

1 UNITED STATES PATENT AND TRADEMARK OFFICE
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD

3
4 TESLA, INC.

5 Petitioner,

6 v.

7 PERCEPTIVE AUTOMATA LLC

8 Patent Owner.
9

10
11 Case No. IPR2025-01573
Patent 10,614,344
12 Case No. IPR2025-01574
Patent 11,126,889
13 Case No. IPR2025-01575
Patent 11,753,046
14 Case No. IPR2025-01576
Patent 11,467,579
15 Case No. IPR2025-01577
Patent 11,520,346
16

17 REMOTE ORAL DEPOSITION OF

18 ELI SABER, Ph.D.

19 August 12, 2026

20 Volume 2
21
22

1
2
3
4
5
6
7 REMOTE ORAL DEPOSITION OF ELI SABER,
8 Ph.D., produced as a witness at the instance of
9 the Petitioner and duly sworn, was taken in the
10 above-styled and numbered cause on the 12th day
11 of August, 2026, from 8:14 a.m. to 1:16 p.m.
12 Central Standard Time, before Laurie Carlisle,
13 Certified Shorthand Reporter in and for the
14 State of Texas, reported by computerized
15 machine shorthand by videoconference.
16
17
18
19
20
21
22

REMOTE APPEARANCES

FOR PETITIONER:

Mr. Mark Speegle
Mr. Ellyar Barazesh
BAKER BOTTS
401 South 1st Street, No. 1300
Austin, Texas 78704
Telephone: 512.322.2536
E-mail: markspeegle@bakerbotts.com

FOR PATENT OWNER:

Mr. Austin Ginnings
NELSON BUMGARDNER CONROY
745 McClintock Drive, Suite 340
Burr Ridge, Illinois 60527
Telephone: 708.675.1975
E-mail: austin@nelbum.com

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22

INDEX

Continued Examination by Mr. Speegle 349

EXHIBITS

Exhibit 20	US Patent Application US2019/0049970 2-14-19	351
Exhibit 21	US Patent Application US2020/0160535 5-21-20	352
Exhibit 22	US Patent Application US 2019/0164018 5-30-19	352

1 MR. SPEEGLE: This is Mark Speegle
2 with Baker Botts, and with me today is
3 Ellyar Barazesh, both representing Tesla.

4 MR. GINNINGS: And Austin Ginnings
5 from Nelson Bumgardner Conroy on behalf of
6 the patent owner.

7 EXAMINATION

8 BY MR. SPEEGLE:

9 Q. Good morning, Dr. Saber.

10 A. Good morning.

11 Q. Dr. Saber, you understand you're still
12 under oath in this deposition?

13 A. I do.

14 Q. And are you still located in your home
15 office today?

16 A. I am.

17 Q. And I'm going to go over some of the
18 same questions from yesterday just to double
19 check. Is there anyone in the room with you
20 today?

21 A. No, sir.

22 Q. Okay. Will you let me know if anyone

1 enters the room during the deposition today?

2 A. I will.

3 Q. And are you on a computer this morning?

4 A. I am, yes. It would be hard to do this
5 on paper and pencil, right?

6 Q. Yes. What windows are visible to you
7 on your computer?

8 A. I just opened the Djuric and Zhu that
9 you sent me. And I have from yesterday open, as
10 you have requested, the '579, the '346 and Ross
11 and Cox, I think.

12 Q. Okay. I assume you also have a Zoom
13 window open, right?

14 A. Yes, of course.

15 Q. But no email or internet browser or
16 anything else?

17 A. No, sir.

18 Q. Will you let me know if any other
19 windows come up on your screen?

20 A. I will do so. None will come up.

21 Q. Sure. And will you let me know if
22 anybody attempts to communicate with you during

1 the deposition today?

2 A. Absolutely.

3 Q. Because you mentioned them before,
4 let's go ahead and mark as Exhibits 20, 21 and
5 22. So did you receive this morning a PDF that
6 begins with a 20 dash file name?

7 A. Yes, sir. I received 20-Djuric and
8 then US patent and a whole bunch of numbers.

9 Q. Let's mark that document beginning with
10 20 dash as Exhibit 20 in the deposition today.

11 (Exhibit 20 marked)

12 Q. And have you seen Exhibit 20 before?

13 A. Yes, I have.

14 Q. And what is Exhibit 20?

15 A. Exhibit 20 is the Djuric prior art
16 that's used in the '579 and the '346.

17 Q. Great. Did you also receive this
18 morning a file beginning with the file name 21
19 dash?

20 A. Yes, sir, I did.

21 MR. SPEEGLE: Let's mark that file
22 as Exhibit 21.

1 (Exhibit 21 marked)

2 Q. Have you seen Exhibit 21 before?

3 A. Yes, I have.

4 Q. Is what Exhibit 21?

5 A. Exhibit 21 is the prior art reference
6 that's abbreviated as AA, because of the large
7 name, that's also used in these proceedings.

8 Q. And did you receive this morning a file
9 beginning with 22 dash?

10 A. Yes, I have.

11 MR. SPEEGLE: And I'll mark that
12 as Exhibit 22.

13 (Exhibit 22 marked)

14 Q. Have you seen Exhibit 22 before?

15 A. Yes, I have.

16 Q. What is Exhibit 22?

17 A. Exhibit 22 is the Zhu prior art
18 reference that's used in these proceedings as
19 well.

20 Q. Thank you.

21 Dr. Saber, is there any reason
22 that you cannot testify fully and accurately

1 today?

2 A. No, sir.

3 Q. All right. Let's turn to your 57 --

4 A. I do -- you asked already and I should
5 mention, I do have the same five binders that
6 counsel sent for this proceeding. Obviously the
7 two have to do with '579 and '346, and they're
8 clean copies.

9 Q. Thank you.

10 Let's turn to your '579
11 declaration, which I believe is Exhibit 4. And
12 let me know when you have that in front of you.

13 A. I'll go ahead and open it. '579
14 declaration. All right. I do have that open,
15 sir.

16 Q. All right. And let's look at
17 paragraph 57 of that declaration.

18 A. Yes, sir.

19 Q. And am I right that paragraph 57 lays
20 out your interpretation of the term "hidden
21 context" as used in the claims of the '579
22 patent?

1 A. Yes, sir.

2 Q. If you don't mind, could you get out
3 your '346 declaration and turn to paragraph 58 of
4 your '346 declaration.

5 A. '346 declaration, paragraph 58. Yes,
6 sir.

7 Q. All right. My question is -- am I
8 right that paragraph 58 of your '346 declaration
9 lays out your interpretation of the term "hidden
10 context" as used in the claims of the '346
11 patent?

12 A. Just one second. It's still opening.
13 All right. I'm at paragraph 58. Yes, sir.

14 Q. So my question is does paragraph 58 lay
15 out your interpretation of the term "hidden
16 context" as used in the claims of the '346
17 patent?

18 A. Yes, sir.

19 Q. Now, am I right that the description of
20 hidden context in these two paragraphs is not
21 identical?

22 A. Are you referring to the "and more" at

1 the end of '346 compared to -- because before
2 that they look like they're identical.

3 Q. For example, there's a parenthetical in
4 the last sentence of the paragraph 57 that's not
5 present in the last sentence of paragraph 58. Is
6 that right?

7 A. That's correct.

8 Q. Now, do you consider that to be a
9 material difference between these two paragraphs?

10 A. Doesn't appear so.

11 Q. Okay. Did you interpret the claim term
12 "hidden context" the same for the '579 patent and
13 the '346 patent?

14 A. According to what's described in the
15 patent, yes. Yes, sir.

16 Q. Okay. Let's focus for the moment on
17 paragraph 57 of the '579 declaration. And I want
18 to ask about the phrase "represents intentions
19 and future plans of a traffic entity." Do you
20 see that phrase in paragraph 57?

21 A. I do.

22 Q. And that's a quote from the '579 patent

1 that you have there, right?

2 A. That is correct. And you have the
3 citation there as well.

4 Q. So what is your understanding of what
5 the phrase "intentions and future plans of a
6 traffic entity" refers to?

7 A. Well, if you go to where that quote --
8 well, I mean, if you -- let me see if I can --

9 If you go to where the quote was
10 lifted from, so I'm on column 14, lines --
11 starting on line 53 because you see the title of
12 that section is "Navigating autonomous vehicle
13 based on hidden context." And obviously that
14 quote is on lines 54 and 55. And then it
15 describes there the hidden context may be used
16 for navigating the autonomous vehicle by
17 adjusting the path. You know, look at the path
18 planning on line 59, predict the hidden context
19 on line 60, and it gives you some examples.
20 Future actions -- like if you look at line 61,
21 you have future actions of pedestrians and
22 cyclists.

1 Q. Okay. Would you agree with me that
2 intentions and future plans of a traffic entity
3 could be described as goals of the traffic
4 entity?

5 MR. GINNINGS: Objection to form.

6 A. It's not really goals. You see it
7 represents the intentions and the future -- so a
8 traffic entity might be a cyclist, a pedestrian.
9 So what is their intention. I mean, are they
10 going to continue to walk -- if it's a cyclist,
11 are they still going to be cycling straight down
12 the road, are they going to turn right or left.
13 So what's their intention and what's the future
14 plan of that particular traffic entity. Because
15 obviously you're trying to make that decision as
16 you're -- as the autonomous vehicle is going by.

17 Q. How is a future intention and a plan
18 different from a goal?

19 MR. GINNINGS: Objection to form
20 and scope.

21 A. Well, I mean, I'm using the language
22 that's used in the patent itself, in the

1 specification, and honestly, that's the language
2 that's described in the specification. The
3 intentions -- so a goal is different from an
4 intention. My goal could be I want to reach, I
5 don't know, the Grand Canyon in five days. My
6 immediate 20-second intention and future plans
7 from the perspective of the autonomous vehicle --
8 I mean, you have to think about this as from the
9 perspective of the autonomous vehicle that's
10 driving down the road. So you have an autonomous
11 vehicle moving down the road. It's got to make
12 decisions on, say, 15 to 20-second time periods.
13 So it has to decide in that time period what are
14 the intentions and future plans of a traffic
15 entity such as a pedestrian or cyclist. Because
16 once it passes that traffic entity, it's no
17 longer relevant. Their goals are no longer
18 relevant.

19 Q. So in the context of self-driving cars,
20 goals and intentions would all be measured in a
21 window of a few seconds?

22 MR. GINNINGS: Objection to form.

1 A. Well, I want to distinguish the word
2 "goal" from the word "intention."

3 The intentions and future plans of
4 a traffic entity is -- you're looking at this
5 from the perspective obviously of an autonomous
6 vehicle that's driving down the road, because you
7 see what it looks like on lines 53 to 55 where
8 that quote obviously is lifted from, you see the
9 vehicle computing system 122.

10 So you have a vehicle, it's got a
11 sensor obviously on it, it's got a computing
12 system, and it's trying to predict hidden context
13 representing intentions and future plans of a
14 traffic entity such as a cyclist or a pedestrian.
15 And it only needs to do that in the amount of
16 time that it's basically in a -- where that
17 traffic entity is in the -- let's call it the
18 window or the perspective of the autonomous
19 vehicle. Because once the vehicle passes it,
20 that traffic entity is no longer technically
21 relevant to the situation.

22 Q. Okay. Would it be fair to characterize

1 a car that wants to turn left as having a goal of
2 turning left?

3 MR. GINNINGS: Objection to form.

4 A. Well, I mean, I don't want to change
5 words with different words because those may be
6 used in different specs or different patents. I
7 want to use the words that exactly are used in
8 the specification. So you're talking about here
9 representing intentions and future plans of a
10 traffic entity in the perspective of what the
11 autonomous vehicle is doing.

12 Q. Okay. Are you saying that you don't
13 know if a goal of a car and an intention of a car
14 could be the same thing?

15 MR. GINNINGS: Objection to form.

16 A. As I explained to you earlier, I mean,
17 the intentions and future plans here of the
18 traffic entity is from the perspective of the --
19 obviously the autonomous vehicle that's driving
20 down the road. The goal of a traffic entity
21 might be in three days I want to reach the Grand
22 Canyon, but that's not relevant to the autonomous

1 vehicle that's driving down the road that may
2 encounter that entity in the next, you know, 15
3 to 20 seconds, let's say.

4 So let's just use the wording
5 that's exactly in the specification.

6 Q. Okay. Do you not understand what the
7 word "goal" means for a traffic entity?

8 MR. GINNINGS: Objection to form.

9 A. I've already explained to you, sir, the
10 word -- why the word "goal" might come across as
11 something different.

12 Q. So sitting here today, you're not able
13 to envision any goal that a traffic entity might
14 have in the window of 15 to 30 seconds?

15 MR. GINNINGS: Objection to form
16 and scope.

17 A. Again, I think you're twisting words
18 around trying to fit basically that round peg in
19 a square hole, so to speak. As I've explained to
20 you, the intentions here and the future plans of
21 the traffic entity are obviously in the
22 perspective of what's happening with the

1 autonomous vehicle.

2 So you have an autonomous vehicle
3 that's driving down the road, it's got to make
4 decisions within a short -- very short period of
5 time. I want to say 15, 20 seconds. I'm using
6 that as an illustration. Maybe it's 25 seconds
7 or maybe it's 10 seconds depending on where --
8 you know, if I'm turning a corner and there's a
9 pedestrian right there, it might be 5 seconds.

10 So it's got to make those
11 decisions within a very short period of time.
12 That's why they use the words "intention" and
13 "future plans" compared to a goal might be --
14 might come across as something maybe in
15 three days that car is going to reach the Grand
16 Canyon. But that's a different story.

17 Q. Okay. And let me turn back to what you
18 say in your declaration here. You say that -- on
19 the second phrase the hidden context "includes
20 factors that affect the behavior of traffic
21 entities" and you list some examples. Is that
22 right?

1 A. Yeah, we're still on the '579
2 declaration, paragraph 57. Is that correct?

3 Q. Correct.

4 A. Yes.

5 Q. Can you explain to me how you're using
6 the word "includes" in this sentence?

7 A. Includes? I don't know what you mean,
8 but it includes factors that affect the behavior
9 of traffic entities.

10 Q. So are you saying that the term "hidden
11 context" is broad enough to encompass those
12 factors as examples of hidden context? Or are
13 you saying that hidden context must always
14 include factors such as those you've listed?

15 A. Well, the hidden context, as used in
16 the '579 patent, represents intentions and future
17 plans of a traffic entity, as I've explained to
18 you in this paragraph, and includes factors that
19 affect the behavior of the traffic entity. And
20 I've given you some examples there. State of
21 mind of a pedestrian and degree of awareness of
22 the existence of the autonomous vehicle in the

1 vicinity, et cetera. So it includes those, but
2 it also may include a cyclist that's going down
3 the road, that it has to also attend to. It
4 might include an oncoming vehicle coming from the
5 other direction. Oncoming traffic.

6 Q. Apologize. I'm not sure I'm
7 understanding.

8 What I'm trying to clarify, just
9 to make sure we're on the same page, is that in
10 terms of claim construction for a patent, the
11 word "includes" can be interpreted a few
12 different ways. And you could be saying here
13 that hidden context must always have factors that
14 affect the behavior of traffic entities, or you
15 could be saying that hidden context in some
16 examples is a factor that affects the behavior of
17 traffic entities. Could you please clarify which
18 of those you're using the word "includes" to mean
19 here?

20 A. I don't understand what you're asking,
21 but as I've explained to you, the hidden context
22 as used in the '579 represents intentions or

1 future plans of a traffic entity.

2 So if my autonomous vehicle sees a
3 pedestrian, a cyclist and oncoming traffic, those
4 are three different traffic entities, so it's
5 going to represent the intentions and future
6 plans of those three traffic entities.

7 So -- and that includes, you know,
8 the behaviors, the state of mind of a pedestrian,
9 or a cyclist. So it includes those factors. But
10 it's broad enough to represent intentions and
11 future plans of a traffic entity.

12 Q. I'm going to try to clarify this again
13 with an example.

14 So if I have something that is
15 allegedly hidden context and it represents
16 intentions and future plans of a traffic entity
17 but it does not include factors that affect the
18 behavior of traffic entities, would that be
19 something you would consider hidden context?

20 MR. GINNINGS: Objection to form.

21 A. I don't understand what you mean. I
22 mean, think of it this way. You have hidden

1 context as defined in the '579 represents
2 intentions and future plans of a traffic entity.
3 Whatever the intentions and future plans are,
4 it's part of that hidden context. Those
5 intentions are, you know, a state of mind,
6 behavior, however those are packaged in a sense,
7 you have intentions and future plans of a traffic
8 entity, obviously, in the grand scheme of the
9 autonomous vehicle driving down the road.

10 Q. I'm apologizing if this is seeming
11 repetitive. I'm genuinely unsure of what you're
12 answering here.

13 Are these two phrases that you've
14 quoted from the '579 patent, are they dual
15 requirements that alleged hidden context must
16 satisfy both of them? Or is it enough to satisfy
17 only the first requirement and the second one is
18 optional after the word "includes"?

19 A. I guess -- I mean, I don't understand
20 what you're asking. Hidden context represents
21 intentions and future plans of a traffic entity.
22 So whatever falls under intentions and future

1 plans of a traffic entity is part of the hidden
2 context.

3 Q. Okay. That's helpful. That actually
4 answers my question. I appreciate you working
5 with me on that.

6 All right. We talked yesterday
7 about the phrase "state of mind." Do you
8 remember that?

9 A. Yes.

10 Q. And I believe, if I'm remembering your
11 testimony correctly, you indicated that state of
12 mind is being used in a specific technical sense
13 according to how a POSITA would read the patents
14 at issue and not necessarily how a person
15 randomly walking down the street might think of
16 the phrase "state of mind."

17 Am I remembering that testimony
18 correctly?

19 A. Well, I mean, we'd have to look at the
20 exact wording, but I mean, obviously it's
21 referring -- when you use the word state -- as I
22 explained to you yesterday, when you use the word

1 "bank," is it a financial institution or is it a
2 snowbank or is it a riverbank.

3 So the context of how the word is
4 used, you know, determines -- you know, adds part
5 of its meaning. So in each specification or each
6 patent, we would have to look at how the wording
7 is used in that particular patent and
8 specification and obviously in the claims.

9 Q. Okay.

10 A. And you read the claims, as I explained
11 to you yesterday, in light of that specification.

12 Q. Just so we can make sure we're talking
13 about the same thing, I think the examples we
14 talked about yesterday were something like an
15 emotion like happy or sad might be a state of
16 mind in ordinary terms people would use outside
17 of the patent. But you did not believe that was
18 a state of mind as used in the context of these
19 patents.

20 Is that a fair characterization of
21 what we discussed yesterday?

22 A. I mean, I don't remember exactly off

1 the top of my head the exact wording, but the
2 point is state of mind would have to be basically
3 as described in that patent and specification.
4 So a different patent may use it slightly
5 differently, you know, so we would have to look
6 at the '579 specification. And obviously if we
7 get into the '346, same thing. And then how is
8 it used in this particular, you know, claim
9 language and specification.

10 Q. Okay. We'll certainly go and look in
11 the '579 for how state of mind is used, but
12 before we do that, would you agree with me that
13 outside of the context of the '579 patent, just
14 in the way people ordinarily use words, state of
15 mind would include something like an emotion such
16 as feeling happy, right?

17 MR. GINNINGS: Objection to form
18 and scope.

19 A. I mean, again, you're asking
20 questions -- hypotheticals in a vacuum, so to
21 speak. I mean, like I said to you, if the word
22 bank, if I just say "bank" and I don't define to

1 you whether it's a financial institution or it's
2 a riverbank or a snowbank, if I just said the
3 word "bank," it could be any one of those three
4 potentially. Or an airplane that's banking, you
5 know, as it's making its turn.

6 So the context defines, in a
7 sense, what a lot of that terminology is. And
8 what I'm -- what I'm providing opinions on or
9 rendering opinions here is with regards to the
10 '579 patent, the specification, and the prior art
11 on how this is utilized, not whether something
12 else could use that wording.

13 Q. So sitting here today, you're not able
14 to tell me whether, outside of the context of the
15 '579 patent, the phrase "state of mind" would
16 encompass something like an emotion?

17 MR. GINNINGS: Objection to form
18 and scope.

19 A. I mean, obviously it's outside -- first
20 of all, it's outside the scope of what we're
21 discussing here. I mean, whether state of mind
22 in some setting could, you know, define an

1 emotion of somebody, I don't know how that would
2 be relevant to what we're talking about here.

3 This is about autonomous driving, and state of
4 mind here is referring to the traffic entities
5 that the autonomous vehicle is encountering in
6 its path.

7 MR. SPEEGLE: Well, I'll object
8 and move to strike as nonresponsive.

9 Q. I was asking if you're able to tell me,
10 whether or not you think it's relevant, that
11 whether outside of the context of the '579
12 patent, the phrase "state of mind" would
13 encompass something like an emotion?

14 MR. GINNINGS: Objection to form
15 and scope.

16 A. I don't know how -- first of all, I
17 don't know how this is relevant to what we're
18 talking about here. We're looking at the '579
19 and obviously the '346. They're about autonomous
20 driving. That's the analysis and the opinions
21 that I've rendered today with regards to those
22 patents and the prior art that was put forth by

1 Tesla.

2 Whether state of mind means
3 something else in some other specification or
4 patent, I would have to look at that to see,
5 okay, what does it mean there, how is it
6 described, what are the details, you know. I
7 don't want to deal in hypotheticals of what
8 things could mean in different contexts. I'm
9 just talking about here the '579 itself and what
10 does it mean in this context and how is it used
11 in this particular context.

12 MR. SPEEGLE: Okay. Again, I'm
13 going to object and move to strike as
14 nonresponsive.

15 Q. I'm seeming like you're giving me a
16 relevancy objection and refusing to answer my
17 question. To try to move things along, I'll tell
18 you why I do think this is relevant.

19 There's been a position taken that
20 the plain and ordinary meaning of the terms is
21 going to be applied for different claims across
22 these five patents. State of mind is one of

1 those terms in the patent, and if we're going to
2 say plain and ordinary meaning, we need to
3 understand what the plain and ordinary meaning is
4 of the state of mind. So that's why I think this
5 question is relevant. I'm going to ask you
6 again, respectfully, if you can tell me in terms
7 of the plain and ordinary meaning and not relying
8 on the actual context of any specific patent,
9 whether the phrase "state of mind" would
10 encompass something like an emotion like feeling
11 happy?

12 MR. GINNINGS: Same objections and
13 argumentative, and counsel is testifying.
14 You want to make comments about relevance,
15 you can take them up with me off the record,
16 Mr. Speegle.

17 A. So as you see in paragraph 57, it
18 states, the first sentence, I've applied the
19 plain and ordinary meaning to a POSITA of all
20 terms in the challenged claims. So it's not
21 whether those terms in a different context could
22 mean something else. What I'm doing here is I'm

1 analyzing the claims, I'm reading, you know, the
2 claims from the lens of a POSITA and applying
3 plain and ordinary meaning unless a construction
4 has been applied. And then I'm looking -- you
5 know, reading that in light of the specification
6 and in the prosecution history, intrinsic,
7 extrinsic evidence, et cetera, and then making a
8 decision, okay, what is the meaning of this claim
9 element or claim language in light of the --
10 reading in light of the specification.

11 That's the assignment that I'm
12 given to do and then render opinions on that. I
13 wasn't asked to say what the state of mind could
14 be in some other scenarios and how could it be
15 used somewhere else. I would have to see what
16 the other scenarios are, how is it being utilized
17 and whether it would make sense or not. But that
18 wasn't the assignment that I was asked to do, and
19 I don't want to render opinions on the fly of
20 whether something could mean something else in a
21 different scenario.

22 Q. Okay. I want to move on from this, so

1 I'm just going to try to summarize that you've
2 said no, sitting here today, based on what you've
3 done, you're not able to tell me one way or the
4 other whether or not outside the context of any
5 specific patents, the phrase "state of mind"
6 would include an emotion like feeling happy.

7 Is that fair?

8 A. No, that's not --

9 MR. GINNINGS: Same objections.
10 Argumentative.

11 Mr. Speegle, you've spent most of
12 this morning arguing with my witness like
13 you did several times yesterday, including
14 having the court reporter having to butt in
15 and keep you from interrupting him many
16 times. I'd ask that you please stop doing
17 that. I'm not going to ask again.

18 A. So, again, Mr. Speegle, as I mentioned
19 to you, words have meaning when they're placed in
20 different contexts. What I -- my assignment here
21 is to read the claims of the '579 in light of the
22 specification, et cetera, and then render

1 opinions on whether the prior art that Tesla has
2 advanced reads on those claims, et cetera, as you
3 see in my declaration.

4 I wasn't asked to render opinions
5 whether the words "state of mind" can mean
6 something else in a different setting. I would
7 have to see how it's utilized in that setting,
8 what is the wording around it, and perform an
9 analysis to do so, and then I can render an
10 opinion. But I'm not going to render an opinion
11 today on the fly on a hypothetical question that
12 has -- I have no idea what the constraints of
13 that question are and what setting it's in just
14 to meet some, you know, perspective somewhere.

15 That wasn't what I was asked to
16 do. And none of those opinions are in that
17 declaration about whether it could mean something
18 else in a different setting. I'm only talking
19 about the '579 here and the prior art that Tesla
20 has advanced.

21 MR. SPEEGLE: Austin, please try
22 to keep your objections to form and scope

1 and we can preserve this on the record as
2 needed.

3 Q. Dr. Saber, you understand that Tesla
4 has alleged that Cox's disclosures regarding
5 determining emotions of subject matters satisfy
6 the state of mind terms in the various challenged
7 claims, right?

8 A. I think we discussed a little bit of
9 that yesterday with regards to Cox. I don't
10 remember exactly the wording of my testimony, but
11 we discussed some of that yesterday.

12 Q. And you haven't considered whether an
13 emotion would count as a state of mind in the
14 plain and ordinary sense of the words "state of
15 mind," disconnected from the descriptions within
16 each of the five challenged patents, right?

17 MR. GINNINGS: Objection, form.

18 A. I'm not sure I understand your
19 question, but as we discussed yesterday with
20 regards to Cox, you know, Cox is about face/no
21 face type identification, as we have discussed,
22 and the technical descriptions in Cox relate to

1 that particular application.

2 And you have my analysis here with
3 regards to whether it reads on these claims --
4 claim elements.

5 MR. SPEEGLE: Objection. Move to
6 strike as nonresponsive.

7 Q. Let's look at dependent claim 7 of the
8 '579 claim. Can you let me know when you have
9 that in front of you?

10 A. Dependent claim 7.

11 Yes, sir.

12 Q. Can you read dependent claim 7 in the
13 '579 patent for me?

14 A. Of course. "The method of claim 1
15 wherein the hidden context represents the state
16 of mind of a user represented by the traffic
17 entity."

18 Q. And can you tell me what construction
19 for state of mind of a user you used when
20 analyzing dependent claim 7 of the '579 patent?

21 MR. GINNINGS: Objection to form
22 and scope.

1 A. I don't believe I rendered any opinions
2 on claim 7 in my declaration. Is there something
3 in my declaration that you're referring to?

4 Q. You understand claim 7 was subject to
5 the '579 IPR, right?

6 A. Yes.

7 Q. And you understand that as a dependent
8 claim, claim 7 informs the scope of claim 1,
9 right?

10 MR. GINNINGS: Objection, form.

11 A. Well, as you see in my declaration, I
12 have analyzed claim 1, and I've rendered opinions
13 on claim 1 with regards to the 1[a-iii] and 1[c]
14 and 1[d] in the corresponding 13 and 20 claims,
15 which are the independent claims in this
16 particular proceeding.

17 Q. Is it accurate to say you did not
18 consider the scope of claim 7 when rendering your
19 opinions on the '579 patent?

20 MR. GINNINGS: Objection to form.

21 A. I did not render any opinions with
22 regards to claim 7 in this proceeding.

1 Q. I asked a slightly different question.
2 I asked did you consider the scope of claim 7
3 when rendering your opinions about the '579
4 patent. Can you tell me whether you considered
5 the scope of claim 7?

6 A. As I mentioned to you I think
7 yesterday -- but I'll mention it again today for
8 the record.

9 So when I read the patent, I read
10 the entire patent. The claims, the
11 specification, you know, the prosecution history,
12 et cetera. So I've considered the entire --
13 entire entirety of the '579, but I've only
14 rendered opinions on the independent claims and
15 those elements of the independent claims. I
16 haven't rendered any opinions on the other ones,
17 and I wouldn't be able to do that today in the --
18 in a deposition. I would need some time to
19 consider that and analyze it.

20 Q. Okay. So sitting here today, you're
21 not able to testify about the scope of claim 7?

22 MR. GINNINGS: Objection to form.

1 A. As I said to you, I didn't render any
2 opinions in my declaration with regards to
3 claim 7, and I'm not going to render opinions on
4 the record on the fly without having to do a
5 proper analysis.

6 Q. Okay. So you -- sitting here today,
7 you can't testify about the meaning of state of
8 mind as used in claim 7 of the '579 patent?

9 MR. GINNINGS: Objection to form.

10 A. I believe I already answered that
11 question for you, but I'm happy to answer it
12 again. So in my declaration, I did not render
13 any opinions on claim 7, unless you happen to see
14 something there that I don't see. I did not
15 render any opinions on claim 7. I only rendered
16 opinions on the independent claims. And I'm not
17 going to render opinions on the fly in a
18 deposition about dependent claims at this time.

19 Mr. Speegle, do you think this
20 would be a good time for a five-minute break, or
21 would that interrupt your process?

22 Q. We can take a break now. That's fine.

1 A. Let's do a five-minute. It's 9:56.

2 How about I'm in my desk 10:01, 10:02?

3 Q. That works for me.

4 MR. SPEEGLE: Good with you,
5 Austin?

6 MR. GINNINGS: Yes.

7 (Recess taken)

8 MR. SPEEGLE: Back on the record
9 at 9:02.

10 BY MR. SPEEGLE:

11 Q. Dr. Saber, at the beginning of our
12 conversation today, I asked you about whether
13 hidden context could be a goal that the user is
14 trying to accomplish. Do you remember that?

15 A. Yes, sir. And I believe I addressed
16 that at that time.

17 Q. Is it fair to say that you did not
18 think hidden context would be a goal of a user?

19 A. As I explained to you earlier today
20 when we were discussing this is, if you look at
21 paragraph 67 of my declaration, it's talking
22 about hidden context obviously of applied plain

1 ordinary meaning in the lens of a POSITA. And
2 when you look at the '579, that represents
3 intentions and future plans of a traffic entity.
4 And I described to you why goal could be
5 misinterpreted.

6 Q. Can you go up to paragraph 54 in your
7 '579 declaration?

8 A. Absolutely.

9 Q. This is a long paragraph, and the part
10 I'm going to direct you to is actually on
11 page 23.

12 A. Let me take a moment and just read the
13 paragraph. Where are you planning to direct my
14 attention?

15 Q. It's the first full sentence on page 23
16 that says, "Hidden context in an image can be,
17 for example..."

18 A. Okay. And what is your question?

19 Q. One of the examples of hidden context
20 that you provide in paragraph 54 is a goal of a
21 user, right?

22 MR. GINNINGS: Objection to form.

1 A. And you see after that where it says,
2 "... and wherein the user expects to achieve the
3 goal within a threshold time interval"?

4 Q. I'm sorry. I didn't want to cut you
5 off. Are you done with your answer?

6 A. Give me one moment. Let me read the
7 paragraph for a second. Okay. So what's your
8 question again? Or I believe I answered that
9 question, but I'm happy to answer another one.

10 Q. My question was one of the examples of
11 hidden context that you provide in paragraph 54
12 is a goal of the user, right?

13 A. And as I mentioned to you in my
14 previous answer, it's not just a goal of the
15 user. That's why misinterpretation can take
16 place. It's where the user expects to achieve
17 the goal within a threshold time interval. So,
18 again, you'll have to look at the overall
19 understanding here that we're talking about
20 autonomous vehicles driving down the road. So
21 it's not just in a vacuum. And as an autonomous
22 vehicle is driving down the road, there's a

1 certain threshold time interval where decisions
2 have to be made. So that's why I like the -- the
3 previous phrasing of intentions, et cetera.

4 Q. Do you think it's erroneous for the
5 '579 patent to refer to a goal of the user?

6 MR. GINNINGS: Objection to form.

7 A. Well, you have to specify -- I mean, as
8 you see here, it's the goal within a threshold
9 time interval. It's not just the open-ended
10 goal. It's you have a goal within a threshold
11 time interval because, as you understand, the
12 traffic entity is within the time interval of the
13 autonomous driving car of a few seconds, right?
14 The car is coming up, sees the cyclist on the
15 right; maybe within 10 seconds or so it's going
16 to pass that cyclist, and then that traffic
17 entity is no longer relevant.

18 So that's why you're looking at
19 it -- you know, a goal within threshold time
20 interval, a near-term type situation, not just an
21 open-ended discussion.

22 Q. You don't specify in your '579

1 declaration how long the threshold time interval
2 has to be, right?

3 A. Well, I didn't specify it there in that
4 paragraph, but it's obviously, when you read
5 the -- you know, the claims and the
6 specification, we're talking about -- you know,
7 it's within the scope of the autonomous vehicle
8 driving down the road, not five days later.

9 Q. The '579 patent doesn't actually say
10 how long the threshold time interval is, does it?

11 A. It might mention a few seconds here and
12 there.

13 Q. Let's try to make this efficient. Do
14 you have a copy of the '579 patent that's been
15 marked as Exhibit 9?

16 A. I do, sir.

17 Q. And is that copy of the '579 patent
18 text searchable?

19 A. Yes, sir.

20 Q. And can you search for the phrase
21 "threshold time"?

22 A. Yes, sir.

1 Q. How many results did you get searching
2 for the phrase "threshold time" in the '579
3 patent?

4 A. Hang on one second. Looks like three
5 hits.

6 Q. And would you agree with me that two of
7 those hits are in column 3 and the third hit is
8 in dependent claim 10?

9 A. Yes.

10 Q. Okay. So the only place in the '579
11 patent where threshold time is discussed is
12 column 3, lines 3 through 9? Is that right?

13 A. Hang on one second. So those are the
14 three hits that we talked about were threshold
15 time, where when you do a search on threshold
16 time, that's what you find.

17 Q. The one paragraph that uses the phrase
18 "threshold time" in the '579 patent specification
19 does not specify the duration of the threshold
20 time interval, right?

21 A. Well, I mean if you -- you have to also
22 read the context of the paragraph that you're

1 talking about. It's not just the single wording.
2 So if you look at column 2 starting at line 64
3 all the way to column 3, line 15 -- so that's
4 where the two hits of threshold time show up,
5 obviously. So it's talking about the hidden
6 context may represent a goal of a user
7 represented by the traffic entity where the user
8 expects to achieve the goal within the threshold
9 time interval. And then it says -- it gives you
10 an example of the hidden context may represent
11 the near-term goal of a person represented by the
12 traffic entity, for example, indicating a person
13 is likely to cross the street, et cetera.

14 So you're obviously looking at
15 this as a POSITA reading the claims in the
16 specification. It's within the -- you know, the
17 subject or the purview of autonomous driving and
18 that type of situation. So that threshold time
19 has to be relevant to the autonomous driving
20 conditions that you would expect to be seeing.
21 It wouldn't be, for instance, three days later.
22 It wouldn't make any sense.

1 So you have to read that with the
2 context of what is being described.

3 Q. Okay. I think I understand what you're
4 saying, but let me say it back to you to make
5 sure I'm following you, that a POSITA reading the
6 paragraph beginning at column 2, line 64 through
7 column 3, line 15 would understand that threshold
8 time interval refers to a period relevant for
9 autonomous driving, even though that paragraph
10 does not provide any specific description for
11 what a threshold time interval would be. Is that
12 right?

13 MR. GINNINGS: Objection, form.

14 A. You've missed a couple of things.
15 You're close but not right.

16 So a POSITA reads not just that
17 paragraph. A POSITA is reading the entire '579,
18 right? He's reading -- a POSITA is reading the
19 claims, he's reading the specification, the
20 entire specification. So this specification is
21 about describing, obviously, autonomous driving.
22 It's not about describing something else, right?

1 So, you know, if you look at the title it says,
2 "probabilistic neural network for predicting
3 hidden context of traffic entities for autonomous
4 vehicles," right?

5 In the technical field, if you
6 look at the technical field on column 1, you see
7 it's talking about traffic entities for
8 autonomous vehicles. It's not -- so that's the
9 context of what is being described here, and it's
10 within the purview of autonomous vehicles. So a
11 POSITA is going to read the entire '579, not just
12 that part. And if you were to ask a POSITA,
13 well, what does the time threshold interval mean,
14 it's not going to be, well, this could be
15 three days because that wouldn't make any sense
16 in an autonomous driving situation.

17 So it has to be within, you know,
18 reasonable autonomous driving conditions.

19 Q. Okay. I think I understand what you're
20 correcting me on. Let me try again, see if I can
21 say it right this time.

22 A POSITA reading the '579 patent

1 as a whole would understand that the references
2 to a threshold time interval refer to the
3 relevant time for an autonomous driving
4 application, even though the '579 patent as a
5 whole does not provide a specific numerical or
6 range of what the threshold time interval would
7 actually be. Is that right?

8 A. Close enough, yes. I mean, yeah, a
9 POSITA reading this would understand. You don't
10 need to specify it's 3 seconds or 5 seconds.
11 It's within the context and the scope of
12 autonomous driving, not -- it wouldn't make sense
13 to be five minutes later.

14 Q. Let's turn to paragraph 69 of your '579
15 declaration.

16 A. Paragraph 69.

17 Q. Yes.

18 A. Okay.

19 Q. I want to ask you about the last
20 sentence in paragraph 69, which says, "As such,
21 in my opinion, the plain and ordinary meaning of
22 'hidden context' encompasses information that is

1 not directly observable from an image."

2 Is that right?

3 A. You read that correctly.

4 Q. When you say "hidden context
5 encompasses information that is not directly
6 observable from an image," are you saying that
7 the hidden context must include information that
8 is not directly observable from an image?

9 A. It encompasses information that's not
10 directly observable from an image. That's what
11 I'm saying.

12 Q. Okay. I'm trying to clarify --

13 A. I don't want to change the wording to
14 some other wording. It encompasses information
15 that is not directly observable from the image.

16 Q. Trying to understand what you mean.
17 I'm just trying to understand what you mean by the
18 word "encompasses." Can you explain that a
19 little more?

20 A. Includes, contains. Encompasses
21 information that's not directly observable from
22 the image.

1 Q. Are you saying that hidden context --
2 well, let me strike that.

3 Are you saying that something only
4 qualifies as hidden context if it includes
5 information that is not directly observable from
6 an image?

7 A. I think, again, you're twisting things
8 around here a bit. So if we look at paragraph 69
9 as a whole, you see it says the term "hidden
10 context" does not require any construction, and
11 then we apply plain and ordinary meaning.
12 I think we've talked about this already.

13 Then based on my review of the
14 '579 spec, the term "hidden context," as we
15 discussed already, represents intentions and
16 future plans of a traffic entity, and I gave you
17 the citation to the specification and includes
18 factors that affect the behavior of a traffic
19 entity, et cetera.

20 So it encompasses information
21 that's not directly observable from an image.
22 Because I can observe -- if you show me an image,

1 I can observe a pedestrian and I can observe a
2 cyclist and I can observe road furniture, but I
3 can't observe in the image, visually see
4 directly, whether I think the cyclist is going to
5 turn right or turn left. So it encompasses
6 information that's not directly observable from
7 the image, and that's why it talks about
8 intentions and future plans of a traffic entity.

9 Q. Am I understanding right that if
10 something is alleged to be hidden context but it
11 does not involve information that is not directly
12 observable from an image, you do not think it
13 would qualify as hidden context?

14 A. I don't understand your question.
15 I think that sentence is very clear. It
16 encompasses information that is not directly
17 observable from the image.

18 Q. The sentence is ambiguous as to whether
19 you're saying hidden context can include
20 information that is not directly observable from
21 an image or must include information that is not
22 directly observable from an image. I'm trying to

1 see if you can clarify for me. Can you tell me
2 if you mean can include or must include?

3 MR. GINNINGS: Objection,
4 argumentative.

5 A. I think the best way I can describe it
6 is it encompasses information -- excuse me. The
7 best way I can describe it to you is it
8 encompasses information that is not directly
9 observable from the image. So it includes,
10 contains, information that is not directly
11 observable from an image. Because, I mean, think
12 about the application here that's -- you know,
13 the claims are trying to target.

14 So you can't tell me whether it
15 means can include or must include?

16 MR. GINNINGS: Objection, form.

17 A. I think encompasses is the better usage
18 of the wording. I don't want to use can or must
19 because that changes the scenarios. It
20 encompasses information that's not directly
21 observable from an image. I think it's very
22 clear. Contains information that's not directly

1 observable from an image.

2 Q. What does it mean, in your
3 understanding, for a patent term to encompass
4 something?

5 MR. GINNINGS: Objection to form
6 and scope.

7 A. I think I've explained this to you
8 already, but I'm happy to explain it again.
9 Obviously the term "hidden context" is part of
10 the claim that we're discussing, independent
11 claims here. And as we defined it to you
12 earlier, based on this '579 spec, intentions and
13 future plans of a traffic entity. So those
14 intentions and future plans of a traffic entity
15 are not observable in the image, right? Because
16 when I show you a frame of video, you don't know
17 whether the cyclist is going to make a U-turn in
18 the next 3 seconds or 2 seconds. You just see
19 the cyclist there. Or if a person is standing at
20 the beginning of a crosswalk, you don't know
21 whether they're going to start down the crosswalk
22 or just stay there for the next 3 seconds. You

1 can't tell that from the image that I showed.

2 So the hidden context encompasses
3 information that's not directly observable from
4 that image.

5 Q. What if your image is a pedestrian
6 who's already got one foot off the curb and
7 hovering over the crosswalk? Couldn't you infer
8 from that that the pedestrian intends to cross
9 the crosswalk?

10 MR. GINNINGS: Objection to form.

11 A. Well, again, obviously you would be --
12 you would have a higher probability of inferring,
13 but they may step back. They may step forward
14 one step and then decide, oh, the car is coming
15 too fast and step back. Or the car is not
16 slowing down and step back. So that's why, you
17 know, we say to you a hidden context is the
18 intentions or future plans. And that encompasses
19 that information that's not directly observable
20 from an image.

21 Q. Okay.

22 A. What you see from the image doesn't

1 tell you what is the intentions or future plans
2 of a traffic entity.

3 Q. So your understanding of hidden context
4 does require information that is not directly
5 observable from an image, right?

6 A. It encompasses information that's not
7 directly observable from an image. I think it's
8 very clear. Includes, contains.

9 Q. When you say "includes, contains," are
10 you saying it always contains or it can contain?

11 MR. GINNINGS: Objection to form.

12 A. I'm not understanding what you're
13 asking. I mean, I think you're trying to perhaps
14 change the scope here a bit. I think it seems
15 very clear to me. The plain ordinary meaning of
16 hidden context encompasses -- includes
17 information that's not directly observable from
18 an image. It's pretty clear. I don't understand
19 what else you're looking for here.

20 Q. I'm trying to understand if the
21 encompassing is mandatory or optional.

22 MR. GINNINGS: Objection, form.

1 A. It encompasses information that's not
2 directly observable from an image. It
3 encompasses that information. I mean, I don't
4 know what else to tell you.

5 Q. Okay. I understand.

6 So when we talked about the
7 example of a pedestrian with their foot off the
8 curb, I believe you suggested there would be a
9 higher degree of probability on a prediction, but
10 it still wouldn't be hidden context. Is that a
11 fair recollection of what your testimony was?

12 A. I think you suggested that example; I
13 didn't, where you said off the curb or whatever.

14 The point is, think about the
15 application here. The autonomous vehicle is
16 driving down the road. It's capturing sensor
17 data. Let's just say sensor is the camera for
18 purpose of the example here. That camera is
19 capturing a picture of a pedestrian, and let's
20 say that pedestrian has one foot that's stepped
21 off the curb. You don't know whether they are
22 stepping off the curb and the next second they

1 are going to look at the car and say it's coming
2 too fast, I'm going to step back. Or they are
3 going to continue going down the crosswalk
4 assuming the car is going to stop because you're
5 supposed to yield for pedestrians in the
6 crosswalk.

7 So that hidden context isn't
8 observable directly from that image. You might
9 have to, you know, put some probabilities on
10 things, but it's not directly observable.

11 Q. Where is the hidden context derived
12 from in the '579 patent?

13 A. Intentions and future plans of the
14 traffic entity, which in this case would be the
15 pedestrian.

16 Q. How does the model predict intentions
17 and future plans of users?

18 A. I mean, that's described in the '579.

19 Q. Can you tell me where?

20 A. Yeah, we have to look at -- for
21 instance, if you look at Figure 2, you see where
22 it has, you know, feature extractions and then

1 prediction components.

2 Q. Okay. So we can talk about that part
3 of Figure 2. That's element 125 in Figure 2 that
4 you're talking about?

5 A. Hang on one second as well. So if you
6 go to -- hang on a second. I'm going to bring
7 the second copy up so I can see the figure at the
8 same time. So if you look at Figure 2 and the
9 description of Figure 2 in the specification
10 starting on column 5, line 47.

11 Q. Okay.

12 A. I mean, you see it's a big description
13 there. It goes on and on, but it starts to
14 describe obviously the neural network. It refers
15 to 120 as "a deep neural network comprising a
16 plurality of layers of nodes," et cetera. And it
17 goes on to the next, obviously, column and
18 continues.

19 Q. Let me focus you on the neural network
20 120 that's identified in Figure 2. Is that the
21 neural network that's going to predict hidden
22 context, in your understanding?

1 MR. GINNINGS: Objection, form and
2 scope.

3 A. I mean, if you look, for instance, at
4 column 6, let's say lines 4 through 6, see it
5 says, "The neural network is a multi-task neural
6 network configured to predict the plurality of
7 output values representing different hidden
8 context attributes."

9 Q. Thank you. And so the neural network
10 120 is what predicts the hidden context in the
11 '579 patent, right?

12 MR. GINNINGS: Objection to form.

13 A. If you see on that same column, lines
14 35 to, say, 38 or 39, you see it talks more about
15 that "neural network 120 comprises components
16 including a feature extraction component [which
17 is labeled] 125 and plurality of prediction
18 components 130a, b, and c. Each prediction
19 component 130" -- it's referring to obviously
20 130a, b and c -- "predicts values for a
21 particular hidden context attribute." And it
22 gives you an example after that.

1 Q. Okay. And those components 130a, b and
2 c are part of neural network 120, right?

3 A. That is correct.

4 Q. And so the neural network 120 is what's
5 predicting hidden context, right?

6 A. Yeah. I mean, it's utilized to predict
7 obviously hidden context and provide proper
8 values.

9 Q. Thank you. And neural network 120 is
10 trained on input 123, right?

11 A. Well, it's going to receive -- if you
12 go back to column 5, it's going to receive --
13 excuse me for a minute. The neural network 120
14 receives an encoding of an image for video as
15 input 123. So that's the input to the neural
16 network.

17 So obviously it's been trained
18 already in this case. It's just operating now.

19 Q. And if I'm reading lines 65 through 67
20 of column 5, it says: "The input 123 comprises
21 stored images or videos provided as training data
22 during a training phase of the neural network

1 120." Right?

2 A. Yes. I mean, you obviously train it,
3 so there's a training process. And then you
4 utilize it to do the work.

5 Q. Yeah. So the network that is going to
6 predict hidden context in the '579 patent is
7 trained on images or videos, right?

8 A. Correct. And then you see in column 6
9 first line, "Once the network is trained, the
10 neural network may be deployed in a vehicle, for
11 example, an autonomous vehicle." So once you've
12 done the training, you now deploy it in a vehicle
13 and it starts to function.

14 Q. If the neural network that is
15 predicting hidden context is trained on images
16 and videos, doesn't it mean that hidden context
17 must be derived from images and videos?

18 A. Well, I mean -- you know, we've been
19 talking about this, and we talked about it
20 yesterday. It's obviously -- in this case, it's
21 probabilistic. Like if you look at the claims --
22 so you're training a probabilistic neural

1 network. If you look at the claim and the way
2 the claim is structured, so -- so let's look at
3 claim 1 for a second. So it's a method claim, as
4 you see, you're training a probabilistic neural
5 network. The probabilistic neural network is
6 configured to perform steps comprising -- and you
7 have [a-i], [a-ii], and [a-iii]. So three
8 different steps. It's receiving an input as
9 input and image of traffic. The image displaying
10 the traffic entity. So this is your images or
11 videos in this particular case that we're talking
12 about. You're generating a feature vector for
13 the plurality of features and that feature vector
14 comprising values describing statistical
15 distribution for each feature. So it's
16 providing -- you know, it's providing
17 distribution that we talked about yesterday.

18 And then you generate output
19 representing hidden context for the traffic
20 entity, and that is comprising plurality of
21 values and each value representing a likelihood
22 of receiving a particular user response from a

1 user presented with the image.

2 So you have that also as part of
3 the training of the probabilistic neural network.
4 So you have that as well.

5 So you have three pieces, right?
6 You're receiving, you're generating and you're
7 generating, and all those pieces are used in
8 training 1A. And then you go to 1B, 1C, 1D and
9 1E.

10 MR. SPEEGLE: I'm going to object
11 and move to strike as nonresponsive.

12 Q. And I would like to focus specifically
13 on the example in the specification we were
14 discussing regarding neural network 120.

15 Could you please let me know if
16 the neural network 120, which is trained on
17 images and data and is predicting hidden context
18 must be using images and video data to derive
19 hidden context, right?

20 MR. GINNINGS: Objection to form.

21 A. I think you're misinterpreting the '579
22 and perhaps trying to minimize its effect.

1 So if you look, for instance, at
2 column 5, look at lines 9 to 13 or so. You see
3 where it says, "The model training system 112 can
4 be implemented in any type of computing system.
5 In one embodiment, the system 112 "-- and this is
6 referring to Figure 1 -- "receives the image,
7 video and/or text information and accompany or
8 linked user responses from the database 110 over
9 the network 104."

10 So if you look at Figure 1, you
11 see you have basically a user response database
12 that's also available to you. So it's not just
13 the images and video.

14 Q. Okay. And --

15 A. I think you're misinterpreting the
16 '579, and that's what I tried to point out in the
17 claim that we discussed on claim 1. You have
18 those three steps of [a-i], [a-ii], and [a-iii]
19 that have to be accomplished to perform the
20 training.

21 Q. The '579 patent does not say that the
22 neural network 120 in Figure 2 is trained using

1 the model training system 112, does it?

2 A. Well, I mean, it's part of the training
3 of what you're talking about here in claim 1. I
4 mean, the training of the probabilistic neural
5 network. I mean, you may have a smaller network
6 that's doing something, but the training of the
7 probabilistic neural network that we're talking
8 about here in claim 1 contains not just -- has
9 available to it not just the images and the video
10 but also the user responses that we've been
11 talking about.

12 MR. SPEEGLE: Objection, move to
13 strike as nonresponsive.

14 Q. I'm asking specifically about the
15 neural network 120 in Figure 2 of the '579
16 patent. I'm going to ask you again, the neural
17 network 120 in the '579 patent is not trained
18 using the model training system 112 according to
19 the '579 patent, right?

20 MR. GINNINGS: Objection to form.

21 A. I think you're misunderstanding. So if
22 you start reading column 5 starting at lines 47,

1 the description of Figure 2, and you go into
2 column 7, which obviously continues the
3 description, and you search on user responses --
4 like, for instance, you look at column 7, lines 4
5 "...the system requests user responses from users
6 observing images of traffic entities..." And
7 obviously they have that. And if you continue on
8 and look below on that same column starting at
9 lines 37, you see "the system trains the
10 probabilistic neural network using stochastic
11 variational inference techniques." And it
12 discusses that. And if you look at lines 47 or
13 so, "The system performs back propagation to
14 optimize the evidence..." et cetera "...using
15 images from the training data set and the actual
16 values determined from the user responses
17 obtained in response to observing images from the
18 training data set."

19 So I think you're mistaken
20 thinking that the probabilistic neural network
21 that's claimed in claim 1 has available to it
22 images, videos and user responses.

1 MR. SPEEGLE: Objection. Move to
2 strike as nonresponsive.

3 Q. I'm asking specifically, Dr. Saber,
4 about the neural network 120 and the training --
5 model training system 112 in the '579 patent.
6 I'd like you to please answer my question with
7 respect to those two specific features in the
8 '579 patent.

9 Isn't it right that the neural
10 network 120 in the '579 patent is not trained
11 using the model training system 112, right?

12 MR. GINNINGS: Same objections.
13 And argumentative.

14 A. And, again, as I've explained to you,
15 if you look at Figure 1, you see where it says
16 model training system 112? And you see where it
17 says neural network 120, which is a box in that
18 Figure 1? Do you see that, sir? Sir?

19 Q. I'm with you.

20 A. Okay. And do you see the connections,
21 the arrows are going back and forth to the 104
22 network and the double-sided arrows into the

1 user's response database and the double-sided
2 arrows into the flying device, et cetera?

3 So why would you say that the
4 model training system has no -- doesn't have
5 availability of that data?

6 Q. Can you point me to anything in the
7 text of the specification of the '579 patent that
8 says the neural network 120 is trained using the
9 model training system 112?

10 MR. GINNINGS: Objection to form.

11 A. I think I pointed you to several
12 things. For instance, if you look at column 5,
13 line 56, the embodiment of the neural network 120
14 is a probabilistic neural network. Right? And
15 if you go to the claim, it talks about the
16 probabilistic neural network and [a-i], [a-ii]
17 and [a-iii] are what takes place for it to be
18 trained. So it's not just -- it's just -- what
19 you're seeing in Figure 2 is just basically an
20 illustration here that's focused most on the
21 imagery, but that doesn't mean the neural network
22 doesn't have access to the user response

1 database. I think you're misinterpreting
2 Figure 1.

3 Q. Okay. Let's talk more about the user
4 response database. You were pointing at a
5 paragraph beginning in column 7, line 4. Is that
6 right?

7 A. Well, I pointed to several things. I
8 don't remember off the top of my head. But if
9 you look, for instance, at column 5, it talks
10 about first -- lines 4 through 7 or so talks
11 about the user response database, and it talks
12 about storing the image, video and text
13 information and associated user responses, and
14 subsequently they're calling them a response to a
15 query.

16 So just because you see the images
17 going into the network on Figure 2 123, those
18 images have associated user responses.

19 Q. Okay. And column 7, lines 4 through 6
20 describes how those user responses are obtained,
21 right?

22 A. Yes. Well, yes.

1 Q. And those user responses are obtained
2 from users observing images of traffic entities,
3 right?

4 MR. GINNINGS: Objection to form.

5 A. Well, it describes there but, you know,
6 the system requests user responses from users
7 observing images of traffic entities, as it says.

8 Q. So the users are deriving their
9 responses from the images?

10 MR. GINNINGS: Same objections.

11 A. They're observing images of traffic
12 entities.

13 Q. So even if the user responses are also
14 used to train the neural network that predicts
15 hidden context, those user responses are still
16 based on the images, right?

17 MR. GINNINGS: Objection to form.

18 A. So I think you're perhaps minimizing or
19 I want to say fumbling here in terms of the
20 description.

21 So the user responses from users
22 observing images of traffic entities -- so

1 they're observing images of traffic entities, and
2 they're providing the responses to those
3 entities. But those responses obviously, if you
4 look later on in that column 7, like lines 11 or
5 so, you see the user response indicates what the
6 user believes is the value of the hidden context
7 attribute, for example, on a scale of 1 to 5, how
8 likely the user believes a pedestrian was likely
9 to cross the street or a bicyclist is aware of
10 the vehicle, et cetera. So essentially the idea
11 here is just like if you were driving down the
12 road and you're making a decision, you see a
13 traffic entity and you make decisions about it.

14 Q. The users described in column 7 don't
15 have any information besides the image, right?

16 A. I don't know what you mean by "don't
17 have any information." User responses -- users
18 are observing images of traffic entities, so
19 you're looking at frames of videos of, you know,
20 traffic entities, and you're providing responses
21 based on that.

22 Q. Look at paragraph 72 of your

1 declaration. This is your '579 declaration.

2 A. '579, paragraph 72. Yes, sir.

3 Q. So you say here that "The goal-based
4 prediction of Djuric is fundamentally different
5 from the 'hidden context' as disclosed in the
6 '579 patent." Is that right?

7 A. You read that correctly.

8 Q. And then you go on to say that -- this
9 is the last sentence of the paragraph. "The '579
10 patent focuses on the nature of people to behave
11 in ways that are typically unpredictable by
12 conventional systems, whereas Djuric focuses on
13 movement in 'common patterns' that was recognized
14 by the prior art systems."

15 Do you see that?

16 A. You read that correctly.

17 Q. When we talked about the way that the
18 neural network in the '579 patent is trained,
19 there was nothing in that discussion about
20 training the neural network in the '579 patent
21 that focused on typically unpredictable behavior,
22 right?

1 A. I think you're misunderstanding the
2 '579. You see, you, the user -- as looking at
3 the images. You, the user, have an understanding
4 of autonomous -- or driving conditions. So your
5 response when you're responding -- when you're
6 looking at traffic entities and making responses,
7 you're responding to that hidden context. Your
8 knowledge of driving and what a vehicle would do
9 as if you're sitting, let's say, in a vehicle
10 yourself and driving.

11 Q. Would you agree with me that the '579
12 patent never discusses unpredictable behavior?

13 MR. GINNINGS: Objection to form.

14 A. Well, I mean, obviously, as we've been
15 discussing, the '579 talks about hidden context
16 and, you know, intentions and future plans,
17 right? And we've been talking about this for a
18 while now. And there are several citations to
19 that that I showed you.

20 Q. Okay. Let me ask it this way. The
21 copy of the '579 patent that you have as
22 Exhibit 9 is text searchable, right?

1 A. Yes.

2 Q. Would you agree with me that the word
3 "unpredictable" does not show up in the '579
4 patent?

5 A. I'm assuming you searched it.

6 Q. Please confirm for yourself.

7 A. Yeah, the word "unpredictable"
8 doesn't -- when I do a text search, it doesn't
9 pop up.

10 Q. And can you also search for the word
11 "conventional" in the '579 patent?

12 A. So it looks like I have one hit. Did I
13 read that correctly?

14 Q. Okay. And is that one hit on column 1,
15 lines 38-39?

16 A. That appears to be the case.

17 Q. And can you read the sentence on column
18 1, lines 38-39 that includes the reference to
19 conventional in the '579 patent?

20 A. So the '579 patent column 1, lines
21 38-39 state, "Conventional systems predict motion
22 of non-stationary objects using kinematics."

1 Q. What does kinematics mean to you?

2 A. Motion estimation. Motion. It's
3 all -- that's typically what conventional systems
4 do. Like I'm looking at a video, I see a car,
5 and as I look at video frames that are captured
6 at 30 frames a second, I see the car moving from
7 frame to frame to frame. I can then predict the
8 velocity, the acceleration if you have enough
9 frames, and the movement of the vehicle, and I
10 can say, okay, this vehicle appears to be moving
11 at X kilometers per hour or whatever.

12 Q. How is that different from goal-based
13 predictions?

14 A. Well, I mean, you would have to look
15 and say, okay, what is the goal-based prediction
16 describing. If I look at Djuric, you know,
17 Djuric -- let me open a copy of Djuric here.
18 Give me one moment. Actually, before I answer
19 this, can we do a quick break?

20 Q. Let's answer this question, and then
21 we'll take a break.

22 A. All right.

1 So I'm looking at a copy of Djuric
2 in front of me. Djuric is about, obviously,
3 object motion prediction and autonomous vehicle
4 control. So Djuric -- I mean, I'm simplifying
5 here, but Djuric essentially is using state data.
6 When you think of state data, that's essentially
7 what I just told you about, looking at frames of
8 images and looking at the motion of potential
9 objects. And geographic data, which is
10 essentially a physical layout of the location,
11 and trying to predict where the object is going
12 to be, you know, in the next X seconds or so.

13 So that's based on, you know,
14 state data of the object, not -- it has nothing
15 to do with hidden context as described in the
16 '579.

17 Q. Okay. I understand you've asked for a
18 break, and we can take a break here and pick up
19 in five minutes.

20 A. I'll be sitting on my desk at 11:05.

21 (Recess taken)

22 MR. SPEEGLE: Back on the record.

1 It is 10:08.

2 BY MR. SPEEGLE:

3 Q. Dr. Saber, do you still have
4 Exhibit 20, which is Djuric, in front of you?

5 A. Yes, sir.

6 Q. And you were describing that your
7 interpretation of Djuric is using state
8 information and kinematics to predict motion. Is
9 that fair?

10 A. Well, I don't remember exact wording,
11 but we were talking about that, yes.

12 Q. Okay. I'd like to direct you to
13 paragraph 81 of Djuric, which is on PDF page 21.

14 A. Paragraph 81 of Djuric?

15 Q. Yes, sir.

16 A. Yes, sir.

17 Q. And paragraph 81 of Djuric describes
18 how the model may use goal-based predictions in
19 Djuric. Is that right?

20 A. Well, it says the model 136 can be
21 completed to perform a goal-based prediction.
22 Yes.

1 Q. And the goal-based predictions in
2 Djuric are associated with nominal pathways. Is
3 that right?

4 A. It says, for instance, an object can be
5 associated with one or more nominal pathways.

6 Q. Okay. And if you go down further,
7 there's an example of some nominal pathways,
8 right?

9 A. Yes.

10 Q. And I'm at the -- most of the way down,
11 probably two-thirds down, there's a sentence that
12 starts "a first nominal pathway of the object."

13 Do you see that?

14 A. Yes.

15 Q. It says, "A first nominal pathway of
16 the object can include a first pathway that
17 corresponds to a right-hand turn at the
18 intersection, a second nominal pathway of the
19 object can include a second pathway that
20 corresponds to a left-hand turn at the
21 intersection" --

22 A. Yes.

1 Q. -- "and a third nominal pathway of the
2 object can include a third pathway that
3 corresponds to traveling straight through the
4 intersection."

5 Do you see that?

6 A. I see it.

7 Q. Those three nominal pathways diverge
8 from a kinematic pathway, right?

9 A. I think you're misunderstanding Djuric.
10 So let's go back to -- let's go back to
11 paragraph 25 of Djuric.

12 See, Djuric is based on state data
13 and geographic data. And as you see -- so if you
14 look at paragraph 25, it's talking about the
15 perception system can be configured. You see
16 that paragraph, sir?

17 Q. Well, I see it, but I think this is
18 nonresponsive to my --

19 A. Hang on a second. Let me explain to
20 you first because I think that gives you the
21 foundation.

22 So if you look halfway down that

1 paragraph, you see where it says, "The state data
2 can be indicative of at least a current or past
3 state of an object that is within the surrounding
4 environment of the autonomous vehicle."

5 Do you see that sentence?

6 Q. Yes.

7 A. And do you see it says, "For example,
8 the state data for each object can describe an
9 estimate of the object's current and/or past
10 location, current and/or past speed, velocity,
11 acceleration, heading," et cetera?

12 Q. Yes.

13 A. So that's how Djuric is -- that's the
14 state data that Djuric is utilizing.

15 Q. And your interpretation -- I'm sorry.
16 Please finish.

17 A. Yeah, so Djuric is utilizing the state
18 data and combining it with the geographic data,
19 which is like essentially map environment
20 information, to have what's called a combined
21 data. And if you look on paragraph 30, you see
22 it says, "The combined data can then -- combined

1 data set can be indicative of the state of the
2 object within the geographic area," et cetera?
3 See that first sentence of paragraph 30?

4 MR. SPEEGLE: If you're going to
5 conclude your answer and let me say
6 something here, I'm going to object to
7 nonresponsive and move to strike.

8 Q. I'm really trying to ask about
9 paragraph 81. I understand if you're trying to
10 answer my question, I'll let you answer, but I
11 don't think this is on point to what I was
12 asking.

13 MR. GINNINGS: Objection to form
14 as argumentative.

15 A. So that's what I was trying to get to
16 you is, the goal-based prediction that you're
17 looking at in paragraph 81 obviously rests on the
18 state data and geographic data that Djuric is
19 utilizing. So that's why you see my paragraph 72
20 there says this is fundamentally different from
21 the hidden context described in the '579. But
22 maybe I'm misunderstanding what your question is.

1 MR. SPEEGLE: Objection. Move to
2 strike, nonresponsive.

3 Q. My question is about the specific three
4 nominal pathways that are described in
5 paragraph 81. To refresh what I was referring
6 to, do you recall that paragraph 81 refers to
7 three nominal pathways from a vehicle approaching
8 an intersection?

9 A. Yes.

10 Q. It could be straight, left or right?

11 A. Yes.

12 MR. GINNINGS: Objection to form.

13 Q. Okay. Kinematic information about a
14 vehicle cannot predict all three of those
15 pathways, right?

16 A. Well, I mean, you see later on in that
17 same paragraph that you pointed to, you see where
18 it says, "The nominal pathways can be based on
19 real-world observations of the type of pathways
20 taken by a particular type of object within the
21 geographic area (or similar geographic area)."
22 Do you see that?

1 Q. Yes, I see it, but I think it's not
2 responsive to my prior question.

3 MR. SPEEGLE: So I'd object to
4 nonresponsive.

5 Q. Can you please answer my question about
6 the three nominal pathways?

7 MR. GINNINGS: Same objections and
8 argumentative.

9 A. I guess I don't understand what the
10 question is. So I'm not sure what you're asking
11 then.

12 Q. Kinematic information is the velocity
13 and acceleration and heading of an object, right?

14 MR. GINNINGS: Objection, form.

15 A. Well, I mean, as Djuric describes,
16 Djuric has state data and geographic data.
17 That's what constitutes the backbone of Djuric's
18 system.

19 Q. Okay. Djuric also describes having
20 goals that it uses for predictions, right?

21 A. Describes a goal-based prediction, but
22 the underlying fundamentals of the system are

1 based on state and geographic data.

2 Q. Do you not think that Djuric is
3 actually using goals?

4 MR. GINNINGS: Objection to form.

5 A. Again, as I've explained to you, the
6 fundamental backbone of Djuric's system is
7 essentially -- it says that even in the abstract,
8 right? If you look at the abstract of Djuric,
9 the method includes obtaining data associated
10 with the geographic area in which the object is
11 located.

12 And it talks about -- if you look
13 at the previous sentence in the abstract, in one
14 example embodiment, the computer implementing
15 method includes obtaining state data indicative
16 of at least a current or past state of an object
17 that is within the surrounding environment of an
18 autonomous vehicle.

19 And then it goes on to talk about
20 includes obtaining data associated with a
21 geographic area. So that's the fundamental
22 backbone of Djuric is that state data, combined

1 with the geographic data that creates the
2 combined data of which Djuric performs its
3 predictions.

4 Q. Is this another situation where you
5 think Djuric's use of the word "goal" is a figure
6 of speech?

7 A. Well, I mean, you have to read Djuric
8 in context. Right? You read how the technical
9 description of Djuric is described. If you go
10 to -- if you look at Figure 6 of Djuric, you see
11 where it says obtaining state data associated
12 with an object, first box, and I explained to you
13 what the state data is already and showed you the
14 disclosure in Djuric about that.

15 Then you're obtaining data
16 associated with a geographic area in which the
17 object is located. So that's your essentially
18 map information, which is static. Then you're
19 generating a combined data set based on the state
20 and the data associated with the geographic in
21 box 606. Now you're obtaining a machine-learned
22 model, inputting the combined data set into the

1 machine-learned model, receiving from the
2 machine-learned model an output indicative of
3 future locations of the object and then
4 controlling the vehicle from that.

5 That's what Djuric is doing. That
6 flow chart is a very good description of what
7 technically it is doing. Whatever words it's
8 using, you know, again, can be sometimes figures
9 of speech, sometimes marketing, whatever it is.
10 But this Figure 6 tells you exactly what it's
11 doing.

12 Q. So you do not think that Djuric is
13 actually considering a goal that an object may
14 want to accomplish?

15 MR. GINNINGS: Objection, form.

16 A. However the goal that it's considering
17 is, it describes in Figure 6 what it's actually
18 doing.

19 Q. And you think the disclosure of Djuric
20 is limited to the embodiment shown in Figure 6?

21 A. Well, as I've described to you, I mean,
22 that's a technical description of Djuric. I

1 mean, when you read through Djuric, Figure 6 is
2 basically -- I mean, flow charts enjoy a very
3 good explanation of what the techniques are
4 about.

5 Q. Because -- I'm sorry, I didn't mean to
6 cut you off. Please finish.

7 A. What I'm saying is the flow chart
8 provides you with a step-by-step description of
9 what the algorithm of Djuric is doing, and you
10 see where it says you have state data and you
11 have geographic data, you're combining it and
12 you're training your model.

13 So Djuric is fairly specific about
14 this particular one.

15 Q. Because Figure 6 does not reference the
16 goal-based predictions described in paragraph 81,
17 it's your opinion that Djuric doesn't actually
18 use goal-based predictions?

19 MR. GINNINGS: Objection to form.

20 A. I'm not saying Djuric doesn't use
21 goal-based predictions. What I'm telling you is
22 Djuric fundamentally -- under the hood what it's

1 doing is what I just explained to you. However
2 the words are used -- you know, people use words
3 in different contexts that sometimes can mean
4 different things, and sometimes the words have
5 flexibility to them. When you look at the
6 technique that's described in Figure 6 -- and
7 Djuric is pretty clear what it's doing.

8 Q. Can you explain to me how state
9 information would allow a model to predict three
10 diverging paths at an intersection for a car?

11 A. Yeah, easily, right? I mean, you can
12 essentially say, look, I'm seeing the object
13 traveling this direction. I can then predict,
14 well, most likely this is the direction of
15 travel, but it's potentially possible it can go
16 in this direction or this other direction with
17 lower probabilities. I mean, we do this all the
18 time.

19 Q. Those changes in directions require
20 applying an external force, right?

21 MR. GINNINGS: Objection, form.

22 A. No, we don't require applying external

1 force. I can look at the video frames
2 themselves, predict where the object is in the
3 past, where the object is in the present, make a
4 prediction for the future as one potential
5 prediction, and predict a couple of other
6 predictions perhaps that may say, well, it's
7 possible it will go in this direction but the
8 probability is lower. It's possible to go in
9 this direction, the probability is lower.

10 Because obviously here in this
11 case you have Djuric's state and geographic data.
12 So Djuric sees the geographic data so it knows
13 there's a right turn coming up so it can make a
14 prediction of whether that object moving --
15 because if you're looking at the speed of the
16 object, let's just say -- I'll give you an
17 example.

18 I have an object that's moving --
19 and I'm going to exaggerate those two examples.
20 I have an object that's moving at 100 miles an
21 hour in my video going down the road. You know,
22 if you were to make -- if I were to show you this

1 and say, okay, where do you think the direction
2 of this object is going to be, no system is going
3 to probably predict to you, well, it's going to
4 make a right turn immediately at a hundred miles
5 an hour, right, because it's very unlikely that
6 that's the case.

7 So versus if I see an object
8 that's decelerating -- coming into an
9 intersection and is decelerating and it's
10 decelerating like it's going to come to a stop,
11 it's possible that it's just going to decelerate
12 in the intersection because it's making sure
13 nobody's skipped a stop sign, and it's going to
14 continue going forward, but it's also going to
15 decelerate in the intersection because it's going
16 to turn right or turn left. So the probabilities
17 of going right versus left would increase because
18 the vehicle is decelerating in that intersection
19 versus the other example where it's going at a
20 hundred miles an hour into the intersection. So
21 much more unlikely that it's going to turn right
22 or left.

1 We do this all the time in video
2 and motion estimation.

3 Q. But you'd agree with me that an object
4 moving in a straight line only changes course due
5 to the application of an external force, right?
6 That's just basic physics.

7 A. I don't know what you mean. I mean,
8 you're mixing so many apples and oranges here,
9 it's hard for me to keep up.

10 Q. I'd like you to just answer my
11 question, Dr. Saber. Do you agree with me
12 that --

13 A. As I explained to you, the object is
14 moving down the road. The car obviously has a
15 motor, has an engine, has the gas pedal. So if
16 I'm sitting in that car and I push the gas pedal
17 and I'm applying a force, right, I'm applying
18 more gas, I'm revving the engine higher,
19 et cetera, so that's the physics that's moving a
20 vehicle. I don't know what force you're talking
21 about beyond this point.

22 But as I've explained to you,

1 looking at the state data of that object, I can
2 make predictions whether it's going to continue
3 to go straight, make a right or left, and those
4 probabilities will change depending on what the
5 speed of the vehicle is, the acceleration or
6 deceleration. And that's essentially what Djuric
7 is targeting.

8 Q. I think you mentioned that Djuric knows
9 if a right-hand turn is coming up. What do you
10 mean by that?

11 A. Well, Djuric has the geographic data,
12 right? So geographic data is a static,
13 essentially, data of the scene, right? So the
14 town knows what the roads look like, right? We
15 have geographic data from satellites or whatever.
16 You have geographic data of the scene.

17 So the system would know, let's
18 say, coming into an intersection that there's an
19 intersection here and you could turn right, left
20 or keep going straight. So it has the geographic
21 data. It has the state data of the object. So
22 if that object is moving at 60 miles an hour, its

1 nominal pathway, one, is probably going to be
2 going straight with a very high probability.
3 It's unlikely it's going to turn right at
4 60 miles an hour or left. So the probability of
5 those nominal pathways would go down
6 significantly versus if that object is coming
7 into an intersection and it's decelerating from
8 40 miles an hour down to 10 miles an hour, the
9 probabilities of going straight will decrease and
10 the other nominal pathways potentially increase
11 because you could turn right, you could turn left
12 at that speed.

13 That has nothing to do with what
14 this '579 is doing.

15 Q. I want to ask you something about the
16 '579 patent. The '579 patent also uses state
17 information to make its predictions, right?

18 A. Well, what specifically are you
19 referring to in the '579? Let's be specific.
20 Let's not use -- I don't want to use the same
21 verbiage of, you know, stuff just randomly.

22 What paragraph, what line are you

1 referring to in the '579?

2 Q. Do you know, sitting here today,
3 whether the '579 patent uses state information to
4 make predictions?

5 A. I'm asking you. What are you referring
6 to in the '579? I mean, the '579 is obviously
7 about -- it uses a probability neural network for
8 predicting hidden context of traffic entities for
9 autonomous vehicles. I mean, that's the main
10 point of it.

11 So what exactly are you referring
12 to in the '579? Let's be specific.

13 MR. SPEEGLE: Objection. Move to
14 strike as nonresponsive.

15 Q. Dr. Saber, I really need you to answer
16 my questions. I'm just asking you, do you know,
17 sitting here today, whether the '579 patent uses
18 state information to make predictions?

19 MR. GINNINGS: Objection to form
20 and argumentative.

21 A. So, again, I'm trying to point you to
22 different things in the '579 that -- so that we

1 are on the same page. I don't want to just use
2 random wording from different places.

3 So if you, for instance, look at
4 column 16 of the '579, I'm just targeting a
5 couple of examples there. Lines 38 or so,
6 somewhere there. Column 16, lines 38 to, say,
7 47.

8 See where it says: The vehicle
9 computing system repeats the following steps 704
10 and 706 for each identified traffic entity. The
11 vehicle computing system determines -- 122
12 determines 704 motion parameters for the traffic
13 entity, for example, speed and direction of
14 movement. It also determines a hidden context
15 associated with the traffic entity, and it
16 measure -- and then determines a measure of
17 uncertainty.

18 So certainly it's going to be
19 looking at the motion parameters of the traffic
20 entity.

21 Q. Thank you. Let's shift gears here. I
22 want to ask specifically about the grounds that

1 you've challenged in each of the '579 and '346.
2 You remember we did this yesterday for the other
3 patents.

4 So can you look at the table of
5 contents for your '579 declaration?

6 A. Yes, sir, I can certainly do that. I'm
7 just going to close a few things. Are we done
8 with the '889 declaration, you think, sir?

9 Q. You don't need it now, for sure.

10 A. Okay, very good. So I'm looking at the
11 '579 declaration right now, and let me open the
12 other one. And I also have open the '346
13 declaration, and I'm looking at the table of
14 contents. Yes, sir.

15 Q. Am I right that you addressed grounds
16 1, 3 and 5 together in your declaration?

17 A. For the '579, yes.

18 Q. And each of these grounds involves
19 Djuric and the AA reference, right?

20 A. That is correct.

21 Q. And your disputes with respect to
22 grounds 1, 3 and 5 relate to elements 1[a-iii],

1 13[a-iii], 20[a-iii], then elements 1[c], 13[c]
2 and 20[c], and elements 1[d], 13[d] and 20[d].
3 Is that right?

4 MR. GINNINGS: Objection, form.

5 A. I've addressed in my declaration that
6 Djuric and AA do not teach the elements that you
7 just mentioned.

8 Q. There were no other elements that you
9 opined are missing from grounds 1, 3 and 5,
10 right?

11 A. Those are the ones I opined on.

12 Q. And then you addressed grounds 2, 4 and
13 6 together as well. Is that right?

14 A. That is correct, sir.

15 Q. And you opined about the same set of
16 elements for grounds 2, 4 and 6 as for grounds 1,
17 3 and 5, right?

18 A. That's correct. I opined about those
19 same elements.

20 Q. And scrolling down to what is numbered
21 page 31 in your declaration, there's a section C
22 that starts your opinions on grounds -- ground 1

1 for elements 1[a-iii], 13[a-iii] and 20[a-iii],
2 right?

3 A. That's correct. I'm looking at Table
4 of Contents. That is correct.

5 Q. You might want to go down to the actual
6 section there because I'm going to start asking
7 questions about this.

8 A. Just give me one moment. All right. I
9 am at page 31 of my dec.

10 Q. And you have a section that begins on
11 page 31 that says, "Djuric does not teach 'hidden
12 context.'" Is that right?

13 A. Correct.

14 Q. And this is the section that includes
15 the paragraph 72 we discussed before?

16 A. Yes. Paragraph 72 of the declaration.

17 Q. Yes.

18 A. Not 72 of some prior art, right?

19 Q. Correct.

20 A. Yes.

21 Q. At paragraph 77 on page 35, you have
22 another section that's captioned, "Djuric does

1 not teach 'the output comprising a plurality of
2 values.'" Right?

3 A. That is correct, sir.

4 Q. In looking at paragraph 79, am I
5 understanding right that your opinion about why
6 Djuric does not disclose the output comprising a
7 plurality of values is based on the fact that you
8 don't believe Djuric discloses hidden context?

9 MR. GINNINGS: Objection, form.

10 A. Well, I describe that obviously in
11 paragraph 79.

12 Q. Okay. Let's scroll down to page 37 and
13 paragraph 84 of your declaration.

14 A. Yes, sir.

15 Q. And here you are opining that Djuric
16 does not teach each value representing a
17 likelihood of receiving a particular user
18 response. Do you see that?

19 A. I do see that.

20 Q. And in paragraph 85, the last sentence
21 you have here -- I'm sorry, let me back up. This
22 is the second sentence -- well, so let me strike

1 that.

2 This is paragraph 85, second
3 sentence. Says "I disagree." And then the next
4 sentence says, "Tesla does not identify any
5 teachings in Djuric that state that the labels
6 are provided by human users as Tesla alleges."
7 Do you see that?

8 A. Yes.

9 Q. So let's go back to Djuric.

10 A. Okay.

11 Q. And let me know when you get to
12 paragraph 53 of Djuric.

13 A. Paragraph 53 of Djuric?

14 Q. Yes.

15 A. Yes, sir.

16 Q. There's a sentence that's about
17 two-thirds of the way down, and the first word is
18 "by." The first word by itself --

19 A. "By way of example"?

20 Q. Yes. "By way of example, the model 136
21 can be trained using labeled state data and
22 geographic data with no known future locations

1 and/or trajectories of objects, e.g., as captured
2 in a data log manually," et cetera.

3 Do you see that?

4 A. Yes.

5 Q. What does "manually" mean in this
6 sentence?

7 A. Well, as captured in a data log
8 manually.

9 Q. Sorry, I don't mean to cut you off.
10 Was your answer done?

11 A. Well, manually. You enter something
12 manually. It's captured by in a data log, so
13 you're capturing data manually.

14 Q. Would you agree this suggests that the
15 labeled data is labeled manually by humans?

16 MR. GINNINGS: Objection to form.

17 A. Well, all this says is "as captured in
18 a data log manually."

19 I mean, that's the point is it
20 doesn't exactly say how the data is labeled.
21 Whether a data is labeled or it's just the
22 capturing is manual. It doesn't --

1 Q. Did you --

2 A. It doesn't state exactly what this
3 "manually" exactly is.

4 Q. Would you agree with me that "e.g."
5 typically means you're listing examples of
6 something?

7 A. Yes.

8 Q. So an example of how the labeled data
9 can be collected is manually?

10 MR. GINNINGS: Objection to form.

11 A. Well, I mean, the manually here
12 essentially doesn't say exactly what is captured
13 manually. All it says is, you know, "state data
14 and geographic data with no feature locations and
15 no trajectories of objects, e.g. as captured in a
16 data log, manually," et cetera, so...

17 Q. Would a POSITA know that this data
18 could be labeled manually?

19 A. It doesn't say. It doesn't say what is
20 exactly labeled. Is the video frames labeled
21 manually, is the -- this is -- I mean, you could
22 say, for instance, these frames are about Denver,

1 Colorado Street 145. So what is labeled exactly
2 manually, it doesn't say specifically.

3 MR. SPEEGLE: Objection, move to
4 strike as nonresponsive.

5 Q. Would a POSITA reading Djuric
6 understand that data used in training can be
7 manually labeled?

8 MR. GINNINGS: Objection to form
9 and argumentative.

10 A. My sentence here in the paragraph just
11 says basically Tesla does not identify any
12 teachings in Djuric that states the labels are
13 provided by human users, as Tesla alleged. So
14 Tesla doesn't provide a teaching, which is
15 obviously -- as you know, it's the burden of
16 Tesla to do so. Tesla doesn't provide any
17 teaching in Djuric that states that the labels
18 are provided by human users. So what teaching in
19 Djuric that you -- that Tesla points to that says
20 these labels are provided by human users.

21 The word "manually" here, I don't
22 know exactly what's being provided manually. Is

1 it the labels of the objects in the scene? Is it
2 just the labels of where the scene is located?
3 Is it the labels of the frames themselves? What
4 is being entered manually here is not clear.

5 MR. SPEEGLE: Objection,
6 nonresponsive. Move to strike.

7 Dr. Saber, and Austin, I don't
8 want to have to call the Board, but I really
9 need the witness to answer my questions.

10 MR. GINNINGS: He has answered
11 your questions. I'll object to the
12 commentary as argumentative.

13 MR. SPEEGLE: I'll object to the
14 speaking objections.

15 Q. Dr. Saber, would a POSITA reading
16 Djuric understand that data used in training can
17 be manually labeled?

18 MR. GINNINGS: Objection to form
19 and argumentative.

20 A. Well, again, what I'm saying to you is
21 my sentence there in paragraph 85 that you raised
22 says Tesla does not identify any teachings in

1 Djuric that states that the labels are provided
2 by human users.

3 Q. Dr. Saber, I'm not asking about the
4 declaration right now. I'm asking about --

5 A. Well, that's where the initial
6 questioning started. You pointed to that
7 sentence, and you were asking about that
8 particular sentence.

9 So Tesla does not identify any
10 teaching in Djuric that says that. Now, a POSITA
11 reading this paragraph that you mentioned to and
12 manually here, wouldn't exactly know what is
13 "manually" referring to. Was it -- like I said
14 to you, I could have just taken a series of
15 videos and say these were all taken in Webster,
16 New York. That's what's manual. I could go into
17 each video frame and label every object in there,
18 and that's done manually. I could go and label
19 the frames themselves as saying this is about
20 traffic entity cyclists and -- you know, and
21 provide some commentary.

22 So what is exactly manual is not

1 described here. So a POSITA wouldn't know from
2 this sentence what is exactly being done here.

3 Q. Dr. Saber, we talked yesterday about
4 the class you teach -- I think it's called
5 Advanced Neural Networks. Is that right?

6 A. Yes, that's part of the title. But
7 yes, you're right.

8 Q. And your students understand that some
9 data that is collected and used for training a
10 model might be labeled manually, right?

11 A. That's generally the case, yes, the
12 student will understand that. But that's not
13 what we're talking about here.

14 Q. Okay. So when Djuric refers to data
15 that may be captured, e.g. manually, somebody
16 who's taking your course and is a POSITA in this
17 art would understand that that could refer to
18 manually labeling data, right?

19 A. As I've explained to you, a POSITA
20 reading this -- first of all, it's Tesla's burden
21 of proof to show where every claim element is
22 disclosed in a prior art. So Tesla has the

1 burden to show that. They have to go through
2 every claim element and show where exactly that's
3 either explicitly or inherently disclosed in the
4 prior art.

5 So my sentence basically says you
6 don't point to any teachings to do so. Now, you
7 pointed to this paragraph and said, well, the
8 word "manually..." And as I've explained to you,
9 that word manually here could mean that you
10 just -- a POSITA reading this could interpret it
11 as this series of video is captured in Webster,
12 New York. That's what's manually done. Or I
13 could go in and label every object in that video,
14 and that's what's manually done. Or I could
15 label the motion estimations of that video, and
16 that's what's manually done.

17 So what exactly is manually done
18 here is not clearly described.

19 Q. All right. Let's go back to your
20 declaration, and I want to direct you to
21 paragraph 89.

22 A. 89 of the '579 dec?

1 Q. Yes.

2 A. Yes, sir.

3 Q. And this paragraph relates to
4 limitations 1[c], 13[c] and 20[c] for ground 1.
5 Is that right?

6 A. That is correct.

7 Q. And your disagreement with respect to
8 this limitations C -- strike that.

9 Your disagreement for the
10 limitations 1[c], 13[c] and 20[c] relate to the
11 fact that you do not believe Djuric teaches
12 hidden context. Is that right?

13 A. Generally speaking, that's correct.

14 Q. All right. Let's go down to
15 paragraph 91. This paragraph relates to
16 limitations 1[d], 13[d] and 20[d] in ground 1,
17 right?

18 A. That is correct.

19 Q. Now, the last sentence of paragraph 91
20 says, "Nothing in Djuric describes determining
21 these way-point confidence levels for any
22 trajectory conflicted level, i.e. Tesla and

1 Dr. Jan t's alleged 'plurality of values.'

2 Do you see that?

3 A. Yes.

4 Q. What is your understanding of the
5 relationship between the trajectory confidence
6 levels and the way-point confidence levels in
7 Djuric?

8 A. So let's go back to Djuric. So if you
9 take a look at Djuric -- and I'm looking at
10 paragraph 83 to start. Let me know when you're
11 there.

12 Q. I see it.

13 A. So you see it says "as shown" -- so
14 this is talking about the vehicle computing
15 system that we've been talking about, and it's
16 talking about system 102, which is on Figure 1.
17 And it receives an output from the model,
18 et cetera, and it gets to Figure 8 which depicts
19 an example. It's showing you basically an
20 example in Figure 8. Now, it says: As shown,
21 each of the predicted trajectories can include a
22 plurality -- each of the predicted trajectories

1 805A-B, which you see on the figure -- it's not
2 extremely clear on the figure, but you can see on
3 the figure like A is the one that looks like it's
4 kind of turning to the right. So we're looking
5 at Figure 8, object 810. Do you see that?

6 Q. I understand.

7 A. So -- and it's talking, you know, the
8 output 800, which is the overall label of the
9 figure, includes a plurality of projected
10 trajectories 805A-B for an object 810. So we're
11 looking at object 810 and you have a trajectory
12 805A, which is kind of turning to the right, and
13 you have a trajectory 805B, which looks like it's
14 going straight. Can include a plurality of
15 way-points and each way-point can be indicative
16 of a predicted future location of the object 810.
17 So it's essentially a future location of that
18 object.

19 Q. Okay. I would like to direct you to
20 paragraph 85 of Djuric, if you're done with your
21 answer. I don't mean to cut you off.

22 A. No, that's fine.

1 Q. And paragraph 85 says that Djuric "can
2 determine a way-point confidence level for each
3 way-point within a predicted trajectory." Right?

4 A. Right.

5 Q. So the way-point confidence level is
6 applied to points on a predicted trajectory,
7 right?

8 MR. GINNINGS: Objection, form.

9 A. Yes. You can see from paragraph 85,
10 the model 136 can predict a way-point confidence
11 level for each way-point within a predicted
12 trajectory.

13 So the confidence level is for
14 each way-point within a predicted trajectory.

15 Q. And if I can direct you to paragraph 90
16 of Djuric, am I right that paragraph 90 says that
17 the model "can be trained to determine a
18 trajectory confidence level (e.g. a per
19 trajectory probability)."

20 Do you see that?

21 A. You read that correctly.

22 Q. Is there a relationship between the per

1 trajectory probability described in paragraph 90
2 and the way-point confidence level described in
3 paragraph 86?

4 MR. GINNINGS: Objection to form
5 and scope.

6 A. Well, it doesn't state here -- I mean,
7 like in paragraph 90, it says to determine a
8 trajectory confidence level. So this trajectory
9 confidence level that's in paragraph 90, that's
10 not the same thing as these way-point predictions
11 that we talked about in the earlier paragraph,
12 confidence level.

13 Q. You'd agree with me that the way-point
14 confidence levels and the per trajectory
15 probabilities are associated with the same
16 trajectory, right?

17 MR. GINNINGS: Objection, form.

18 Q. Yeah, that was a bad question. Let me
19 try again.

20 So let's look at Figure 8, and we
21 can be a little more specific. Would you agree
22 with me that looking specifically at 805A, which

1 is the right-hand turn, the concentric circles
2 getting larger going away from object 810 reflect
3 the way-point confidence levels for each point on
4 that trajectory 805?

5 A. That's generally the case, yes.

6 Q. Okay. And according to paragraph 90 of
7 Djuric, the model can also determine a trajectory
8 confidence level for trajectory 805A itself,
9 right?

10 A. That's what it states. The model can
11 be trained to determine a trajectory confidence
12 level.

13 Q. So the way-point confidence levels
14 along the path of 805A and the trajectory
15 confidence level for trajectory 805A itself, both
16 reflect the likelihood of object 810 being at any
17 given point along the trajectory 805A, right?

18 MR. GINNINGS: Objection, form.

19 A. Well, I think -- I mean, you're mixing
20 the two concepts a little bit. So the way-point
21 confidence levels are about the way-points. The
22 trajectory confidence level is about the

1 trajectory. That doesn't mean that -- so my
2 sentence here it says, "Nothing in Djuric
3 describes determining three way-point confidence
4 levels for any trajectory confidence level."

5 So you're not taking the
6 trajectory and computing from it the way
7 confidence levels -- I mean, the way-points and
8 then computing the confidence levels for those.
9 So you're computing them as separate entities --
10 or Djuric is computing them as separate entities.
11 That's the point I'm making.

12 Q. Let's look again at paragraph 90. And
13 there's an equation at the bottom of
14 paragraph 90. Do you see that? Sorry, not the
15 bottom. It's in the middle. The L equals L_{traj}
16 plus L_{cls} ?

17 A. Yes.

18 Q. And L_{cls} is defined in paragraph 91,
19 right?

20 A. Hang on, I'm going to make this a
21 little bigger.

22 Well, L_{cls} is defined in

1 paragraph 90, not 91. So if you look at
2 paragraph 90, it says, "where L trajectory is a
3 trajectory loss calculated using the formula
4 above taken from the most accurate mode and Lcls
5 is the classification loss that quantifies the
6 accuracy of the per trajectory probability."

7 Q. You're absolutely right. The formula
8 given for Lcls is in paragraph 91, right?

9 A. That's correct.

10 Q. Okay. What does that formula for Lcls
11 reflect?

12 A. I'm sorry?

13 Q. Can you explain to me the formula for
14 Lcls in paragraph 91?

15 A. So, I mean, here it's probably -- it's
16 not explained very well, but you see in paragraph
17 91 says, "assuming the predictive probability for
18 the M modes are" this symbol that it shows -- let
19 me see if I can get a better look at it. So it
20 shows that symbol and "that the probability label
21 (computed on the fly during training with m^*
22 being 1 and all others being 0) is c." Because

1 that's the different modes obviously. "The
2 classification loss can be computed as shown
3 below where H " -- I don't think it means to say
4 his here because it's probably a typo. Where H
5 parentheses -- well, it's H space is. So that's
6 a typo here. It should say H space is the
7 cross-entropy function.

8 So H is the cross-entropy function
9 between the probability labeled C and the
10 predictive probability for the M modes.

11 Q. Okay. I'm sorry, again, I'm running a
12 little short on time, but I'm not trying to cut
13 you off. Did you have anything else you wanted
14 to say?

15 A. No.

16 Q. Am I right that paragraph 89 of Djuric
17 discusses a relationship between M and the
18 outputs, which they call $5N+1$?

19 A. Yeah, there is $5N+1$ is described there.

20 Q. And the $5N+1$, that relates back to the
21 trajectory link described in paragraph 86, right?

22 A. I'm not sure what you're asking, but

1 the 5N outputs for a single -- in addition to the
2 5N outputs for a single trajectory, one
3 additional output can be used to estimate the per
4 trajectory probability, 5N+1.

5 Q. And that 5N+1 you just referenced comes
6 from the paragraph 86, right?

7 I can see that we're going to have
8 a little confusion on the record. I'm going to
9 start saying "Mike" and "Nancy" for M and N just
10 to try and help the court reporter. I'll restate
11 that question.

12 In the 5N, for Nancy, plus 1 that
13 you referenced, that comes from paragraph 86,
14 right?

15 MR. GINNINGS: Objection, form.

16 A. So paragraph 86 is talking about -- so
17 if you look at the paragraph here, it says, "The
18 model 136 can be trained to determine the
19 way-point confidence levels of a way-point. For
20 instance, an assumption can be made that each
21 way-point can be sampled from a 2D-Gaussian
22 distribution" that we mentioned -- we talked

1 about this yesterday -- "where the Gaussian
2 distribution is parametrized by 2D mean" -- so
3 the x-y position and 2x2 covariance. Because you
4 can characterize the Gaussian distribution by its
5 mean and covariance. All you need is mean and
6 covariance to characterize it, and I can give you
7 the equation for that.

8 So "The negative log-likelihood of
9 the training data set can be minimized" --
10 because that's what you're trying to minimize
11 typically -- "with the potential assumption that
12 all way-points are independently sampled." So
13 obviously that's an assumption that's not always
14 valid, but it is an assumption.

15 "For instance, assuming a set T of
16 training trajectories, and assuming w.l.o.g. that
17 all trajectories are of length N" -- so you have
18 a length N for each trajectory -- "the loss can
19 be written as..." and it gives you the formula
20 here.

21 So this paragraph's talking about
22 essentially the loss with a negative likelihood.

1 Log-likelihood.

2 Q. Thank you. And this is loss for the
3 way-point confidence in paragraph 86, right?

4 A. So -- so each way-point is sampled from
5 a 2D-Gaussian distribution. So you're
6 essentially looking at these way-points as if
7 they're Gaussian distributions because obviously
8 they're predictions. They're not exactly
9 100 percent. Where the Gaussian distribution is
10 parametrized, so you have a 2D-Gaussian
11 distribution. The negative log-likelihood of the
12 training data set can be minimized with a
13 potential assumption that all way-points are
14 independently sampled.

15 Now, what it's telling you here,
16 the loss -- so assuming that all trajectories are
17 of length N, the loss can be written as follows.
18 This is the loss with regards to -- let's see.
19 So this is the loss -- what appears to be is the
20 loss with respect to the trajectory. But it
21 doesn't clearly say that.

22 Q. Okay. Let's dig into this formula a

1 little bit more. There's a sigma, which goes
2 from T selected from set big T and then a square
3 at the top. Do you see that?

4 A. Yes.

5 Q. And what's your understanding of that
6 sigma?

7 A. Well, it's a sum.

8 Q. And do you understand what it's
9 summing?

10 A. Well, you see what it says, as for
11 instance, assuming a set capital T of training
12 trajectories. So capital T is the training
13 trajectories, and there's a set of them. Ten.
14 So then the variable small T is basically like
15 "I" equal 1-10. So it's summing over the set.
16 So small T would be T equal 1 would be trajectory
17 1. Let's say T equal 2 would be trajectory 2 of
18 ten trajectories. So it's summing over the set
19 of trajectories.

20 Q. Thank you. To the right of that sigma
21 there is another smaller sigma that goes from "I"
22 equals 1 to N?

1 A. Yes.

2 Q. I understand N is the length of the
3 trajectory, right?

4 A. Yeah, with the assumption here that all
5 trajectories are of length N , so N is the length
6 of the trajectory. That is correct.

7 Q. So this is summing over the length of
8 each trajectory?

9 A. Yes.

10 Q. Then what's to the right of that second
11 sigma is the thing that is being summed, right?

12 A. Yes. So it's the log of the
13 probability. Because for Gaussian -- you know,
14 Gaussian is an exponential function, right? So
15 you take the log of it, you turn it into a
16 summation.

17 Q. So the Gaussian that's being summed
18 there to the right of the log refers to X_{ti} and
19 Y_{ti} and X^{ti} and Y^{ti} . Do you see that?

20 A. One second, I'm just making this a
21 little bit bigger.

22 Yes. So the "i" is for the second

1 summation. The "t" is for the first summation.

2 Q. Right. So these are going to be points
3 along -- the "i" tells you where it is along the
4 trajectory, and the "t" tells you which
5 trajectory it is, right?

6 A. Correct.

7 Q. So this is a sum of the probability
8 associated with specific points along each
9 trajectory, right?

10 A. Yes. So P of X_{ti} , Y_{ti} -- you see that
11 straight up and down? That basically says such
12 that the mean is equal to this and the covariance
13 is equal to that. So the $\hat{M}$ is the mean. The
14 small $\hat{\sigma}$ that you see at the end of that
15 formula is the covariance, which they talk about
16 later on. Do you see that?

17 Q. Yes. And X and Y in this function refer to
18 the way-points, right?

19 A. Yes. X and Y would refer to the points
20 along the trajectory.

21 Q. Okay.

22 A. Not necessarily the way-points. That's

1 just points along the trajectory. Because you
2 have -- assuming a set T of training trajectories
3 and assuming that all trajectories are of length
4 N , then X_{ti} , Y_{ti} would be along those
5 trajectories.

6 Q. Okay.

7 A. Now, there is potentially a typo here
8 because the probability -- the mean and the
9 covariance wouldn't be for every point. You see
10 what I mean? So that's not necessarily a correct
11 formulation here.

12 Q. Okay. If we go back to paragraph 90,
13 which is discussing the trajectory confidence
14 level.

15 A. Yes.

16 Q. The second half of paragraph 90 after
17 the formula says where L trajectory is the
18 trajectory loss (calculated using the formula
19 above.) Do you see that?

20 A. Yes.

21 Q. And that refers to the formula we were
22 just discussing in paragraph 86, right?

1 A. Yes.

2 Q. So you'd agree with me that the
3 trajectory confidence level as calculated in
4 paragraph 90 is related to the way-point
5 confidence level described in paragraph 86,
6 right?

7 MR. GINNINGS: Objection, form.

8 A. Well, I think you're mixing a couple of
9 things here.

10 So the formula in paragraph 86, if
11 you see it says, "The negative log-likelihood of
12 the training data" -- I'm at the bottom end of
13 the paragraph -- "data set can be minimized with
14 the potential assumption that all way-points are
15 independently sampled."

16 For instance, assuming a set of T
17 of training trajectories and assuming that all
18 trajectories are of length N, the loss can be
19 written as follows. So this loss formula you see
20 here is addressing the trajectories and the
21 points along a given trajectory.

22 Q. This is on Exhibit 20, page 22.

1 MR. GINNINGS: Counsel, we've been
2 at it for a little over an hour. Is this a
3 good time for a break?

4 MR. SPEEGLE: Yes, let's take a
5 break.

6 (Lunch Recess)

7 BY MR. SPEEGLE:

8 Q. Dr. Saber, we were discussing the
9 Djuric reference and the formulas on page 22
10 before the lunch break. Do you recall that?

11 A. Yes, sir.

12 Q. And the formula we were looking at is a
13 loss function. Is that right?

14 A. I'm assuming you're referring to the
15 formula on paragraph 86?

16 Q. Correct. And also -- we also discussed
17 the formula on paragraph 90, and I guess I can
18 ask questions separately. Let's start with the
19 formula in paragraph 86. Is that a loss function
20 written in paragraph 86?

21 A. Yes. It states right above the formula
22 the loss can be written as follows.

1 Q. Okay. And what would the loss function
2 like this be used for in Djuric?

3 A. Well, I mean, typically loss functions
4 are used to determine the loss between what you
5 expect and what you predict. So I expect to be
6 at this point, I'm predicting at this point, the
7 difference between them exhibit a loss.

8 Q. It's fair to say that the loss
9 functions are used for training models?

10 A. That's typically the case in general.

11 Q. And in Djuric, loss functions would be
12 used to train models to predict trajectory and
13 way-point probabilities, right?

14 A. As we --

15 THE WITNESS: Go ahead, Austin.

16 MR. GINNINGS: Sorry. Objection
17 to form.

18 A. As we discussed earlier before lunch,
19 you know, Djuric is talking about predicting
20 trajectories, as we discussed earlier.

21 Q. And Djuric also predicts confidence
22 levels for its trajectories, right?

1 A. That's the general idea. But obviously
2 we're talking here in the context of the claim
3 that we're discussing, right? If you go back and
4 look at the claim that's being discussed here --
5 and I'm referring to claim 1, but obviously the
6 other two independent claims say the same thing.
7 So it's in the context of discussing the claim
8 here where let's say 1[a-iii] is talking about
9 the hidden context with traffic entity, the
10 output comprising a plurality of values, these
11 are related to hidden context. Each value
12 representing the likelihood -- again, these are
13 related to the hidden context, not trajectories
14 as Djuric is describing. So you have to keep
15 this in mind as you're discussing this. It's
16 related to the claim elements that we are
17 discussing.

18 Q. Let's go back to your declaration. And
19 this is your '579 declaration I'm talking about.

20 A. Yes, sir.

21 Q. Can you turn to -- let's go back to the
22 Table of Contents.

1 A. Yes, sir.

2 Q. And we discussed before that you're
3 disputing the same limitations for both grounds
4 1, 3 and 5 and grounds 2, 4 and 6. Is that
5 right?

6 A. Yes, sir.

7 Q. And under the heading of what is 9B in
8 your Table of Contents, it looks like you have
9 two subheadings, which are "Djuric, AA and Cox do
10 not teach 'hidden context.'"

11 A. Correct.

12 Q. The second one is "Djuric and Cox do
13 not teach the output comprising of plurality of
14 values, each value representing the likelihood of
15 receiving a particular user response."

16 A. You read those correctly.

17 Q. Am I right that you don't dispute for
18 grounds 2, 4 and 6 that Djuric, AA and Cox
19 disclose each value representing a likelihood of
20 receiving a particular user response -- let me
21 strike that. That's not a good question.

22 Can you explain why you have two

1 subheadings under element IX(B) in your Table of
2 Contents compared to the three subheadings you
3 have under VIII(C)?

4 A. Well, in VII(C), I've separated all
5 three of them. So you have Djuric does not teach
6 hidden context, so this is all referring,
7 obviously, to element 1[a-iii] and the other two,
8 13 and 20.

9 So in 7 -- sorry, VIII(C), I've
10 separated "Djuric does not teach 'hidden
11 context,'" then the next element, "Djuric does
12 not teach the output comprising plurality of
13 values," which is obviously all part of that
14 claim element. Then item 3, "Djuric does not
15 teach each value representing the likelihood of
16 receiving a particular user response."

17 So when you put those three
18 together, you get the element that we're talking
19 about in 8C.

20 When you go down in IX(B) -- so
21 you have one is "Djuric, AA and Cox does not
22 teach 'hidden context,'" and 2 is the rest of it.

1 It's like, I guess, I combined the output and
2 each value together into one analysis.

3 Q. Okay. Let's go down to paragraph 114,
4 which is on numbered page 51.

5 A. Okay.

6 Q. And am I right that you're saying here
7 that your opinions regarding the absence of
8 hidden context from ground 2 are based on what
9 you discussed in section 8C above regarding
10 Djuric?

11 A. I lost you there. Is there a sentence
12 you're referring to in paragraph -- you said 114?

13 Q. Yes. I'm looking at the first two
14 sentences. I was paraphrasing.

15 A. Yes.

16 Q. Why don't you read those first two
17 sentences, then I'll ask my question again.

18 A. I have read those two sentences.

19 Q. Okay. Is it fair to say that your
20 arguments about whether the combination of
21 Djuric, AA and Cox teach hidden context are based
22 on what you discussed for the combination of

1 Djuric and AA in section VIII(C) above?

2 A. That's correct.

3 Q. Okay. Then you separately go on to
4 discuss that you also don't believe Cox discloses
5 hidden context. Is that right?

6 A. That's correct. But that obviously
7 does not contend that Cox or AA teach the claimed
8 hidden context.

9 Q. Okay. And then in paragraph 117, can
10 you look at the second-to-last sentence for me
11 and read that into the record?

12 A. You mean the sentence that starts with
13 "Cox does not make inferences..."

14 Q. No, I'm sorry. This is paragraph 117,
15 second-to-last sentence. I believe it starts
16 "Cox also does not predict..."

17 A. Yes, okay, I have it. So you want me
18 to read it into the record, or you want to read
19 it into the record?

20 Q. Why don't you read it.

21 A. This is paragraph 117 of my '579
22 declaration. The sentence states, "Cox also does

1 not predict underlying mental states, intentions,
2 awareness, goals or other hidden contextual
3 information in an image."

4 Q. And when you say "mental states," are
5 you referring to mental states specific to road
6 users?

7 A. I mean, that's the idea here, yes.

8 Q. And so would you consider an emotion
9 like happy or sad to qualify as a mental state in
10 how you're using the term in this sentence?

11 MR. GINNINGS: Objection to form
12 and scope.

13 A. I mean, again, as we discussed earlier
14 I think maybe yesterday or maybe earlier today,
15 happy or sad has nothing to do with autonomous
16 driving, right? So the car, the autonomous
17 driving vehicle, has to make assessments about a
18 road user or traffic entity in the road and its
19 mental state relative to autonomous driving
20 conditions.

21 Q. Okay.

22 A. Smiling or laughing is irrelevant.

1 Q. Okay. This sentence also refers to
2 hidden contextual information, right?

3 A. Correct.

4 Q. Is that the same as hidden context as
5 we've been using that term throughout the day?

6 A. Generally speaking, yes.

7 Q. And with regards to whether Cox
8 discloses hidden context, are you again
9 restricting that to hidden context that's
10 potentially relevant for autonomous driving?

11 A. Yeah.

12 MR. GINNINGS: Objection, form.

13 A. Obviously in the context of the claims
14 and the claim element that refers to hidden
15 context as read from the lens of a POSITA in
16 light of the specification of the '579.

17 Q. Let's move up to paragraph 94 of your
18 '579 declaration. Let me know when you're there.

19 A. Yes, sir.

20 Q. You've disputed that a POSITA would be
21 motivated to combine Djuric and AA, as suggested
22 by Tesla and Dr. Jan t. Is that right?

1 A. That's correct.

2 Q. Am I right that one of the reasons you
3 dispute that a POSITA would be motivated to
4 combine Djuric and AA as suggested by Tesla and
5 Dr. Jan t is that Djuric and AA both already
6 teach a probabilistic neural network?

7 MR. GINNINGS: Objection to form.

8 A. I'm not sure I follow what you are
9 exactly saying. I mean AA has a completely
10 different application, right? AA has nothing to
11 do with autonomous driving.

12 Q. Okay.

13 A. Totally different application from what
14 we've been talking about here with regards to
15 Djuric.

16 Q. There's a sentence you have in -- or
17 two sentences at the end of paragraph 95 that
18 say, "In addition, Tesla and Dr. Jan t claim that
19 both Djuric and AA already teach a PNN. If that
20 is the case, Tesla and Dr. Jan t never explain
21 why a POSITA considering Djuric would modify
22 Djuric in view of AA to implement a PNN."

1 Do you see that?

2 A. I see -- give me a second, let me read
3 the paragraph. Okay. I see that sentence -- or
4 those two sentences.

5 Q. Okay. Do you agree that Djuric already
6 teaches a PNN?

7 A. I mean, Djuric obviously mentions a
8 bunch of PNNs -- a bunch of neural networks.

9 Q. If Djuric is already mentioning a bunch
10 of PNNs, why would a POSITA not be motivated to
11 implement a PNN from AA?

12 MR. GINNINGS: Objection to form.

13 A. Well, Djuric never really mentions --
14 if my memory serves me right, never mentions a
15 PNN. Just mentions NNs, neural networks. If you
16 look at this paragraph 27 of Djuric -- and let me
17 just take a look here. It talks about a CNN, a
18 current NN; never mentions directly a PNN, if I'm
19 not mistaken.

20 Q. What distinguishes a probabilistic
21 neural network, or a PNN, from a CNN?

22 A. Well, I provide that explanation in my

1 declaration. So if you type in -- so if you go
2 back to the declaration, paragraph 54, which
3 talks about overview of the '579, there's a
4 description there halfway down the paragraph --
5 obviously it starts talking about PNNs and
6 discusses why is that different from a fully
7 connected neural network and a CNN and what the
8 differences are. Obviously, I'm summarizing
9 here. And it also points you to a reference
10 I think in this case, which I'm -- so
11 Exhibit 2051, which I point to in this particular
12 paragraph, talks about probabilistic neural
13 networks.

14 And, you know, there's a
15 description -- obviously there's a more detailed
16 description there, but in this particular
17 paragraph, I give you a description of why a
18 PNN -- why is a PNN different from a CNN or a
19 fully connected neural network typically. We can
20 go over that explanation if you want, but there's
21 an explanation there in that paragraph.

22 Q. You say it's derived from Bayesian

1 decision theory? Is that right?

2 MR. GINNINGS: Objection to form.

3 A. Well, if you look at my paragraph 54,
4 it says, "A PNN is a kernel-based classifier
5 derived from Bayesian decision theory that
6 estimates the probability density function of
7 each class using Parzen window or similar style
8 estimations and classifies new observations
9 according to the maximum posterior probability
10 without iterative weight optimization" like you
11 would see in a CNN or an FCNN.

12 Q. Are you familiar with the phrase
13 "Bayesian network"?

14 A. Yes.

15 Q. Is a Bayesian network different from a
16 PNN, in your view?

17 A. Well, again, I mean, it depends on how
18 it is -- you know, how it is constructed.

19 Q. Have you seen Bayesian networks that
20 are not PNNs?

21 A. I mean, a Bayesian network is also --
22 is a probabilistic type model as well, because

1 you're looking at nodes and basically conditional
2 probabilities and that type of thing. But it
3 also -- the PNNs that we're talking about here
4 are going after computing probability density
5 functions and maximum posterior probabilities.
6 So a Bayesian network may not be doing that in a
7 sense.

8 Q. Okay.

9 A. You would have to show me some details
10 and technical descriptions to be able to give you
11 a more accurate answer, but I don't believe I
12 provided any opinions on Bayesian networks in my
13 declaration.

14 Q. When you say "a Bayesian network is
15 probabilistic," what do you mean?

16 A. Well, you could have your Bayesian
17 network constructed with nodes that are related
18 to probabilities, like there's -- you know, you
19 have nodes, for instance, that are arrows between
20 the nodes that might have probabilistic
21 dependencies and quantify conditional
22 probabilities like what's the probability of it's

1 raining given the sky is dark or whatever. You
2 know, you have those type of probabilities.

3 Q. Is there a way to use a Bayesian
4 decision theory that does not involve
5 probabilities?

6 A. Well, typically when you're using
7 Bayesian networks, you're typically -- I mean,
8 there's always exceptions to anything. But,
9 typically speaking, you're dealing with some type
10 of probabilities. But there are -- I mean, the
11 devil is obviously in the details and the direct
12 distinctions.

13 Q. Okay. So if a POSITA saw a disclosure
14 described as a Bayesian network, would a POSITA
15 understand that to refer to a probabilistic
16 neural network?

17 MR. GINNINGS: Objection to form
18 and scope.

19 A. Again, I mean, that's a very large
20 terminology. And I know what you're trying to
21 refer to. I mean, if you look at Djuric, for
22 instance, paragraph 126, it mentions Bayesian

1 networks. But that doesn't necessarily mean -- a
2 POSITA reading that doesn't necessarily deduce
3 from it -- because there's also a whole other
4 list of networks, right? It doesn't mean that
5 you have a probabilistic neural network that
6 computes probability density functions and deal
7 with, you know, Parzen windows or estimations of
8 posterior.

9 So there's a lot of technical
10 details here that would need to be filled in that
11 are obviously missing by that just one wording.
12 And, you know, patents typically do that a lot.
13 They'll just mention a whole bunch of stuff.

14 Q. So it's your testimony that even though
15 Djuric mentions a Bayesian network, a POSITA may
16 not understand Djuric to be implementing a
17 Bayesian network?

18 MR. GINNINGS: Objection, form.

19 A. And, again, as I mentioned to you, you
20 know, a POSITA -- a POSITA also reads here
21 obviously a feed-forward neural network, a
22 recurrent neural network, (e.g., a long

1 short-term memory recurrent neural...) -- you
2 know, there's a whole list of -- basically a
3 laundry list of networks.

4 So a POSITA reading Bayesian
5 network doesn't necessarily connect it
6 immediately with a probabilistic neural network.
7 It understands that it's a Bayesian network that
8 can be computing probabilities, but that could be
9 distinctly different from an ENN that talks about
10 density functions and it's not iterative in
11 nature, versus a Bayesian network is typically
12 iterative in nature.

13 Q. In your experience in this field, have
14 you ever worked with or seen a Bayesian network
15 that you would not describe as a probabilistic
16 neural network?

17 A. I mean, we've worked with a lot of
18 networks over the years. I would have to sit
19 down and look at some of the papers that we
20 published. We published a lot of papers in these
21 areas, so I would have to sit down and look
22 specifically at different papers.

1 But you can construct a Bayesian
2 network that may not necessarily be a
3 probabilistic neural network. Yes, it computes
4 probabilities, but it's not the PNN that we're
5 talking about here in the '579 disclosures.

6 Q. Is it your opinion that the PNN
7 discussed in the '579 is more specific than just
8 in any network using probabilities?

9 MR. GINNINGS: Objection to form
10 and scope.

11 A. Well, the '579 talks about a
12 probabilistic neural network.

13 Q. In your opinion, what's required for a
14 network to qualify as a probabilistic neural
15 network as that term is used in the '579 patent?

16 A. I mean, it discusses, you know -- for
17 instance, if you look at the '579 column 2, it
18 talks about obviously the probabilistic -- "the
19 system executes the probabilistic neural
20 network" -- I'm on line 23 -- "to generate output
21 representing hidden context," et cetera.

22 Line 31, you're talking about "the

1 probabilistic neural network is configured to
2 generate samples of features..." So it's
3 describing what its probabilistic neural network
4 is doing.

5 Q. Okay. And your understanding is those
6 are all requirements in order for a model to
7 qualify as a probabilistic neural network as
8 claimed in the '579 patent?

9 MR. GINNINGS: Objection, form,
10 scope.

11 A. Obviously it's describing what its
12 network is doing, right?

13 THE REPORTER: (Reporter
14 clarification.)

15 Q. Those requirements in the '579
16 specification are necessary for a neural network
17 to qualify as a probabilistic neural network as
18 that term is used in the claims of the '579
19 patent?

20 MR. GINNINGS: Objection to form
21 and scope.

22 A. Well, again, as I explained to you, the

1 '579 obviously talks about a probabilistic neural
2 network. If you look, for instance, at column 7
3 of the '579, you see it says -- line 22 you see
4 it says, "The neural network is a probabilistic
5 neural network that may generate different
6 outputs for the same input if the neural network
7 is executed repeatedly. However, the outputs
8 generated have a particular statistical
9 distribution," talks about means and standard
10 deviations. "The training process adjusts the
11 parameters of the neural network so that the
12 statistical distribution," et cetera.

13 And so they have a specific type
14 of probabilistic neural network that they're
15 describing here for the application that they're
16 using.

17 Q. And it's your opinion that the claims
18 are limited to that description of a
19 probabilistic neural network in column 7 of the
20 '579 patent?

21 MR. GINNINGS: Objection to form
22 and scope.

1 A. Well, I mean, the claims claim a
2 probabilistic neural network. The specification
3 describes a particular embodiment of that, but
4 the claims claim training a probabilistic neural
5 network as long as the network is configured to
6 perform the steps comprising of 1[a-i], 1[a-ii]
7 and 1[a-iii], it meets the description of the
8 claims. The limitations of the claims.

9 Q. Could a Bayesian network qualify as a
10 probabilistic neural network as used in the
11 claims?

12 MR. GINNINGS: Objection to form
13 and scope.

14 A. Well, first of all, it's a very
15 hypothetical question. Second of all, it's --
16 we're not talking about here about Bayesian
17 networks. And, third of all, I would have to see
18 the details of what you're talking about.
19 I would need to see what the network is comprised
20 of, how it's designed, what's the input, what the
21 outputs to see whether it meets the claim
22 limitations or not. So I wouldn't be able to

1 answer that on the fly here.

2 Q. Djuric discloses that it can be
3 implemented in a Bayesian network, correct?

4 MR. GINNINGS: Objection, form.

5 A. Djuric discloses the word Bayesian
6 network, that is correct. If you look at
7 paragraph 126 of Djuric and paragraph 132, it
8 mentions the word "Bayesian networks." Doesn't
9 provide any technical details of what that is,
10 how it's done, what's the structure of the
11 network or anything else.

12 Q. To clarify, are you referring to
13 paragraph 126 -- I'll read the sentence, and you
14 can tell me if I've got it right.

15 "As examples, the machine-learned
16 model 740 can be or can otherwise include various
17 machine-learning models such as, for example,
18 neural networks, (e.g. deep neural networks,)
19 support vector machines, decision trees, ensemble
20 models, k-nearest neighbor models, Bayesian
21 networks, or other types of models including
22 linear models and/or non-linear models."

1 Is that what you're referring to?

2 A. Yes, you read that sentence correctly.

3 And obviously it lists a laundry list of neural
4 networks which are very different in the way they
5 work.

6 So there is no description or any
7 technical details. I mean, like I mentioned to
8 you before, patents sometimes do this. Perhaps
9 it's marketing or whatever it is, but it's a
10 laundry list of networks that are distinctively
11 different. The decision tree's networks are very
12 different from Bayesian networks. So it's very
13 different from support vector machines. So these
14 are completely different networks, and there's no
15 technical details of how that would be done in
16 any of those networks.

17 Q. Okay. And when we were discussing
18 page 22 of the Djuric reference, we discussed
19 that the actual math in Djuric deals with
20 probabilities, right?

21 A. Correct. Yes, generally speaking.
22 Obviously, the devil is in the details, but yes,

1 it deals with probabilities.

2 Q. Do you think a POSITA would understand
3 how to implement the features in Djuric in a
4 probabilistic neural network?

5 A. Well, again, I mean, you're jumping --
6 you're making a very big leap of faith. So just
7 because I've given you a couple of equations, it
8 doesn't mean you can implement a network. So you
9 have to provide more details than that. And
10 Djuric doesn't describe -- I mean, the
11 probabilistic neural network that we're talking
12 about here in the claim that's being claimed has
13 a certain description to it, as claimed. And
14 that's what we're talking here, right, is it's
15 not just a generic PNN. It's as claimed in the
16 '579.

17 Q. Okay. Are you referring to limitations
18 of the claims in the '579 besides the words
19 "probabilistic neural network"?

20 A. If you look at the '579 and the
21 independent claims, you see -- I'm looking at
22 claim 1 obviously. The others are the same.

1 So if you see, it says training a
2 probabilistic neural network. Then that
3 probabilistic neural network, which has an
4 antecedent basis to a probabilistic neural
5 network configured to perform steps comprising.
6 So it has to be able to perform the receiving,
7 the generating, and the generating step as
8 described there.

9 That's what is claimed. So if you
10 design a Bayesian network that doesn't meet those
11 claimed elements, it doesn't meet the claims.

12 Q. I appreciate that. And thank you for
13 clarifying where we're at. I'm trying to
14 separate out the requirement in claim 1 to have a
15 probabilistic neural network from the other
16 requirements and the steps we've talked about
17 before.

18 And so my question is just with
19 regard to the requirement in claim 1 that the
20 neural network be a probabilistic neural network,
21 would a Bayesian network that uses probability in
22 its loss functions qualify as a probabilistic

1 neural network, setting aside whether it meets
2 the other requirements in the claim?

3 MR. GINNINGS: Objection to form
4 and scope.

5 A. And as I told you earlier, I would have
6 to see what that exact network is, what's the
7 technical details of it, what are the inputs to
8 that network. The inputs could be, for instance,
9 a set of features, not an image. So the claimed
10 PNN says receiving as input an image of traffic.
11 So the Bayesian network you're talking about
12 could be receiving a set of features, not
13 necessarily an image of traffic. And the image
14 of traffic in this case displaying the traffic
15 entity belonging to the traffic.

16 So there are some specific, you
17 know, things that are claimed here in detail that
18 just designing the generic Bayesian network
19 doesn't necessarily meet the claimed elements.
20 So I would have to see what the Bayesian network
21 you're talking about is, how is it designed,
22 what's the inputs, what does it generate, what

1 are the outputs. What type of statistical
2 distributions it's doing, et cetera. Then I can
3 do the analysis. But I can't do an analysis on
4 the fly on a hypothetical network that you're
5 proposing.

6 Q. We can move on.

7 I want to ask you about the '346
8 declaration.

9 A. Absolutely. Let me bring that up. Are
10 we done with the '579, do you think?

11 Q. Probably, but you might just leave it
12 open just in case.

13 A. All right. I'll do that. So let me go
14 ahead and open the '346. Yes, sir, I think I
15 have the '346 open.

16 Q. Okay. I'm looking at the table of
17 contents of your '346 declaration.

18 A. Yes, sir.

19 Q. And am I right that you addressed
20 grounds 1, 3, 5 and 7 in one group?

21 A. That is correct.

22 Q. And it looks like you've grouped

1 together three sub-elements that you dispute with
2 respect to those grounds. Is that right?

3 A. Yes, sir.

4 Q. That's 1[d-ii], 10[d-ii], 19[d-ii] and
5 then 1[d-iii], 10[d-iii], 19[d-iii]. And lastly,
6 1[d-v], 10[d-v] and 19[d-v]. Is that right?

7 A. That is correct, sir.

8 Q. And those are the only elements that
9 you dispute with respect to grounds 1, 3, 5, and
10 7?

11 A. Those are the ones that are discussed
12 in my declaration, that's correct.

13 Q. Then let's look at grounds 2, 4, 6 and
14 8. Am I right that you addressed those in one
15 combined group as well?

16 A. That is correct, sir.

17 Q. And is it the same sub-elements that
18 you dispute with respect to grounds 2, 4, 6 and
19 8?

20 A. That is correct, sir.

21 Q. Let's turn down to page 28 and
22 paragraph 64 of your declaration. Let me know

1 when you've got that in front of you.

2 A. Yes, sir, I have paragraph 64 in front
3 of me.

4 Q. Okay. And looking at your opinion
5 here, is it fair that the three limitations that
6 you dispute with respect to grounds 1, 3, 5, and
7 8 all involve hidden context?

8 MR. GINNINGS: Objection, form.

9 A. So I'm looking at the '346 patent, just
10 so we're talking about the same thing, and I'm
11 looking at claim 1. So they state what they are.
12 So 1[d-ii] talks about outputs summary statistics
13 of expected human responses described in a hidden
14 context. 1[d-iii] talks about determining the
15 hidden context of the traffic entity. And then
16 1[d-v] is talking about modifying the region
17 based on the hidden context. And obviously if
18 you look at the claim 1, those might be the
19 slightly longer -- you know, like 1[d-v] says
20 modifying the region based on the hidden context
21 of the traffic entity and... so I'm just focusing
22 here on the important pieces.

1 Q. Okay. Scrolling down, you have a
2 heading 1 on page 29 that says, "Djuric does not
3 teach 'hidden context.'" Do you see that?

4 A. Yes, sir.

5 Q. And if you look at paragraph 65, you
6 refer to -- at the second-to-last sentence,
7 "Djuric's disclosure of 'goal-based prediction'
8 aligns with the '579 patent's description of
9 'hidden context.'"

10 A. That's probably a typo.

11 Q. That's fine. My question here is,
12 really, is there anything about your opinions
13 regarding Djuric and hidden context that differs
14 between the '346 and the '579 patents?

15 A. Not that I recall off the top of my
16 head.

17 Q. Okay. And so we had a lengthy
18 conversation earlier today with regards to hidden
19 context and Djuric in the context of the '579
20 patent. Was there anything from that discussion
21 that would be different with respect to the '346
22 patent?

1 MR. GINNINGS: Objection to form.

2 A. I mean, obviously I address this in
3 my -- my declaration addresses the -- why Djuric
4 does not teach hidden context with regards to the
5 claims elements of here, which are different from
6 the '579.

7 So if you look at the '579 claim
8 elements, there are differences between them,
9 right, and obviously, as counsel has always told
10 me -- or taught me over the years, those
11 differences are important.

12 So if you look at the '579 claim 1
13 and compare them to the '346 claim 1, there
14 are -- you know, there are several differences.
15 So my declaration addresses that in light of the
16 claim of the '346 exactly. So there might be
17 some minor differences in the way things are
18 addressed because they're addressing the '346
19 exactly, which obviously, as I said, are
20 different -- the claim language isn't exactly the
21 same.

22 Q. We had a discussion about how the '579

1 patent describes hidden context and what hidden
2 context means in connection with the '579 patent.
3 In your opinion, is anything that we discussed
4 regarding hidden context and the meaning and the
5 '579 patent different for the '346 patent?

6 MR. GINNINGS: Objection to form.

7 A. I mean, paragraph 66 appears to be the
8 same, addressing obviously the hidden context
9 here, right? So "the term 'hidden context' does
10 not require any construction." I'm talking about
11 paragraph 66 of the '346 declaration and
12 describes it there.

13 Q. Well, in the -- at the risk of
14 repeating what was an onerous line of
15 questioning, I will ask again, this last sentence
16 in paragraph 66 says "...in my opinion, 'hidden
17 context' encompasses information that is not
18 directly observable from an image."

19 Do you see that?

20 A. Yes.

21 Q. And can you tell me whether this
22 sentence means that hidden context must include

1 information that is not directly observable from
2 an image or if it just means hidden context may
3 include information that is not directly
4 observable from an image?

5 MR. GINNINGS: Objection to form.

6 A. I think we went over this quite a bit
7 this morning, so I'll basically just say it's the
8 same answer I've given you this morning. It
9 encompasses -- and this is -- so this
10 paragraph 66 is very similar -- if you compare it
11 to the '579 declaration, it's very similar to
12 paragraph 69 of the '579. There are some minor
13 word differences, but it's very similar to it.
14 So, again, encompasses means including, contains,
15 as I explained to you earlier this morning.

16 Q. So you're not going to tell me whether
17 it may include or can include?

18 MR. GINNINGS: Objection to form.

19 A. Again, as I mentioned this morning, the
20 word "encompass" contains, includes -- as I've
21 discussed, it encompasses information that's not
22 directly observable from an image. I don't want

1 to change its meaning by using some other
2 wording.

3 Q. Would you agree with me that it's
4 ambiguous?

5 MR. GINNINGS: Objection to form.

6 A. I don't believe it's ambiguous.
7 I think it's fairly straightforward. Encompasses
8 information that's not directly observable from
9 an image. I don't know what's so ambiguous about
10 it. If I take a student from my classroom and I
11 asked them "encompasses information," they would
12 understand it.

13 Q. I understand that your answer is no
14 different for the '346 and '579, and we can move
15 on.

16 MR. GINNINGS: Object as
17 argumentative and counsel testifying.

18 Q. Let's turn to paragraph 74.

19 A. Yes, sir.

20 Q. And you have a section here that's
21 under a heading "Djuric does not teach output
22 summary statistics of expected human responses

1 describing a hidden context."

2 Do you see that?

3 A. I do see that, yes, sir.

4 Q. And the phrase "summary statistics"
5 appears in the '046 and '889 patents as well,
6 right?

7 A. If I recall off the top of my head,
8 that is correct, yes.

9 Q. Okay. And did you attribute a
10 different meaning to summary statistics in the
11 '346 patent compared to the '046 and '889
12 patents?

13 A. Well, again, I mean, when I read the
14 '346 patent, I'm reading the claims in light of
15 the '346 specification and prosecution history,
16 et cetera. And sometimes words are slightly
17 different. But when I'm looking at the '346, I'm
18 reading its specification and how it describes
19 these things compared to something else.

20 Q. Okay. Is it your opinion that there
21 are numbers that could constitute summary
22 statistics with respect to the '046 and '889 but

1 not the '346?

2 MR. GINNINGS: Objection to form
3 and scope.

4 A. Well, the '346 obviously has the term
5 "hidden context" in it, and that term doesn't
6 appear in the other -- let me open up the '344
7 patent for a moment.

8 So if you look at the '344
9 patent -- and again, I'm looking at claim 1 just
10 for the sake of simplicity. So if you look at
11 claim 1 of the '344 patent, the term "statistical
12 summary" in the claims -- so you have "predicting
13 an output statistical summary characterizing a
14 distribution of user responses expected to be
15 received," et cetera. So that statistical
16 summary is characterized in a distribution.

17 If you look at the '346, it talks
18 about an output statistical -- output summary
19 statistic of expected human responses describing
20 a hidden context. So that's -- no, something
21 told me different, so it's -- you know, you have
22 to read this in light of the specification of the

1 '346 and what it's describing. So this is
2 talking about a hidden context. The previous one
3 is talking about the -- the '344 is talking about
4 a distribution of user responses, characterizing
5 a distribution of user responses versus
6 describing a hidden context.

7 Q. Thank you for that explanation.

8 I understand that there are
9 additional claim terms besides summary statistics
10 in all of these patents. I'm trying to ask
11 specifically just about the claim terms "summary
12 statistics." So setting aside whether or not the
13 other requirements of these claims would be
14 satisfied, is there anything additional required
15 for something to count as a summary statistic in
16 the '346 patent compared to the '046 or '889
17 patents?

18 MR. GINNINGS: Objection to form.

19 A. I already answered your question, and
20 that's what I initially thought you asked, and I
21 answered that question.

22 In the '346, it says -- if you

1 look at the claim element 1[d-ii], it says "and
2 output summary statistic of expected human
3 responses describing a hidden context of the
4 input traffic entity."

5 So the summary statistics in the
6 '346 are describing a hidden context of the
7 traffic entity. The summary statistic -- or the
8 statistical summary of the '344 are characterized
9 in a distribution of user responses expected to
10 be received, et cetera.

11 So the claim elements are claiming
12 different stuff. So you have to read it in light
13 of this -- its own claim, claim elements and
14 specification.

15 Q. I think you were mentioning that claim
16 1 of the '344 patent uses the verb
17 "characterizing" while the '346 patent uses the
18 verb "describing." Is that right?

19 A. That's correct.

20 Q. Do those words have different meanings
21 to you?

22 MR. GINNINGS: Objection, form and

1 scope.

2 A. Well, I mean, you're going to read it.
3 Words obviously have meaning in context, right,
4 so you have to read it in the context of what's
5 being discussed here. So in the '346 it says
6 "output summary statistics of expected human
7 responses describing a hidden context." So that
8 output summary statistic is going to describe a
9 hidden context versus the statistical summary of
10 the '344 characterizes a distribution of user
11 responses. But there are slightly different
12 meanings here because you're looking at a user
13 response -- a distribution of user responses,
14 which is -- let's assume it's a Gaussian
15 distribution. So the statistical summary is
16 going to try to characterize that distribution
17 rather than describe a hidden context. So there
18 are some slight -- there are different meanings
19 in the way it's described, let's put it that way.

20 Q. I certainly understand that there's
21 differences in what is being described and what
22 is being characterized. But just in terms of

1 what those verbs by themselves mean, are you
2 using the word -- not using.

3 Are you interpreting the word
4 "characterizing" different from the word
5 "describing"?

6 A. I'm interpreting it as plain and
7 ordinary meaning of what's being claimed. Like I
8 just explained to you, the '344 says "statistical
9 summary characterizing a distribution of user
10 responses." Let me give you an example.

11 So assume the user response is a
12 Gaussian -- two-dimensional Gaussian probability
13 density function. Then a statistical summary
14 might be the mean and the covariance matrix. So
15 those two -- I give you the mean and the
16 covariance matrix, you can characterize a
17 distribution -- a Gaussian distribution. It
18 doesn't describe a Gaussian distribution because
19 to describe it, you would have to show a normal
20 distribution the way it looks. You're
21 characterizing it by using its mean and
22 covariance matrixes, versus in the '346, you're

1 saying the output -- the '346 is saying the
2 output summary statistic described a hidden
3 context, which is what it's trying to target in
4 that.

5 So there are differences in the
6 way it's intended and utilized in the claims.

7 Q. Okay. Let me turn to the '346 patent
8 itself. Can you pull that up?

9 A. Yeah, I do have that open, sir.

10 Q. Okay. Do you see Figure 4 of the '346
11 patent, which is on page 6 of the PDF?

12 A. Figure 4, you said? Yeah, I do see it.

13 Q. And is Figure 4 an accurate description
14 of what's in the '346 patent?

15 A. Well, I mean, Figure 4 describes what
16 it describes. I mean, there are other figures in
17 a patent, right; it's not just one figure and one
18 description.

19 Q. Let me ask it this way. Does Figure 4
20 of the '346 patent align with your understanding
21 of the claims of the '346 patent?

22 MR. GINNINGS: Objection to form.

1 A. Well, I mean, Figure 4 is just one
2 description of an entire specification, right?
3 So if you look back at the patent itself -- I'm
4 looking at column 4, line, say, 8 to 11.
5 Figure 4 describes "a flow chart showing a
6 process of training and machine-learning based
7 model to predict hidden context information
8 describing traffic entities, according to some
9 embodiments of the invention."

10 So that's what it's describing. I
11 mean, there's other figures obviously that
12 predict state of mind and other stuff. So it's
13 not just the only figure in the whole
14 description.

15 Q. Figure 4 refers to, in step 410,
16 "generate statistics based on the response." Do
17 you see that?

18 A. Yes.

19 Q. And then the next step is to "train a
20 model based on the statistics"?

21 A. Yeah, I see that.

22 Q. And then step 414 would be "apply model

1 to other video data to generate a prediction of
2 user behavior associated with the other video
3 data."

4 Do you see that?

5 A. I see that.

6 Q. And would you agree with me that these
7 are steps that are consistent with the claims of
8 the '346 patent?

9 MR. GINNINGS: Objection to form.

10 A. I mean, this is obviously one
11 embodiment, right, as it says. You know,
12 Figure 4, as you look at the description of
13 Figure 4, it says it's "a flow chart showing the
14 process of training and machine-learning based
15 model to predict hidden context information
16 describing traffic entities, according to some
17 embodiments of the invention."

18 So the claims claim what they
19 claim. There are embodiments of how those claims
20 can be achieved, and Figure 4 is describing a
21 flow chart essentially about a training and
22 machine-learning based model.

1 Q. Let me ask you a more general question.
2 Are you interpreting the claims of the '346
3 patent in a way that would exclude any
4 embodiments described in the specifications of
5 the '346 patent?

6 MR. GINNINGS: Objection to form
7 and scope.

8 A. I think you're jumping to something
9 completely different here. So my assignment here
10 was to look at the claims of the '346, review the
11 Tesla IPR application that basically challenged
12 those claims, and render an opinion whether the
13 prior art that's produced by Tesla in their
14 arguments read on the claims -- the '346 claims
15 or not. And that's the analysis I've conducted
16 here. I wasn't asked to conduct whether there is
17 exclusion of embodiments or anything else in the
18 patent.

19 Q. Okay. So you don't know if your
20 interpretation of the claims of the '346 patent
21 would exclude any embodiments described in the
22 specification of the '346 patent?

1 MR. GINNINGS: Objection to form
2 and scope.

3 A. I wasn't asked to conduct such an
4 analysis. What I was asked to conduct is what it
5 says there in my declaration, the scope of my
6 analysis, what I was asked to conduct, and I've
7 done that.

8 So if there's something else that
9 needs to be done, I would need to be asked to do
10 so, specify exactly the scope of it, and I would
11 be happy to perform that analysis.

12 Q. So you have not done the analysis to
13 see if your interpretation of the claims of the
14 '346 patent would exclude any embodiments
15 described in the specification of the '346
16 patent, right?

17 MR. GINNINGS: Objection to form.

18 A. I wasn't asked to perform such an
19 analysis. I was asked to look at the claims of
20 the '346 versus, you know, vis-a-vis the Tesla
21 IPR, you know, petition and prior art and perform
22 the analysis.

1 Q. Okay. Dr. Saber, have you given any
2 statements during your deposition, either today
3 or yesterday, that you would like to correct or
4 change?

5 A. No, sir, I do not.

6 Q. And during today's deposition and on
7 the breaks today, have you discussed the
8 substance of your testimony with anybody?

9 A. No, sir, I have not.

10 MR. SPEEGLE: Okay. I pass the
11 witness.

12 MR. GINNINGS: Let's take a short
13 break here. I'll check over my notes and
14 see if I have anything for Dr. Saber.

15 MR. SPEEGLE: Okay. Off the
16 record and back in ten minutes.

17 MR. GINNINGS: Sure. That works.

18 (Recess taken)

19 MR. GINNINGS: Back on the record
20 now. This is Austin Ginnings from Nelson
21 Bumgardner Conroy.

22 Dr. Saber, thank you very much for

1 your time yesterday and today answering
2 Tesla's counsel's questions. I don't have
3 anything for you today, and with that, we
4 can go back off the record.

5 MR. SPEEGLE: Laurie, I would like
6 a rough. Delivery in five days? Is that
7 okay?

8 THE REPORTER: Yes. Mr. Ginnings?

9 MR. GINNINGS: I don't need the
10 rough and standard turnaround is good for
11 me.

12 (Deposition concluded at 1:16 p.m.)

13

14

15

16

17

18

19

20

21

22

REPORTER'S CERTIFICATE

REMOTE ORAL DEPOSITION OF ELI SABER, Ph.D.

August 12, 2026

I, the undersigned Certified Shorthand Reporter in and for the State of Texas, certify that the facts stated in the foregoing pages are true and correct.

That ELI SABER, Ph.D., the witness whose deposition is hereinbefore set forth, was duly sworn by me before the commencement of such deposition and that such deposition was taken before me and is a true record of the testimony given by such witness.

I further certify that the adverse party, PATENT OWNER, was represented by counsel at the deposition.

1 I further certify that the deposition
2 of ELI SABER, Ph.D., occurred virtually on
3 August 12, 2026, commencing at 8:14 a.m. to 1:16 p.m.
4

5 I further certify that I am not related to
6 any of the parties to this action by blood or
7 marriage, I am not employed by or an attorney to
8 any of the parties to this action, and that I am
9 in no way interested, financially or otherwise, in
10 the outcome of this matter.
11

12 SUBSCRIBED AND SWORN TO under my hand
13 and seal of office on this the 18th day of
14 August, 2026.
15

16 

17 Laurie Carlisle, CSR

18 Texas CSR 2205

19 Expiration: 2/28/28

20 PLANET DEPOS
21
22

A			
a-b	acceleration	504:14	475:13, 476:8,
453:1, 453:10	418:8, 423:11,	address	480:17, 482:19,
a-i	426:13, 435:5	498:2	483:19, 486:22,
405:7, 407:18,	access	addressed	491:5, 499:15,
411:16, 488:6	411:22	382:15, 439:15,	500:14, 500:19,
a-ii	accompany	440:5, 440:12,	502:13, 503:9
405:7, 407:18,	407:7	494:19, 495:14,	agree
411:16, 488:6	accomplish	498:18	357:1, 369:12,
a-iii	382:14, 429:14	addresses	387:6, 416:11,
379:13, 405:7,	accomplished	498:3, 498:15	417:2, 434:3,
407:18, 411:17,	407:19	addressing	434:11, 444:14,
439:22, 440:1,	according	467:20, 498:18,	445:4, 455:13,
441:1, 470:8,	355:14, 367:13,	499:8	455:21, 467:2,
472:7, 488:7	408:18, 456:6,	adds	478:5, 501:3,
aa	480:9, 509:8,	368:4	510:6
352:6, 439:19,	510:16	adjusting	ahead
440:6, 471:9,	accuracy	356:17	351:4, 353:13,
471:18, 472:21,	458:6	adjusts	469:15, 494:14
473:21, 474:1,	accurate	487:10	airplane
474:7, 476:21,	379:17, 458:4,	advanced	370:4
477:4, 477:5,	481:11, 508:13	376:2, 376:20,	algorithm
477:9, 477:10,	accurately	449:5	430:9
477:19, 477:22,	352:22	adverse	align
478:11	achieve	515:17	508:20
abbreviated	384:2, 384:16,	affect	aligns
352:6	388:8	362:20, 363:8,	497:8
able	achieved	363:19, 364:14,	all
361:12, 370:13,	510:20	365:17, 393:18	353:3, 353:14,
371:9, 375:3,	across	affects	353:16, 354:7,
380:17, 380:21,	361:10, 362:14,	364:16	354:13, 358:20,
481:10, 488:22,	372:21	after	367:6, 370:20,
492:6	action	366:18, 384:1,	371:16, 373:19,
above	516:6, 516:8	402:22, 466:16,	388:3, 406:7,
458:4, 466:19,	actions	481:4	418:3, 418:22,
468:21, 473:9,	356:20, 356:21	again	425:14, 431:17,
474:1	actual	361:17, 365:12,	434:1, 441:8,
above-styled	373:8, 409:15,	369:19, 372:12,	444:17, 445:13,
346:10	441:5, 490:19	373:6, 375:17,	448:15, 449:20,
absence	actually	375:18, 380:7,	450:19, 451:14,
473:7	367:3, 383:10,	381:12, 384:8,	458:22, 461:5,
absolutely	386:9, 391:7,	384:18, 390:20,	461:12, 461:17,
351:2, 383:8,	418:18, 427:3,	393:7, 396:8,	462:13, 462:16,
458:7, 494:9	429:13, 429:17,	397:11, 408:16,	464:4, 466:3,
abstract	430:17	410:14, 427:5,	467:14, 467:17,
427:7, 427:8,	addition	429:8, 437:21,	472:4, 472:6,
427:13	460:1, 477:18	447:20, 455:19,	472:13, 486:6,
	additional	457:12, 459:11,	488:14, 488:15,
	460:3, 504:9,	470:12, 473:17,	488:17, 494:13,

496:7, 504:10 alleged 366:15, 377:4, 394:10, 446:13, 452:1 allegedly 365:15 alleges 443:6 allow 431:9 along 372:17, 456:14, 456:17, 465:3, 465:8, 465:20, 466:1, 466:4, 467:21 already 353:4, 361:9, 381:10, 393:12, 393:15, 396:8, 397:6, 403:18, 428:13, 477:5, 477:19, 478:5, 478:9, 504:19 also 350:12, 351:17, 352:7, 364:2, 364:3, 387:21, 406:2, 407:12, 408:10, 413:13, 417:10, 426:19, 433:14, 436:16, 438:14, 439:12, 456:7, 468:16, 469:21, 474:4, 474:16, 474:22, 476:1, 479:9, 480:21, 481:3, 483:3, 483:20 always 363:13, 364:13, 398:10, 461:13, 482:8, 498:9 ambiguous 394:18, 501:4, 501:6, 501:9 amount 359:15	analysis 371:20, 376:9, 378:2, 381:5, 473:2, 494:3, 511:15, 512:4, 512:6, 512:11, 512:12, 512:19, 512:22 analyze 380:19 analyzed 379:12 analyzing 374:1, 378:20 another 384:9, 428:4, 441:22, 463:21 answer 372:16, 381:11, 384:5, 384:9, 384:14, 410:6, 418:18, 418:20, 424:5, 424:10, 426:5, 434:10, 437:15, 444:10, 447:9, 453:21, 481:11, 489:1, 500:8, 501:13 answered 381:10, 384:8, 447:10, 504:19, 504:21 answering 366:12, 514:1 answers 367:4 antecedent 492:4 any 350:18, 352:21, 361:13, 370:3, 373:8, 375:4, 379:1, 379:21, 380:16, 381:1, 381:13, 381:15, 388:22, 389:10, 390:15, 393:10, 407:4, 414:15,	414:17, 443:4, 446:11, 446:16, 447:22, 448:9, 450:6, 451:21, 456:16, 457:4, 481:12, 485:8, 489:9, 490:6, 490:16, 499:10, 511:3, 511:21, 512:14, 513:1, 516:6, 516:8 anybody 350:22, 513:8 anyone 349:19, 349:22 anything 350:16, 411:6, 459:13, 482:8, 489:11, 497:12, 497:20, 499:3, 504:14, 511:17, 513:14, 514:3 apologize 364:6 apologizing 366:10 appeal 345:2 appear 355:10, 503:6 appearances 347:1 appears 417:16, 418:10, 462:19, 499:7, 502:5 apples 434:8 application 348:9, 348:12, 348:14, 378:1, 391:4, 395:12, 399:15, 434:5, 477:10, 477:13, 487:15, 511:11 applied 372:21, 373:18, 374:4, 382:22,	454:6 apply 393:11, 509:22 applying 374:2, 431:20, 431:22, 434:17 appreciate 367:4, 492:12 approaching 425:7 area 424:2, 425:21, 427:10, 427:21, 428:16 areas 484:21 arguing 375:12 argumentative 373:13, 375:10, 395:4, 410:13, 424:14, 426:8, 437:20, 446:9, 447:12, 447:19, 501:17 arguments 473:20, 511:14 around 361:18, 376:8, 393:8 arrows 410:21, 410:22, 411:2, 481:19 art 351:15, 352:5, 352:17, 370:10, 371:22, 376:1, 376:19, 415:14, 441:18, 449:17, 449:22, 450:4, 511:13, 512:21 aside 493:1, 504:12 asked 353:4, 374:13, 374:18, 376:4, 376:15, 380:1, 380:2, 382:12,
---	--	---	--

419:17, 501:11, 504:20, 511:16, 512:3, 512:4, 512:6, 512:9, 512:18, 512:19 asking 364:20, 366:20, 369:19, 371:9, 398:13, 408:14, 410:3, 424:12, 426:10, 437:5, 437:16, 441:6, 448:3, 448:4, 448:7, 459:22 assessments 475:17 assignment 374:11, 374:18, 375:20, 511:9 associated 412:13, 412:18, 421:2, 421:5, 427:9, 427:20, 428:11, 428:16, 428:20, 438:15, 455:15, 465:8, 510:2 assume 350:12, 506:14, 507:11 assuming 400:4, 417:5, 458:17, 461:15, 461:16, 462:16, 463:11, 466:2, 466:3, 467:16, 467:17, 468:14 assumption 460:20, 461:11, 461:13, 461:14, 462:13, 464:4, 467:14 attempts 350:22 attend 364:3 attention 383:14	attorney 516:7 attribute 402:21, 414:7, 502:9 attributes 402:8 august 345:24, 346:11, 515:3, 516:3, 516:14 austin 347:8, 347:13, 349:4, 376:21, 382:5, 447:7, 469:15, 513:20 austin@nelbum 347:18 automata 345:7 autonomous 356:12, 356:16, 357:16, 358:7, 358:9, 358:10, 359:5, 359:18, 360:11, 360:19, 360:22, 362:1, 362:2, 363:22, 365:2, 366:9, 371:3, 371:5, 371:19, 384:20, 384:21, 385:13, 386:7, 388:17, 388:19, 389:9, 389:21, 390:3, 390:8, 390:10, 390:16, 390:18, 391:3, 391:12, 399:15, 404:11, 416:4, 419:3, 423:4, 427:18, 437:9, 475:15, 475:16, 475:19, 476:10, 477:11 availability 411:5 available 407:12, 408:9,	409:21 aware 414:9 awareness 363:21, 475:2 away 456:2 B back 362:17, 382:8, 389:4, 397:13, 397:15, 397:16, 400:2, 403:12, 409:13, 410:21, 419:22, 422:10, 442:21, 443:9, 450:19, 452:8, 459:20, 466:12, 470:3, 470:18, 470:21, 479:2, 509:3, 513:16, 513:19, 514:4 backbone 426:17, 427:6, 427:22 bad 455:18 baker 347:6, 349:2 bank 368:1, 369:22, 370:3 banking 370:4 barazesh 347:5, 349:3 based 356:13, 375:2, 393:13, 396:12, 413:16, 414:21, 419:13, 422:12, 425:18, 427:1, 428:19, 442:7, 473:8, 473:21, 496:17, 496:20, 509:6, 509:16, 509:20, 510:14,	510:22 basic 434:6 basically 359:16, 361:18, 369:2, 407:11, 411:19, 430:2, 446:11, 450:5, 452:19, 463:14, 465:11, 481:1, 484:2, 500:7, 511:11 basis 492:4 bayesian 479:22, 480:5, 480:13, 480:15, 480:19, 480:21, 481:6, 481:12, 481:14, 481:16, 482:3, 482:7, 482:14, 482:22, 483:15, 483:17, 484:4, 484:7, 484:11, 484:14, 485:1, 488:9, 488:16, 489:3, 489:5, 489:8, 489:20, 490:12, 492:10, 492:21, 493:11, 493:18, 493:20 because 351:3, 352:6, 355:1, 356:11, 357:14, 358:15, 359:6, 359:19, 360:5, 385:11, 390:15, 393:22, 395:11, 395:19, 396:15, 400:4, 412:16, 422:20, 430:5, 430:15, 432:10, 432:15, 433:5, 433:12, 433:15, 433:17, 436:11, 441:6, 458:22, 459:4,
--	---	---	--

461:3, 461:10, 462:7, 464:13, 466:1, 466:8, 480:22, 483:3, 491:7, 498:18, 506:12, 507:18 been 372:19, 374:4, 386:14, 403:17, 404:18, 408:10, 416:14, 416:17, 452:15, 468:1, 476:5, 477:14 before 345:2, 346:12, 351:3, 351:12, 352:2, 352:14, 355:1, 369:12, 418:18, 441:15, 468:10, 469:18, 471:2, 490:8, 492:17, 515:12, 515:14 beginning 351:9, 351:18, 352:9, 382:11, 389:6, 396:20, 412:5 begins 351:6, 441:10 behalf 349:5 behave 415:10 behavior 362:20, 363:8, 363:19, 364:14, 364:16, 365:18, 366:6, 393:18, 415:21, 416:12, 510:2 behaviors 365:8 being 367:12, 374:16, 389:2, 390:9, 446:22, 447:4, 449:2, 456:16,	458:22, 464:11, 464:17, 470:4, 491:12, 506:5, 506:21, 506:22, 507:7 believe 353:11, 367:10, 368:17, 379:1, 381:10, 382:15, 384:8, 399:8, 442:8, 451:11, 474:4, 474:15, 481:11, 501:6 believes 414:6, 414:8 belonging 493:15 below 409:8, 459:3 besides 414:15, 491:18, 504:9 best 395:5, 395:7 better 395:17, 458:19 between 355:9, 452:5, 454:22, 459:9, 459:17, 469:4, 469:7, 481:19, 497:14, 498:8 beyond 434:21 bicyclist 414:9 big 401:12, 463:2, 491:6 bigger 457:21, 464:21 binders 353:5 bit 377:8, 393:8, 398:14, 456:20, 463:1, 464:21, 500:6	blood 516:6 board 345:2, 447:8 both 349:3, 366:16, 456:15, 471:3, 477:5, 477:19 bottom 457:13, 457:15, 467:12 botts 347:6, 349:2 box 410:17, 428:12, 428:21 break 381:20, 381:22, 418:19, 418:21, 419:18, 468:3, 468:5, 468:10, 513:13 breaks 513:7 bring 401:6, 494:9 broad 363:11, 365:10 browser 350:15 bumgardner 347:14, 349:5, 513:21 bunch 351:8, 478:8, 478:9, 483:13 burden 446:15, 449:20, 450:1 burr 347:16 butt 375:14 C calculated 458:3, 466:18, 467:3	call 359:17, 447:8, 459:18 called 423:20, 449:4 calling 412:14 camera 399:17, 399:18 can't 381:7, 394:3, 395:14, 397:1, 494:3 cannot 352:22, 425:14 canyon 358:5, 360:22, 362:16 capital 463:11, 463:12 captioned 441:22 captured 418:5, 444:1, 444:7, 444:12, 444:17, 445:12, 445:15, 449:15, 450:11 capturing 399:16, 399:19, 444:13, 444:22 car 360:1, 360:13, 362:15, 385:13, 385:14, 397:14, 397:15, 400:1, 400:4, 418:4, 418:6, 431:10, 434:14, 434:16, 475:16 carlisle 346:12, 516:17 cars 358:19 case 345:11, 345:13, 345:15, 345:17, 345:19, 400:14,
---	--	---	---

403:18, 404:20, 405:11, 417:16, 432:11, 433:6, 449:11, 456:5, 469:10, 477:20, 479:10, 493:14, 494:12 cause 346:10 central 346:12 certain 385:1, 491:13 certainly 369:10, 438:18, 439:6, 506:20 certificate 515:1 certified 346:13, 515:5 certify 515:6, 515:17, 516:1, 516:5 cetera 364:1, 374:7, 375:22, 376:2, 380:12, 385:3, 388:13, 393:19, 401:16, 409:14, 411:2, 414:10, 423:11, 424:2, 434:19, 444:2, 445:16, 452:18, 485:21, 487:12, 494:2, 502:16, 503:15, 505:10 challenged 373:20, 377:6, 377:16, 439:1, 511:11 change 360:4, 392:13, 398:14, 435:4, 501:1, 513:4 changes 395:19, 431:19, 434:4 characterization 368:20	characterize 359:22, 461:4, 461:6, 506:16, 507:16 characterized 503:16, 505:8, 506:22 characterizes 506:10 characterizing 503:13, 504:4, 505:17, 507:4, 507:9, 507:21 chart 429:6, 430:7, 509:5, 510:13, 510:21 charts 430:2 check 349:19, 513:13 circles 456:1 citation 356:3, 393:17 citations 416:18 claim 355:11, 364:10, 369:8, 374:8, 374:9, 378:4, 378:7, 378:8, 378:10, 378:12, 378:14, 378:20, 379:2, 379:4, 379:8, 379:12, 379:13, 379:18, 379:22, 380:2, 380:5, 380:21, 381:3, 381:8, 381:13, 381:15, 387:8, 396:10, 405:1, 405:2, 405:3, 407:17, 408:3, 408:8, 409:21, 411:15, 449:21, 450:2, 470:2, 470:4,	470:5, 470:7, 470:16, 472:14, 476:14, 477:18, 488:1, 488:4, 488:21, 491:12, 491:22, 492:14, 492:19, 493:2, 496:11, 496:18, 498:7, 498:12, 498:13, 498:16, 498:20, 503:9, 503:11, 504:9, 504:11, 505:1, 505:11, 505:13, 505:15, 510:18, 510:19 claimed 409:21, 474:7, 486:8, 491:12, 491:13, 491:15, 492:9, 492:11, 493:9, 493:17, 493:19, 507:7 claiming 505:11 claims 353:21, 354:10, 354:16, 368:8, 368:10, 372:21, 373:20, 374:1, 374:2, 375:21, 376:2, 377:7, 378:3, 379:14, 379:15, 380:10, 380:14, 380:15, 381:16, 381:18, 386:5, 388:15, 389:19, 395:13, 396:11, 404:21, 470:6, 476:13, 486:18, 487:17, 488:1, 488:4, 488:8, 488:11, 491:18, 491:21, 492:11, 498:5, 502:14, 503:12, 504:13, 508:6, 508:21, 510:7,	510:18, 510:19, 511:2, 511:10, 511:12, 511:14, 511:20, 512:13, 512:19 clarification 486:14 clarify 364:8, 364:17, 365:12, 392:12, 395:1, 489:12 clarifying 492:13 class 449:4, 480:7 classification 458:5, 459:2 classifier 480:4 classifies 480:8 classroom 501:10 clean 353:8 clear 394:15, 395:22, 398:8, 398:15, 398:18, 431:7, 447:4, 453:2 clearly 450:18, 462:21 close 389:15, 391:8, 439:7 cnn 478:17, 478:21, 479:7, 479:18, 480:11 collected 445:9, 449:9 colorado 446:1 column 356:10, 387:7, 387:12, 388:2, 388:3, 389:6, 389:7, 390:6,
--	---	--	--

401:10, 401:17, 402:4, 402:13, 403:12, 403:20, 404:8, 407:2, 408:22, 409:2, 409:4, 409:8, 411:12, 412:5, 412:9, 412:19, 414:4, 414:14, 417:14, 417:17, 417:20, 438:4, 438:6, 485:17, 487:2, 487:19, 509:4 com 347:10, 347:18 combination 473:20, 473:22 combine 476:21, 477:4 combined 423:20, 423:22, 427:22, 428:2, 428:19, 428:22, 473:1, 495:15 combining 423:18, 430:11 come 350:19, 350:20, 361:10, 362:14, 433:10 comes 460:5, 460:13 coming 364:4, 385:14, 397:14, 400:1, 432:13, 433:8, 435:9, 435:18, 436:6 commencement 515:12 commencing 516:3 commentary 447:12, 448:21 comments 373:14 common 415:13	communicate 350:22 compare 498:13, 500:10 compared 355:1, 362:13, 472:2, 502:11, 502:19, 504:16 completed 420:21 completely 477:9, 490:14, 511:9 component 402:16, 402:19 components 401:1, 402:15, 402:18, 403:1 comprised 488:19 comprises 402:15, 403:20 comprising 401:15, 405:6, 405:14, 405:20, 442:1, 442:6, 470:10, 471:13, 472:12, 488:6, 492:5 computed 458:21, 459:2 computer 350:3, 350:7, 427:14 computerized 346:14 computes 483:6, 485:3 computing 359:9, 359:11, 407:4, 438:9, 438:11, 452:14, 457:6, 457:8, 457:9, 457:10, 481:4, 484:8 concentric 456:1 concepts 456:20	conclude 424:5 concluded 514:12 conditional 481:1, 481:21 conditions 388:20, 390:18, 416:4, 475:20 conduct 511:16, 512:3, 512:4, 512:6 conducted 511:15 confidence 451:21, 452:5, 452:6, 454:2, 454:5, 454:10, 454:13, 454:18, 455:2, 455:8, 455:9, 455:12, 455:14, 456:3, 456:8, 456:11, 456:13, 456:15, 456:21, 456:22, 457:3, 457:4, 457:7, 457:8, 460:19, 462:3, 466:13, 467:3, 467:5, 469:21 configured 402:6, 405:6, 422:15, 486:1, 488:5, 492:5 confirm 417:6 conflicted 451:22 confusion 460:8 connect 484:5 connected 479:7, 479:19 connection 499:2 connections 410:20	conroy 347:14, 349:5, 513:21 consider 355:8, 365:19, 379:18, 380:2, 380:19, 475:8 considered 377:12, 380:4, 380:12 considering 429:13, 429:16, 477:21 consistent 510:7 constitute 502:21 constitutes 426:17 constraints 376:12 construct 485:1 constructed 480:18, 481:17 construction 364:10, 374:3, 378:18, 393:10, 499:10 contain 398:10 contains 392:20, 395:10, 395:22, 398:8, 398:9, 398:10, 408:8, 500:14, 500:20 contend 474:7 contents 439:5, 439:14, 441:4, 470:22, 471:8, 472:2, 494:17 contexts 372:8, 375:20, 431:3 contextual 475:2, 476:2
--	---	---	--

continue 357:10, 400:3, 409:7, 433:14, 435:2 continued 348:3 continues 401:18, 409:2 control 419:4 controlling 429:4 conventional 415:12, 417:11, 417:19, 417:21, 418:3 conversation 382:12, 497:18 copies 353:8 copy 386:14, 386:17, 401:7, 416:21, 418:17, 419:1 corner 362:8 correct 355:7, 356:2, 363:2, 363:3, 403:3, 404:8, 439:20, 440:14, 440:18, 441:3, 441:4, 441:13, 441:19, 442:3, 451:6, 451:13, 451:18, 458:9, 464:6, 465:6, 466:10, 468:16, 471:11, 474:2, 474:6, 476:3, 477:1, 489:3, 489:6, 490:21, 494:21, 495:7, 495:12, 495:16, 495:20, 502:8, 505:19, 513:3, 515:8 correcting 390:20	correctly 367:11, 367:18, 392:3, 415:7, 415:16, 417:13, 454:21, 471:16, 490:2 corresponding 379:14 corresponds 421:17, 421:20, 422:3 could 354:2, 357:3, 358:4, 360:14, 364:12, 364:15, 364:17, 370:3, 370:12, 370:22, 372:8, 373:21, 374:13, 374:14, 374:20, 376:17, 382:13, 383:4, 390:14, 406:15, 425:10, 435:19, 436:11, 445:18, 445:21, 448:14, 448:16, 448:18, 449:17, 450:9, 450:10, 450:13, 450:14, 481:16, 484:8, 488:9, 493:8, 493:12, 502:21 couldn't 397:7 counsel 353:6, 373:13, 468:1, 498:9, 501:17, 515:18 counsel's 514:2 count 377:13, 504:15 couple 389:14, 432:5, 438:5, 467:8, 491:7 course 350:14, 378:14,	434:4, 449:16 court 375:14, 460:10 covariance 461:3, 461:5, 461:6, 465:12, 465:15, 466:9, 507:14, 507:16, 507:22 cox 350:11, 377:9, 377:20, 377:22, 471:9, 471:12, 471:18, 472:21, 473:21, 474:4, 474:7, 474:13, 474:16, 474:22, 476:7 cox's 377:4 creates 428:1 cross 388:13, 397:8, 414:9 cross-entropy 459:7, 459:8 crosswalk 396:20, 396:21, 397:7, 397:9, 400:3, 400:6 csr 516:17, 516:18 curb 397:6, 399:8, 399:13, 399:21, 399:22 current 423:2, 423:9, 423:10, 427:16, 478:18 cut 384:4, 430:6, 444:9, 453:21, 459:12 cycling 357:11 cyclist 357:8, 357:10,	358:15, 359:14, 364:2, 365:3, 365:9, 385:14, 385:16, 394:2, 394:4, 396:17, 396:19 cyclists 356:22, 448:20 D d-ii 495:4, 496:12, 505:1 d-iii 495:5, 496:14 d-v 495:6, 496:16, 496:19 dark 482:1 dash 351:6, 351:10, 351:19, 352:9 data 399:17, 403:21, 406:17, 406:18, 409:15, 409:18, 411:5, 419:5, 419:6, 419:9, 419:14, 422:12, 422:13, 423:1, 423:8, 423:14, 423:18, 423:21, 423:22, 424:1, 424:18, 426:16, 427:1, 427:9, 427:15, 427:20, 427:22, 428:1, 428:2, 428:11, 428:13, 428:15, 428:19, 428:20, 428:22, 430:10, 430:11, 432:11, 432:12, 435:1, 435:11, 435:12, 435:13, 435:15, 435:16, 435:21, 443:21, 443:22,
--	---	--	--

444:2, 444:7, 444:12, 444:13, 444:15, 444:18, 444:20, 444:21, 445:8, 445:13, 445:14, 445:16, 445:17, 446:6, 447:16, 449:9, 449:14, 449:18, 461:9, 462:12, 467:12, 467:13, 510:1, 510:3 database 407:8, 407:11, 411:1, 412:1, 412:4, 412:11 day 346:10, 476:5, 516:13 days 358:5, 360:21, 362:15, 386:8, 388:21, 390:15, 514:6 deal 372:7, 483:6 dealing 482:9 deals 490:19, 491:1 dec 441:9, 450:22 decelerate 433:11, 433:15 decelerating 433:8, 433:9, 433:10, 433:18, 436:7 deceleration 435:6 decide 358:13, 397:14 decision 357:15, 374:8, 414:12, 480:1, 480:5, 482:4, 489:19, 490:11 decisions 358:12, 362:4,	362:11, 385:1, 414:13 declaration 353:11, 353:14, 353:17, 354:3, 354:4, 354:5, 354:8, 355:17, 362:18, 363:2, 376:3, 376:17, 379:2, 379:3, 379:11, 381:2, 381:12, 382:21, 383:7, 386:1, 391:15, 415:1, 439:5, 439:8, 439:11, 439:13, 439:16, 440:5, 440:21, 441:16, 442:13, 448:4, 450:20, 470:18, 470:19, 474:22, 476:18, 479:1, 479:2, 481:13, 494:8, 494:17, 495:12, 495:22, 498:3, 498:15, 499:11, 500:11, 512:5 decrease 436:9 deduce 483:2 deep 401:15, 489:18 define 369:22, 370:22 defined 366:1, 396:11, 457:18, 457:22 defines 370:6 degree 363:21, 399:9 delivery 514:6 density 480:6, 481:4, 483:6, 484:10,	507:13 denver 445:22 dependencies 481:21 dependent 378:7, 378:10, 378:12, 378:20, 379:7, 381:18, 387:8 depending 362:7, 435:4 depends 480:17 depicts 452:18 deploy 404:12 deployed 404:10 depos 516:20 deposition 345:22, 346:7, 349:12, 350:1, 351:1, 351:10, 380:18, 381:18, 513:2, 513:6, 514:12, 515:2, 515:11, 515:13, 515:19, 516:1 derive 406:18 derived 400:11, 404:17, 479:22, 480:5 deriving 413:8 describe 395:5, 395:7, 401:14, 423:8, 442:10, 484:15, 491:10, 506:8, 506:17, 507:18, 507:19 described 355:14, 357:3, 358:2, 369:3,	372:6, 383:4, 389:2, 390:9, 400:18, 414:14, 419:15, 424:21, 425:4, 428:9, 429:21, 430:16, 431:6, 449:1, 450:18, 455:1, 455:2, 459:19, 459:21, 467:5, 482:14, 492:8, 496:13, 506:19, 506:21, 508:2, 511:4, 511:21, 512:15 describes 356:15, 412:20, 413:5, 420:17, 426:15, 426:19, 426:21, 429:17, 451:20, 457:3, 488:3, 499:1, 499:12, 502:18, 508:15, 508:16, 509:5 describing 389:21, 389:22, 405:14, 418:16, 420:6, 470:14, 486:3, 486:11, 487:15, 502:1, 503:19, 504:1, 504:6, 505:3, 505:6, 505:18, 506:7, 507:5, 509:8, 509:10, 510:16, 510:20 description 354:19, 389:10, 401:9, 401:12, 409:1, 409:3, 413:20, 428:9, 429:6, 429:22, 430:8, 479:4, 479:15, 479:16, 479:17, 487:18, 488:7, 490:6, 491:13, 497:8,
---	---	---	--

508:13, 508:18, 509:2, 509:14, 510:12 descriptions 377:15, 377:22, 481:10 design 492:10 designed 488:20, 493:21 designing 493:18 desk 382:2, 419:20 detail 493:17 detailed 479:15 details 372:6, 481:9, 482:11, 483:10, 488:18, 489:9, 490:7, 490:15, 490:22, 491:9, 493:7 determine 454:2, 454:17, 455:7, 456:7, 456:11, 460:18, 469:4 determined 409:16 determines 368:4, 438:11, 438:12, 438:14, 438:16 determining 377:5, 451:20, 457:3, 496:14 deviations 487:10 device 411:2 devil 482:11, 490:22 difference 355:9, 469:7 differences 479:8, 498:8,	498:11, 498:14, 498:17, 500:13, 506:21, 508:5 different 357:18, 358:3, 360:5, 360:6, 361:11, 362:16, 364:12, 365:4, 369:4, 372:8, 372:21, 373:21, 374:21, 375:20, 376:6, 376:18, 380:1, 402:7, 405:8, 415:4, 418:12, 424:20, 431:3, 431:4, 437:22, 438:2, 459:1, 477:10, 477:13, 479:6, 479:18, 480:15, 484:9, 484:22, 487:5, 490:4, 490:11, 490:12, 490:13, 490:14, 497:21, 498:5, 498:20, 499:5, 501:14, 502:10, 502:17, 503:21, 505:12, 505:20, 506:11, 506:18, 507:4, 511:9 differently 369:5 differs 497:13 dig 462:22 direct 383:10, 383:13, 420:12, 450:20, 453:19, 454:15, 482:11 direction 364:5, 431:13, 431:14, 431:16, 432:7, 432:9, 433:1, 438:13 directions 431:19	directly 392:1, 392:5, 392:8, 392:10, 392:15, 392:21, 393:5, 393:21, 394:4, 394:6, 394:11, 394:16, 394:20, 394:22, 395:8, 395:10, 395:20, 395:22, 397:3, 397:19, 398:4, 398:7, 398:17, 399:2, 400:8, 400:10, 478:18, 499:18, 500:1, 500:3, 500:22, 501:8 disagree 443:3 disagreement 451:7, 451:9 disclose 442:6, 471:19 disclosed 415:5, 449:22, 450:3 discloses 442:8, 474:4, 476:8, 489:2, 489:5 disclosure 428:14, 429:19, 482:13, 497:7 disclosures 377:4, 485:5 disconnected 377:15 discuss 474:4 discussed 368:21, 377:8, 377:11, 377:19, 377:21, 387:11, 393:15, 407:17, 441:15, 468:16, 469:18, 469:20, 470:4, 471:2, 473:9, 473:22,	475:13, 485:7, 490:18, 495:11, 499:3, 500:21, 506:5, 513:7 discusses 409:12, 416:12, 459:17, 479:6, 485:16 discussing 370:21, 382:20, 396:10, 406:14, 416:15, 466:13, 466:22, 468:8, 470:3, 470:7, 470:15, 470:17, 490:17 discussion 385:21, 415:19, 497:20, 498:22 displaying 405:9, 493:14 dispute 471:17, 477:3, 495:1, 495:9, 495:18, 496:6 disputed 476:20 disputes 439:21 disputing 471:3 distinctions 482:12 distinctively 490:10 distinctly 484:9 distinguish 359:1 distinguishes 478:20 distribution 405:15, 405:17, 460:22, 461:2, 461:4, 462:5, 462:9, 462:11, 487:9, 487:12, 503:14, 503:16,
--	---	---	---

504:4, 504:5, 505:9, 506:10, 506:13, 506:15, 506:16, 507:9, 507:17, 507:18, 507:20 distributions 462:7, 494:2 diverge 422:7 diverging 431:10 djuric's 426:17, 427:6, 428:5, 432:11, 497:7 document 351:9 doing 360:11, 373:22, 375:16, 408:6, 429:5, 429:7, 429:11, 429:18, 430:9, 431:1, 431:7, 436:14, 481:6, 486:4, 486:12, 494:2 done 375:3, 384:5, 404:12, 439:7, 444:10, 448:18, 449:2, 450:12, 450:14, 450:16, 450:17, 453:20, 489:10, 490:15, 494:10, 512:7, 512:9, 512:12 double 349:18 double-sided 410:22, 411:1 down 357:11, 358:10, 358:11, 359:6, 360:20, 361:1, 362:3, 364:2, 366:9, 367:15, 384:20, 384:22,	386:8, 396:21, 397:16, 399:16, 400:3, 414:11, 421:6, 421:10, 421:11, 422:22, 432:21, 434:14, 436:5, 436:8, 440:20, 441:5, 442:12, 443:17, 451:14, 465:11, 472:20, 473:3, 479:4, 484:19, 484:21, 495:21, 497:1 dr 349:9, 349:11, 352:21, 377:3, 382:11, 410:3, 420:3, 434:11, 437:15, 447:7, 447:15, 448:3, 449:3, 452:1, 468:8, 476:22, 477:5, 477:18, 477:20, 513:1, 513:14, 513:22 drive 347:15 driving 358:10, 359:6, 360:19, 361:1, 362:3, 366:9, 371:3, 371:20, 384:20, 384:22, 385:13, 386:8, 388:17, 388:19, 389:9, 389:21, 390:16, 390:18, 391:3, 391:12, 399:16, 414:11, 416:4, 416:8, 416:10, 475:16, 475:17, 475:19, 476:10, 477:11 dual 366:14 due 434:4	duly 346:9, 515:12 duration 387:19 during 350:1, 350:22, 403:22, 458:21, 513:2, 513:6 E e 445:4, 454:18, 483:22, 489:18 e-mail 347:10, 347:18 each 368:5, 377:16, 402:18, 405:15, 405:21, 423:8, 438:10, 439:1, 439:18, 442:16, 448:17, 452:21, 452:22, 453:15, 454:2, 454:11, 454:14, 456:3, 460:20, 461:18, 462:4, 464:8, 465:8, 470:11, 471:14, 471:19, 472:15, 473:2, 480:7 earlier 360:16, 382:19, 396:12, 455:11, 469:18, 469:20, 475:13, 475:14, 493:5, 497:18, 500:15 easily 431:11 effect 406:22 efficient 386:13 either 450:3, 513:2 element 374:9, 401:3,	449:21, 450:2, 472:1, 472:7, 472:11, 472:14, 472:18, 476:14, 505:1 elements 378:4, 380:15, 439:22, 440:1, 440:2, 440:6, 440:8, 440:16, 440:19, 441:1, 470:16, 492:11, 493:19, 495:8, 498:5, 498:8, 505:11, 505:13 eli 345:23, 346:7, 515:2, 515:10, 516:2 ellyar 347:5, 349:3 else 350:16, 370:12, 372:3, 373:22, 374:15, 374:20, 376:6, 376:18, 389:22, 398:19, 399:4, 459:13, 489:11, 502:19, 511:17, 512:8 email 350:15 embodiment 407:5, 411:13, 427:14, 429:20, 488:3, 510:11 embodiments 509:9, 510:17, 510:19, 511:4, 511:17, 511:21, 512:14 emotion 368:15, 369:15, 370:16, 371:1, 371:13, 373:10, 375:6, 377:13, 475:8 emotions 377:5
--	--	--	--

employed 516:7 encoding 403:14 encompass 363:11, 370:16, 371:13, 373:10, 396:3, 500:20 encompasses 391:22, 392:5, 392:9, 392:14, 392:18, 392:20, 393:20, 394:5, 394:16, 395:6, 395:8, 395:17, 395:20, 397:2, 397:18, 398:6, 398:16, 399:1, 399:3, 499:17, 500:9, 500:14, 500:21, 501:7, 501:11 encompassing 398:21 encounter 361:2 encountering 371:5 end 355:1, 465:14, 467:12, 477:17 engine 434:15, 434:18 enjoy 430:2 enn 484:9 enough 363:11, 365:10, 366:16, 391:8, 418:8 ensemble 489:19 enter 444:11 entered 447:4 enters 350:1	entire 380:10, 380:12, 380:13, 389:17, 389:20, 390:11, 509:2 entirety 380:13 entities 362:21, 363:9, 364:14, 364:17, 365:4, 365:6, 365:18, 371:4, 390:3, 390:7, 409:6, 413:2, 413:7, 413:12, 413:22, 414:1, 414:3, 414:18, 414:20, 416:6, 437:8, 457:9, 457:10, 509:8, 510:16 entity 355:19, 356:6, 357:2, 357:4, 357:8, 357:14, 358:15, 358:16, 359:4, 359:14, 359:17, 359:20, 360:10, 360:18, 360:20, 361:2, 361:7, 361:13, 361:21, 363:17, 363:19, 365:1, 365:11, 365:16, 366:2, 366:8, 366:21, 367:1, 378:17, 383:3, 385:12, 385:17, 388:7, 388:12, 393:16, 393:19, 394:8, 396:13, 396:14, 398:2, 400:14, 405:10, 405:20, 414:13, 438:10, 438:13, 438:15, 438:20, 448:20, 470:9, 475:18, 493:15,	496:15, 496:21, 505:4, 505:7 environment 423:4, 423:19, 427:17 envision 361:13 equal 463:15, 463:16, 463:17, 465:12, 465:13 equals 457:15, 463:22 equation 457:13, 461:7 equations 491:7 erroneous 385:4 essentially 414:10, 419:5, 419:6, 419:10, 423:19, 427:7, 428:17, 431:12, 435:6, 435:13, 445:12, 453:17, 461:22, 462:6, 510:21 estimate 423:9, 460:3 estimates 480:6 estimation 418:2, 434:2 estimations 450:15, 480:8, 483:7 et 364:1, 374:7, 375:22, 376:2, 380:12, 385:3, 388:13, 393:19, 401:16, 409:14, 411:2, 414:10, 423:11, 424:2, 434:19, 444:2, 445:16, 452:18, 485:21, 487:12,	494:2, 502:16, 503:15, 505:10 even 389:9, 391:4, 413:13, 427:7, 483:14 ever 484:14 every 448:17, 449:21, 450:2, 450:13, 466:9 evidence 374:7, 409:14 exact 367:20, 369:1, 420:10, 493:6 exactly 360:7, 361:5, 368:22, 377:10, 429:10, 437:11, 444:20, 445:2, 445:3, 445:12, 445:20, 446:1, 446:22, 448:12, 448:22, 449:2, 450:2, 450:17, 462:8, 477:9, 498:16, 498:19, 498:20, 512:10 exaggerate 432:19 examination 348:3, 349:7 example 355:3, 365:13, 383:17, 388:10, 388:12, 399:7, 399:12, 399:18, 402:22, 404:11, 406:13, 414:7, 421:7, 423:7, 427:14, 432:17, 433:19, 438:13, 443:19, 443:20, 445:8, 452:19, 452:20, 489:17, 507:10
--	---	---	---

examples 356:19, 362:21, 363:12, 363:20, 364:16, 368:13, 383:19, 384:10, 432:19, 438:5, 445:5, 489:15 exceptions 482:8 exclude 511:3, 511:21, 512:14 exclusion 511:17 excuse 395:6, 403:13 executed 487:7 executes 485:19 exhibit 348:9, 348:12, 348:14, 351:10, 351:11, 351:12, 351:14, 351:15, 351:22, 352:1, 352:2, 352:4, 352:5, 352:12, 352:13, 352:14, 352:16, 352:17, 353:11, 386:15, 416:22, 420:4, 467:22, 469:7, 479:11 exhibits 348:7, 351:4 existence 363:22 expect 388:20, 469:5 expected 496:13, 501:22, 503:14, 503:19, 505:2, 505:9, 506:6 expects 384:2, 384:16, 388:8	experience 484:13 expiration 516:19 explain 363:5, 392:18, 396:8, 422:19, 431:8, 458:13, 471:22, 477:20 explained 360:16, 361:9, 361:19, 363:17, 364:21, 367:22, 368:10, 382:19, 396:7, 410:14, 427:5, 428:12, 431:1, 434:13, 434:22, 449:19, 450:8, 458:16, 486:22, 500:15, 507:8 explanation 430:3, 478:22, 479:20, 479:21, 504:7 explicitly 450:3 exponential 464:14 external 431:20, 431:22, 434:5 extraction 402:16 extractions 400:22 extremely 453:2 extrinsic 374:7	factors 362:20, 363:8, 363:12, 363:14, 363:18, 364:13, 365:9, 365:17, 393:18 facts 515:7 fair 359:22, 368:20, 375:7, 382:17, 399:11, 420:9, 469:8, 473:19, 496:5 fairly 430:13, 501:7 faith 491:6 falls 366:22 familiar 480:12 fast 397:15, 400:2 fcnn 480:11 feature 400:22, 402:16, 405:12, 405:13, 405:15, 445:14 features 405:13, 410:7, 486:2, 491:3, 493:9, 493:12 feed-forward 483:21 feeling 369:16, 373:10, 375:6 few 358:21, 364:11, 385:13, 386:11, 439:7 field 390:5, 390:6, 484:13 figure 400:21, 401:3,	401:7, 401:8, 401:9, 401:20, 407:6, 407:10, 407:22, 408:15, 409:1, 410:15, 410:18, 411:19, 412:2, 412:17, 428:5, 428:10, 429:10, 429:17, 429:20, 430:1, 430:15, 431:6, 452:16, 452:18, 452:20, 453:1, 453:2, 453:3, 453:5, 453:9, 455:20, 508:10, 508:12, 508:13, 508:15, 508:17, 508:19, 509:1, 509:5, 509:13, 509:15, 510:12, 510:13, 510:20 figures 429:8, 508:16, 509:11 file 351:6, 351:18, 351:21, 352:8 filled 483:10 financial 368:1, 370:1 financially 516:9 find 387:16 fine 381:22, 453:22, 497:11 finish 423:16, 430:6 first 366:17, 370:19, 371:16, 373:18, 383:15, 404:9, 412:10, 421:12, 421:15, 421:16, 422:20, 424:3,
F			
	face 377:20, 377:21 fact 442:7, 451:11 factor 364:16		

428:12, 443:17, 443:18, 449:20, 465:1, 473:13, 473:16, 488:14 fit 361:18 five 353:5, 358:5, 372:22, 377:16, 386:8, 391:13, 419:19, 514:6 five-minute 381:20, 382:1 flexibility 431:5 flow 429:6, 430:2, 430:7, 509:5, 510:13, 510:21 fly 374:19, 376:11, 381:4, 381:17, 458:21, 489:1, 494:4 flying 411:2 focus 355:16, 401:19, 406:12 focused 411:20, 415:21 focuses 415:10, 415:12 focusing 496:21 follow 477:8 following 389:5, 438:9 follows 462:17, 467:19, 468:22 foot 397:6, 399:7, 399:20 force 431:20, 432:1, 434:5, 434:17,	434:20 foregoing 515:7 form 357:5, 357:19, 358:22, 360:3, 360:15, 361:8, 361:15, 365:20, 369:17, 370:17, 371:14, 376:22, 377:17, 378:21, 379:10, 379:20, 380:22, 381:9, 383:22, 385:6, 389:13, 395:16, 396:5, 397:10, 398:11, 398:22, 402:1, 402:12, 406:20, 408:20, 411:10, 413:4, 413:17, 416:13, 424:13, 425:12, 426:14, 427:4, 429:15, 430:19, 431:21, 437:19, 440:4, 442:9, 444:16, 445:10, 446:8, 447:18, 454:8, 455:4, 455:17, 456:18, 460:15, 467:7, 469:17, 475:11, 476:12, 477:7, 478:12, 480:2, 482:17, 483:18, 485:9, 486:9, 486:20, 487:21, 488:12, 489:4, 493:3, 496:8, 498:1, 499:6, 500:5, 500:18, 501:5, 503:2, 504:18, 505:22, 508:22, 510:9, 511:6, 512:1, 512:17 formula 458:3, 458:7,	458:10, 458:13, 461:19, 462:22, 465:15, 466:17, 466:18, 466:21, 467:10, 467:19, 468:12, 468:15, 468:17, 468:19, 468:21 formulas 468:9 formulation 466:11 forth 371:22, 410:21, 515:11 forward 397:13, 433:14 foundation 422:21 frame 396:16, 418:7, 448:17 frames 414:19, 418:5, 418:6, 418:9, 419:7, 432:1, 445:20, 445:22, 447:3, 448:19 front 353:12, 378:9, 419:2, 420:4, 496:1, 496:2 full 383:15 fully 352:22, 479:6, 479:19 fumbling 413:19 function 404:13, 459:7, 459:8, 464:14, 465:17, 468:13, 468:19, 469:1, 480:6, 507:13 functions 469:3, 469:9, 469:11, 481:5,	483:6, 484:10, 492:22 fundamental 427:6, 427:21 fundamentally 415:4, 424:20, 430:22 fundamentals 426:22 furniture 394:2 further 421:6, 515:17, 516:1, 516:5 future 355:19, 356:5, 356:20, 356:21, 357:2, 357:7, 357:13, 357:17, 358:6, 358:14, 359:3, 359:13, 360:9, 360:17, 361:20, 362:13, 363:16, 365:1, 365:5, 365:11, 365:16, 366:2, 366:3, 366:7, 366:21, 366:22, 383:3, 393:16, 394:8, 396:13, 396:14, 397:18, 398:1, 400:13, 400:17, 416:16, 429:3, 432:4, 443:22, 453:16, 453:17 G gas 434:15, 434:16, 434:18 gaussian 461:1, 461:4, 462:7, 462:9, 464:13, 464:14, 464:17, 506:14, 507:12, 507:17, 507:18
---	---	--	--

gave 393:16 gears 438:21 general 469:10, 470:1, 511:1 generally 449:11, 451:13, 456:5, 476:6, 490:21 generate 405:18, 485:20, 486:2, 487:5, 493:22, 509:16, 510:1 generated 487:8 generating 405:12, 406:6, 406:7, 428:19, 492:7 generic 491:15, 493:18 genuinely 366:11 geographic 419:9, 422:13, 423:18, 424:2, 424:18, 425:21, 426:16, 427:1, 427:10, 427:21, 428:1, 428:16, 428:20, 430:11, 432:11, 432:12, 435:11, 435:12, 435:15, 435:16, 435:20, 443:22, 445:14 getting 456:2 ginnings 347:13, 349:4, 357:5, 357:19, 358:22, 360:3, 360:15, 361:8, 361:15, 365:20, 369:17, 370:17,	371:14, 373:12, 375:9, 377:17, 378:21, 379:10, 379:20, 380:22, 381:9, 382:6, 383:22, 385:6, 389:13, 395:3, 395:16, 396:5, 397:10, 398:11, 398:22, 402:1, 402:12, 406:20, 408:20, 410:12, 411:10, 413:4, 413:10, 413:17, 416:13, 424:13, 425:12, 426:7, 426:14, 427:4, 429:15, 430:19, 431:21, 437:19, 440:4, 442:9, 444:16, 445:10, 446:8, 447:10, 447:18, 454:8, 455:4, 455:17, 456:18, 460:15, 467:7, 468:1, 469:16, 475:11, 476:12, 477:7, 478:12, 480:2, 482:17, 483:18, 485:9, 486:9, 486:20, 487:21, 488:12, 489:4, 493:3, 496:8, 498:1, 499:6, 500:5, 500:18, 501:5, 501:16, 503:2, 504:18, 505:22, 508:22, 510:9, 511:6, 512:1, 512:17, 513:12, 513:17, 513:19, 513:20, 514:8, 514:9 give 384:6, 418:18, 432:16, 441:8, 461:6, 478:2,	479:17, 481:10, 507:10, 507:15 given 363:20, 374:12, 456:17, 458:8, 467:21, 482:1, 491:7, 500:8, 513:1, 515:15 gives 356:19, 388:9, 402:22, 422:20, 461:19 giving 372:15 go 349:17, 351:4, 353:13, 356:7, 356:9, 369:10, 383:6, 401:6, 403:12, 406:8, 409:1, 411:15, 415:8, 421:6, 422:10, 428:9, 431:15, 432:7, 432:8, 435:3, 436:5, 441:5, 443:9, 448:16, 448:18, 450:1, 450:13, 450:19, 451:14, 452:8, 466:12, 469:15, 470:3, 470:18, 470:21, 472:20, 473:3, 474:3, 479:1, 479:20, 494:13, 514:4 goal 357:18, 358:3, 358:4, 359:2, 360:1, 360:13, 360:20, 361:7, 361:10, 361:13, 362:13, 382:13, 382:18, 383:4, 383:20, 384:3, 384:12, 384:14, 384:17, 385:5, 385:8, 385:10,	385:19, 388:6, 388:8, 388:11, 428:5, 429:13, 429:16 goal-based 415:3, 418:12, 418:15, 420:18, 420:21, 421:1, 424:16, 426:21, 430:16, 430:18, 430:21, 497:7 goals 357:3, 357:6, 358:17, 358:20, 426:20, 427:3, 475:2 goes 401:13, 401:17, 427:19, 463:1, 463:21 going 349:17, 357:10, 357:11, 357:12, 357:16, 362:15, 364:2, 365:5, 365:12, 372:13, 372:21, 373:1, 373:5, 375:1, 375:17, 376:10, 381:3, 381:17, 383:10, 385:15, 390:11, 390:14, 394:4, 396:17, 396:21, 400:1, 400:2, 400:3, 400:4, 401:6, 401:21, 403:11, 403:12, 404:5, 406:10, 408:16, 410:21, 412:17, 419:11, 424:4, 424:6, 432:19, 432:21, 433:2, 433:3, 433:10, 433:11, 433:13, 433:14, 433:15, 433:17, 433:19, 433:21, 435:2,
---	--	--	--

435:20, 436:1, 436:2, 436:3, 436:9, 438:18, 439:7, 441:6, 453:14, 456:2, 457:20, 460:7, 460:8, 465:2, 481:4, 500:16, 506:2, 506:8, 506:16 good 349:9, 349:10, 381:20, 382:4, 429:6, 430:3, 439:10, 468:3, 471:21, 514:10 grand 358:5, 360:21, 362:15, 366:8 great 351:17 ground 440:22, 451:4, 451:16, 473:8 grounds 438:22, 439:15, 439:18, 439:22, 440:9, 440:12, 440:16, 440:22, 471:3, 471:4, 471:18, 494:20, 495:2, 495:9, 495:13, 495:18, 496:6 group 494:20, 495:15 grouped 494:22 guess 366:19, 426:9, 468:17, 473:1 H h 459:3 half 466:16 halfway 422:22, 479:4	hand 516:12 hang 387:4, 387:13, 401:5, 401:6, 422:19, 457:20 happen 381:13 happening 361:22 happy 368:15, 369:16, 373:11, 375:6, 381:11, 384:9, 396:8, 475:9, 475:15, 512:11 hard 350:4, 434:9 hat 465:13, 465:14 head 369:1, 412:8, 497:16, 502:7 heading 423:11, 426:13, 471:7, 497:2, 501:21 help 460:10 helpful 367:3 hereinbefore 515:11 high 436:2 higher 397:12, 399:9, 434:18 history 374:6, 380:11, 502:15 hit 387:7, 417:12, 417:14 hits 387:5, 387:7, 387:14, 388:4 hole 361:19	home 349:14 honestly 358:1 hood 430:22 hour 418:11, 432:21, 433:5, 433:20, 435:22, 436:4, 436:8, 468:2 hovering 397:7 however 366:6, 429:16, 431:1, 487:7 human 443:6, 446:13, 446:18, 446:20, 448:2, 496:13, 501:22, 503:19, 505:2, 506:6 humans 444:15 hundred 433:4, 433:20 hypothetical 376:11, 488:15, 494:4 hypotheticals 369:20, 372:7 I idea 376:12, 414:10, 470:1, 475:7 identical 354:21, 355:2 identification 377:21 identified 401:20, 438:10 identify 443:4, 446:11, 447:22, 448:9 illinois 347:16 illustration 362:6, 411:20	image 383:16, 392:1, 392:6, 392:8, 392:10, 392:15, 392:22, 393:6, 393:21, 393:22, 394:3, 394:7, 394:12, 394:17, 394:21, 394:22, 395:9, 395:11, 395:21, 396:1, 396:15, 397:1, 397:4, 397:5, 397:20, 397:22, 398:5, 398:7, 398:18, 399:2, 400:8, 403:14, 405:9, 406:1, 407:6, 412:12, 414:15, 475:3, 493:9, 493:10, 493:13, 499:18, 500:2, 500:4, 500:22, 501:9 imagery 411:21 images 403:21, 404:7, 404:15, 404:17, 405:10, 406:17, 406:18, 407:13, 408:9, 409:6, 409:15, 409:17, 409:22, 412:16, 412:18, 413:2, 413:7, 413:9, 413:11, 413:16, 413:22, 414:1, 414:18, 416:3, 419:8 immediate 358:6 immediately 433:4, 484:6 implement 477:22, 478:11, 491:3, 491:8 implemented 407:4, 489:3
---	--	--	--

implementing 427:14, 483:16 important 496:22, 498:11 inc 345:4 include 363:14, 364:2, 364:4, 365:17, 369:15, 375:6, 392:7, 394:19, 394:21, 395:2, 395:15, 421:16, 421:19, 422:2, 452:21, 453:14, 489:16, 499:22, 500:3, 500:17 includes 362:19, 363:6, 363:7, 363:8, 363:18, 364:1, 364:11, 364:18, 365:7, 365:9, 366:18, 392:20, 393:4, 393:17, 395:9, 398:8, 398:9, 398:16, 417:18, 427:9, 427:15, 427:20, 441:14, 453:9, 500:20 including 375:13, 402:16, 489:21, 500:14 increase 433:17, 436:10 independent 379:15, 380:14, 380:15, 381:16, 396:10, 470:6, 491:21 independently 461:12, 462:14, 467:15 index 348:1 indicated 367:11	indicates 414:5 indicating 388:12 indicative 423:2, 424:1, 427:15, 429:2, 453:15 infer 397:7 inference 409:11 inferences 474:13 inferring 397:12 information 391:22, 392:5, 392:7, 392:9, 392:14, 392:21, 393:5, 393:20, 394:6, 394:11, 394:16, 394:20, 394:21, 395:6, 395:8, 395:10, 395:20, 395:22, 397:3, 397:19, 398:4, 398:6, 398:17, 399:1, 399:3, 407:7, 412:13, 414:15, 414:17, 420:8, 423:20, 425:13, 426:12, 428:18, 431:9, 436:17, 437:3, 437:18, 475:3, 476:2, 499:17, 500:1, 500:3, 500:21, 501:8, 501:11, 509:7, 510:15 informs 379:8 inherently 450:3 initial 448:5 initially 504:20	input 403:10, 403:15, 403:20, 405:8, 405:9, 487:6, 488:20, 493:10, 505:4 inputs 493:7, 493:8, 493:22 inputting 428:22 instance 346:8, 388:21, 400:21, 402:3, 407:1, 409:4, 411:12, 412:9, 421:4, 438:3, 445:22, 460:20, 461:15, 463:11, 467:16, 481:19, 482:22, 485:17, 487:2, 493:8 institution 368:1, 370:1 intended 508:6 intends 397:8 intention 357:9, 357:13, 357:17, 358:4, 358:6, 359:2, 360:13, 362:12 intentions 355:18, 356:5, 357:2, 357:7, 358:3, 358:14, 358:20, 359:3, 359:13, 360:9, 360:17, 361:20, 363:16, 364:22, 365:5, 365:10, 365:16, 366:2, 366:3, 366:5, 366:7, 366:21, 366:22, 383:3, 385:3, 393:15, 394:8, 396:12,	396:14, 397:18, 398:1, 400:13, 400:16, 416:16, 475:1 interested 516:9 internet 350:15 interpret 355:11, 450:10 interpretation 353:20, 354:9, 354:15, 420:7, 423:15, 511:20, 512:13 interpreted 364:11 interpreting 507:3, 507:6, 511:2 interrupt 381:21 interrupting 375:15 intersection 421:18, 421:21, 422:4, 425:8, 431:10, 433:9, 433:12, 433:15, 433:18, 433:20, 435:18, 435:19, 436:7 interval 384:3, 384:17, 385:1, 385:9, 385:11, 385:12, 385:20, 386:1, 386:10, 387:20, 388:9, 389:8, 389:11, 390:13, 391:2, 391:6 intrinsic 374:6 invention 509:9, 510:17 involve 394:11, 482:4, 496:7
--	--	---	---

involves 439:18 ipr 345:11, 345:13, 345:15, 345:17, 345:19, 379:5, 511:11, 512:21 irrelevant 475:22 issue 367:14 item 472:14 iterative 480:10, 484:10, 484:12 itself 357:22, 372:9, 443:18, 456:8, 456:15, 508:8, 509:3 ix (b 472:1, 472:20 J jan 452:1, 476:22, 477:5, 477:18, 477:20 jumping 491:5, 511:8 K k-nearest 489:20 keep 375:15, 376:22, 434:9, 435:20, 470:14 kernel-based 480:4 kilometers 418:11 kind 453:4, 453:12 kinematic 422:8, 425:13, 426:12	kinematics 417:22, 418:1, 420:8 know 349:22, 350:18, 350:21, 353:12, 356:17, 358:5, 360:13, 361:2, 362:8, 363:7, 365:7, 366:5, 368:4, 369:5, 369:8, 370:5, 370:22, 371:1, 371:16, 371:17, 372:6, 374:1, 374:5, 376:14, 377:20, 378:8, 380:11, 385:19, 386:5, 386:6, 388:16, 390:1, 390:17, 395:12, 396:16, 396:20, 397:17, 399:4, 399:21, 400:9, 400:22, 404:18, 405:16, 406:15, 413:5, 414:16, 414:19, 416:16, 418:16, 419:12, 419:13, 429:8, 431:2, 432:21, 434:7, 434:20, 435:17, 436:21, 437:2, 437:16, 443:11, 445:13, 445:17, 446:15, 446:22, 448:12, 448:20, 449:1, 452:10, 453:7, 464:13, 469:19, 476:18, 479:14, 480:18, 481:18, 482:2, 482:20, 483:7, 483:12, 483:20, 484:2, 485:16, 493:17, 495:22, 496:19, 498:14, 501:9,	503:21, 510:11, 511:19, 512:20, 512:21 knowledge 416:8 known 443:22 knows 432:12, 435:8, 435:14 L label 448:17, 448:18, 450:13, 450:15, 453:8, 458:20 labeled 402:17, 443:21, 444:15, 444:20, 444:21, 445:8, 445:18, 445:20, 446:1, 446:7, 447:17, 449:10, 459:9 labeling 449:18 labels 443:5, 446:12, 446:17, 446:20, 447:1, 447:2, 447:3, 448:1 language 357:21, 358:1, 369:9, 374:9, 498:20 large 352:6, 482:19 larger 456:2 last 355:4, 355:5, 391:19, 415:9, 442:20, 451:19, 499:15 lastly 495:5 later 386:8, 388:21,	391:13, 414:4, 425:16, 465:16 laughing 475:22 laundry 484:3, 490:3, 490:10 laurie 346:12, 514:5, 516:17 lay 354:14 layers 401:16 layout 419:10 lays 353:19, 354:9 lcls 457:16, 457:18, 457:22, 458:4, 458:8, 458:10, 458:14 leap 491:6 least 423:2, 427:16 leave 494:11 left 357:12, 360:1, 360:2, 394:5, 425:10, 433:16, 433:17, 433:22, 435:3, 435:19, 436:4, 436:11 left-hand 421:20 length 461:17, 461:18, 462:17, 464:2, 464:5, 464:7, 466:3, 467:18 lengthy 497:17 lens 374:2, 383:1, 476:15
--	--	--	---

let's 351:4, 351:9, 351:21, 353:3, 353:10, 353:16, 355:16, 359:17, 361:3, 361:4, 378:7, 382:1, 386:13, 391:14, 399:17, 399:19, 402:4, 405:2, 412:3, 416:9, 418:20, 422:10, 432:16, 435:17, 436:19, 436:20, 437:12, 438:21, 442:12, 443:9, 450:19, 451:14, 452:8, 455:20, 457:12, 462:18, 462:22, 463:17, 468:4, 468:18, 470:8, 470:18, 470:21, 473:3, 476:17, 495:13, 495:21, 501:18, 506:14, 506:19, 513:12 level 451:22, 454:2, 454:5, 454:11, 454:13, 454:18, 455:2, 455:8, 455:9, 455:12, 456:8, 456:12, 456:15, 456:22, 457:4, 466:14, 467:3, 467:5 levels 451:21, 452:6, 455:14, 456:3, 456:13, 456:21, 457:4, 457:7, 457:8, 460:19, 469:22 lifted 356:10, 359:8 light 368:11, 374:5,	374:9, 374:10, 375:21, 476:16, 498:15, 502:14, 503:22, 505:12 likelihood 405:21, 442:17, 456:16, 461:22, 470:12, 471:14, 471:19, 472:15 likely 388:13, 414:8, 431:14 limitations 451:4, 451:8, 451:10, 451:16, 471:3, 488:8, 488:22, 491:17, 496:5 limited 429:20, 487:18 line 356:11, 356:18, 356:19, 356:20, 388:2, 388:3, 389:6, 389:7, 401:10, 404:9, 411:13, 412:5, 434:4, 436:22, 485:20, 485:22, 487:3, 499:14, 509:4 linear 489:22 lines 356:10, 356:14, 359:7, 387:12, 402:4, 402:13, 403:19, 407:2, 408:22, 409:4, 409:9, 409:12, 412:10, 412:19, 414:4, 417:15, 417:18, 417:20, 438:5, 438:6 link 459:21 linked 407:8	list 362:21, 483:4, 484:2, 484:3, 490:3, 490:10 listed 363:14 listing 445:5 lists 490:3 little 377:8, 392:19, 455:21, 456:20, 457:21, 459:12, 460:8, 463:1, 464:21, 468:2 llc 345:7 located 349:14, 427:11, 428:17, 447:2 location 419:10, 423:10, 453:16, 453:17 locations 429:3, 443:22, 445:14 log 444:2, 444:7, 444:12, 444:18, 445:16, 464:12, 464:15, 464:18 log-likelihood 461:8, 462:1, 462:11, 467:11 long 383:9, 386:1, 386:10, 483:22, 488:5 longer 358:17, 359:20, 385:17, 496:19 look 353:16, 355:2, 356:17, 356:20, 367:19, 368:6, 369:5, 369:10, 372:4, 378:7,	382:20, 383:2, 384:18, 388:2, 390:1, 390:6, 393:8, 400:1, 400:20, 400:21, 401:8, 402:3, 404:21, 405:1, 405:2, 407:1, 407:2, 407:10, 409:4, 409:8, 409:12, 410:15, 411:12, 412:9, 414:4, 414:22, 418:5, 418:14, 418:16, 422:14, 422:22, 423:21, 427:8, 427:12, 428:10, 431:5, 431:12, 432:1, 435:14, 438:3, 439:4, 452:9, 455:20, 457:12, 458:1, 458:19, 460:17, 470:4, 474:10, 478:16, 478:17, 480:3, 482:21, 484:19, 484:21, 485:17, 487:2, 489:6, 491:20, 495:13, 496:18, 497:5, 498:7, 498:12, 503:8, 503:10, 503:17, 505:1, 509:3, 510:12, 511:10, 512:19 looking 359:4, 371:18, 374:4, 385:18, 388:14, 398:19, 414:19, 416:2, 416:6, 418:4, 419:1, 419:7, 419:8, 424:17, 432:15, 435:1, 438:19, 439:10, 439:13, 441:3, 442:4, 452:9,
---	--	--	---

453:4, 453:11, 455:22, 462:6, 468:12, 473:13, 481:1, 491:21, 494:16, 496:4, 496:9, 496:11, 502:17, 503:9, 506:12, 509:4 looks 359:7, 387:4, 417:12, 453:3, 453:13, 471:8, 494:22, 507:20 loss 458:3, 458:5, 459:2, 461:18, 461:22, 462:2, 462:16, 462:17, 462:18, 462:19, 462:20, 466:18, 467:18, 467:19, 468:13, 468:19, 468:22, 469:1, 469:3, 469:4, 469:7, 469:8, 469:11, 492:22 lost 473:11 lot 370:7, 483:9, 483:12, 484:17, 484:20 lower 431:17, 432:8, 432:9 ltraj 457:15 lunch 468:6, 468:10, 469:18 M m 458:21 machine 346:15 machine-learned 428:21, 429:1,	429:2, 489:15 machine-learning 489:17, 509:6, 510:14, 510:22 machines 489:19, 490:13 made 385:2, 460:20 main 437:9 make 357:15, 358:11, 362:3, 362:10, 364:9, 368:12, 373:14, 374:17, 386:13, 388:22, 389:4, 390:15, 391:12, 396:17, 414:13, 432:3, 432:13, 432:22, 433:4, 435:2, 435:3, 436:17, 437:4, 437:18, 457:20, 474:13, 475:17 making 370:5, 374:7, 414:12, 416:6, 433:12, 457:11, 464:20, 491:6 mandatory 398:21 manual 444:22, 448:16, 448:22 manually 444:2, 444:5, 444:8, 444:11, 444:12, 444:13, 444:15, 444:18, 445:3, 445:9, 445:11, 445:13, 445:16, 445:18, 445:21, 446:2, 446:7, 446:21, 446:22, 447:4, 447:17, 448:12, 448:13, 448:18,	449:10, 449:15, 449:18, 450:8, 450:9, 450:12, 450:14, 450:16, 450:17 many 375:15, 387:1, 434:8 map 423:19, 428:18 mark 347:4, 349:1, 351:4, 351:9, 351:21, 352:11 marked 351:11, 352:1, 352:13, 386:15 marketing 429:9, 490:9 markspeegle@bake- rbotts 347:10 marriage 516:7 material 355:9 math 490:19 matrix 507:14, 507:16 matrixes 507:22 matter 516:10 matters 377:5 maximum 480:9, 481:5 maybe 362:6, 362:7, 362:14, 385:15, 424:22, 475:14 mcclintock 347:15 meaning 368:5, 372:20, 373:2, 373:3, 373:7, 373:19,	374:3, 374:8, 375:19, 381:7, 383:1, 391:21, 393:11, 398:15, 499:4, 501:1, 502:10, 506:3, 507:7 meanings 505:20, 506:12, 506:18 means 361:7, 372:2, 395:15, 445:5, 459:3, 487:9, 499:2, 499:22, 500:2, 500:14 measure 438:16 measured 358:20 meet 376:14, 492:10, 492:11, 493:19 meets 488:7, 488:21, 493:1 memory 478:14, 484:1 mental 475:1, 475:4, 475:5, 475:9, 475:19 mention 353:5, 380:7, 386:11, 483:13 mentioned 351:3, 375:18, 380:6, 384:13, 435:8, 440:7, 448:11, 460:22, 483:19, 490:7, 500:19 mentioning 478:9, 505:15 mentions 478:7, 478:13, 478:14, 478:15, 478:18, 482:22,
---	--	---	--

483:15, 489:8 method 378:14, 405:3, 427:9, 427:15 middle 457:15 might 357:8, 360:21, 361:10, 361:13, 362:9, 362:13, 362:14, 364:4, 367:15, 368:15, 386:11, 400:8, 441:5, 449:10, 481:20, 494:11, 496:18, 498:16, 507:14 mike 460:9 miles 432:20, 433:4, 433:20, 435:22, 436:4, 436:8 mind 354:2, 363:21, 365:8, 366:5, 367:7, 367:12, 367:16, 368:16, 368:18, 369:2, 369:11, 369:15, 370:15, 370:21, 371:4, 371:12, 372:2, 372:22, 373:4, 373:9, 374:13, 375:5, 376:5, 377:6, 377:13, 377:15, 378:16, 378:19, 381:8, 470:15, 509:12 minimize 406:22, 461:10 minimized 461:9, 462:12, 467:13 minimizing 413:18 minor 498:17, 500:12	minute 403:13 minutes 391:13, 419:19, 513:16 misinterpretation 384:15 misinterpreted 383:5 misinterpreting 406:21, 407:15, 412:1 missed 389:14 missing 440:9, 483:11 mistaken 409:19, 478:19 misunderstanding 408:21, 416:1, 422:9, 424:22 mixing 434:8, 456:19, 467:8 mode 458:4 model 400:16, 407:3, 408:1, 408:18, 410:5, 410:11, 410:16, 411:4, 411:9, 420:18, 420:20, 428:22, 429:1, 429:2, 430:12, 431:9, 443:20, 449:10, 452:17, 454:10, 454:17, 456:7, 456:10, 460:18, 480:22, 486:6, 489:16, 509:7, 509:20, 509:22, 510:15, 510:22 models 469:9, 469:12, 489:17, 489:20, 489:21, 489:22 modes 458:18, 459:1,	459:10 modify 477:21 modifying 496:16, 496:20 moment 355:16, 383:12, 384:6, 418:18, 441:8, 503:7 more 354:22, 392:19, 402:14, 412:3, 421:5, 433:21, 434:18, 455:21, 463:1, 479:15, 481:11, 485:7, 491:9, 511:1 morning 349:9, 349:10, 350:3, 351:5, 351:18, 352:8, 375:12, 500:7, 500:8, 500:15, 500:19 most 375:11, 411:20, 421:10, 431:14, 458:4 motion 417:21, 418:2, 419:3, 419:8, 420:8, 434:2, 438:12, 438:19, 450:15 motivated 476:21, 477:3, 478:10 motor 434:15 move 371:8, 372:13, 372:17, 374:22, 378:5, 406:11, 408:12, 410:1, 424:7, 425:1, 437:13, 446:3, 447:6, 476:17, 494:6, 501:14	movement 415:13, 418:9, 438:14 moving 358:11, 418:6, 418:10, 432:14, 432:18, 432:20, 434:4, 434:14, 434:19, 435:22 much 433:21, 513:22 multi-task 402:5 must 363:13, 364:13, 366:15, 392:7, 394:21, 395:2, 395:15, 395:18, 404:17, 406:18, 499:22 N n 461:17 name 351:6, 351:18, 352:7 nancy 460:9, 460:12 nature 415:10, 484:11, 484:12 navigating 356:12, 356:16 near-term 385:20, 388:11 necessarily 367:14, 465:22, 466:10, 483:1, 483:2, 484:5, 485:2, 493:13, 493:19 necessary 486:16 need 373:2, 380:18, 391:10, 437:15, 439:9, 447:9,
---	--	---	---

461:5, 483:10, 488:19, 512:9, 514:9 needed 377:2 needs 359:15, 512:9 negative 461:8, 461:22, 462:11, 467:11 neighbor 489:20 nelson 347:14, 349:5, 513:20 networks 449:5, 478:8, 478:15, 479:13, 480:19, 481:12, 482:7, 483:1, 483:4, 484:3, 484:18, 488:17, 489:8, 489:18, 489:21, 490:4, 490:10, 490:11, 490:12, 490:14, 490:16 neural 390:2, 401:14, 401:15, 401:19, 401:21, 402:5, 402:9, 402:15, 403:2, 403:4, 403:9, 403:13, 403:15, 403:22, 404:10, 404:14, 404:22, 405:4, 405:5, 406:3, 406:14, 406:16, 407:22, 408:4, 408:7, 408:15, 408:16, 409:10, 409:20, 410:4, 410:9, 410:17, 411:8, 411:13, 411:14, 411:16, 411:21, 413:14, 415:18, 415:20,	437:7, 449:5, 477:6, 478:8, 478:15, 478:21, 479:7, 479:12, 479:19, 482:16, 483:5, 483:21, 483:22, 484:1, 484:6, 484:16, 485:3, 485:12, 485:14, 485:19, 486:1, 486:3, 486:7, 486:16, 486:17, 487:1, 487:4, 487:5, 487:6, 487:11, 487:14, 487:19, 488:2, 488:4, 488:10, 489:18, 490:3, 491:4, 491:11, 491:19, 492:2, 492:3, 492:4, 492:15, 492:20, 493:1 never 416:12, 477:20, 478:13, 478:14, 478:18 new 448:16, 450:12, 480:8 next 361:2, 396:18, 396:22, 399:22, 401:17, 419:12, 443:3, 472:11, 509:19 nn 478:18 nns 478:15 nobody's 433:13 nodes 401:16, 481:1, 481:17, 481:19, 481:20 nominal 421:2, 421:5,	421:7, 421:12, 421:15, 421:18, 422:1, 422:7, 425:4, 425:7, 425:18, 426:6, 436:1, 436:5, 436:10 non-linear 489:22 non-stationary 417:22 none 350:20, 376:16 nonresponsive 371:8, 372:14, 378:6, 406:11, 408:13, 410:2, 422:18, 424:7, 425:2, 426:4, 437:14, 446:4, 447:6 normal 507:19 notes 513:13 nothing 415:19, 419:14, 436:13, 451:20, 457:2, 475:15, 477:10 numbered 346:10, 440:20, 473:4 numbers 351:8, 502:21 numerical 391:5 O oath 349:12 object 371:7, 372:13, 406:10, 419:3, 419:11, 419:14, 421:4, 421:12, 421:16, 421:19, 422:2, 423:3,	423:8, 424:2, 424:6, 425:20, 426:3, 426:13, 427:10, 427:16, 428:12, 428:17, 429:3, 429:13, 431:12, 432:2, 432:3, 432:14, 432:16, 432:18, 432:20, 433:2, 433:7, 434:3, 434:13, 435:1, 435:21, 435:22, 436:6, 447:11, 447:13, 448:17, 450:13, 453:5, 453:10, 453:11, 453:16, 453:18, 456:2, 456:16, 501:16 object's 423:9 objection 357:5, 357:19, 358:22, 360:3, 360:15, 361:8, 361:15, 365:20, 369:17, 370:17, 371:14, 372:16, 377:17, 378:5, 378:21, 379:10, 379:20, 380:22, 381:9, 383:22, 385:6, 389:13, 395:3, 395:16, 396:5, 397:10, 398:11, 398:22, 402:1, 402:12, 406:20, 408:12, 408:20, 410:1, 411:10, 413:4, 413:17, 416:13, 424:13, 425:1, 425:12, 426:14, 427:4, 429:15, 430:19, 431:21, 437:13, 437:19, 440:4, 442:9,
---	---	--	---

444:16, 445:10, 446:3, 446:8, 447:5, 447:18, 454:8, 455:4, 455:17, 456:18, 460:15, 467:7, 469:16, 475:11, 476:12, 477:7, 478:12, 480:2, 482:17, 483:18, 485:9, 486:9, 486:20, 487:21, 488:12, 489:4, 493:3, 496:8, 498:1, 499:6, 500:5, 500:18, 501:5, 503:2, 504:18, 505:22, 508:22, 510:9, 511:6, 512:1, 512:17 objections 373:12, 375:9, 376:22, 410:12, 413:10, 426:7, 447:14 objects 417:22, 419:9, 444:1, 445:15, 447:1 observable 392:1, 392:6, 392:8, 392:10, 392:15, 392:21, 393:5, 393:21, 394:6, 394:12, 394:17, 394:20, 394:22, 395:9, 395:11, 395:21, 396:1, 396:15, 397:3, 397:19, 398:5, 398:7, 398:17, 399:2, 400:8, 400:10, 499:18, 500:1, 500:4, 500:22, 501:8 observations 425:19, 480:8	observe 393:22, 394:1, 394:2, 394:3 observing 409:6, 409:17, 413:2, 413:7, 413:11, 413:22, 414:1, 414:18 obtained 409:17, 412:20, 413:1 obtaining 427:9, 427:15, 427:20, 428:11, 428:15, 428:21 obviously 353:6, 356:13, 357:15, 359:5, 359:8, 359:11, 360:19, 361:21, 366:8, 367:20, 368:8, 369:6, 370:19, 371:19, 382:22, 386:4, 388:5, 388:14, 389:21, 396:9, 397:11, 401:14, 401:17, 402:19, 403:7, 403:17, 404:2, 404:20, 409:2, 409:7, 414:3, 416:14, 419:2, 424:17, 432:10, 434:14, 437:6, 442:10, 446:15, 459:1, 461:13, 462:7, 470:1, 470:5, 472:7, 472:13, 474:6, 476:13, 478:7, 479:5, 479:8, 479:15, 482:11, 483:11, 483:21, 485:18, 486:11, 487:1, 490:3, 490:22, 491:22, 496:17, 498:2, 498:9,	498:19, 499:8, 503:4, 506:3, 509:11, 510:10 occurred 516:2 office 345:1, 349:15, 516:13 oh 397:14 okay 349:22, 350:12, 355:11, 355:16, 357:1, 359:22, 360:12, 361:6, 362:17, 367:3, 368:9, 369:10, 372:5, 372:12, 374:8, 374:22, 380:20, 381:6, 383:18, 384:7, 387:10, 389:3, 390:19, 391:18, 392:12, 397:21, 399:5, 401:2, 401:11, 403:1, 407:14, 410:20, 412:3, 412:19, 416:20, 417:14, 418:10, 418:15, 419:17, 420:12, 421:6, 425:13, 426:19, 433:1, 439:10, 442:12, 443:10, 449:14, 453:19, 456:6, 458:10, 459:11, 462:22, 465:21, 466:6, 466:12, 469:1, 473:3, 473:5, 473:19, 474:3, 474:9, 474:17, 475:21, 476:1, 477:12, 478:3, 478:5, 481:8, 482:13, 486:5, 490:17, 491:17, 494:16,	496:4, 497:1, 497:17, 502:9, 502:20, 508:7, 508:10, 511:19, 513:1, 513:10, 513:15, 514:7 once 358:16, 359:19, 404:9, 404:11 oncoming 364:4, 364:5, 365:3 one 354:12, 366:17, 370:3, 372:22, 375:3, 383:19, 384:6, 384:9, 384:10, 387:4, 387:13, 387:17, 397:6, 397:14, 399:20, 401:5, 407:5, 417:12, 417:14, 418:18, 421:5, 427:13, 430:14, 432:4, 436:1, 439:12, 441:8, 453:3, 460:2, 464:20, 471:12, 472:21, 473:2, 477:2, 483:11, 494:20, 495:14, 504:2, 508:17, 509:1, 510:10 onerous 499:14 ones 380:16, 440:11, 495:11 only 359:15, 366:17, 376:18, 380:13, 381:15, 387:10, 393:3, 434:4, 495:8, 509:13 open 350:9, 350:13, 353:13, 353:14,
--	--	--	---

418:17, 439:11, 439:12, 494:12, 494:14, 494:15, 503:6, 508:9 open-ended 385:9, 385:21 opened 350:8 opening 354:12 operating 403:18 opined 440:9, 440:11, 440:15, 440:18 opining 442:15 opinion 376:10, 391:21, 430:17, 442:5, 485:6, 485:13, 487:17, 496:4, 499:3, 499:16, 502:20, 511:12 opinions 370:8, 370:9, 371:20, 374:12, 374:19, 376:1, 376:4, 376:16, 379:1, 379:12, 379:19, 379:21, 380:3, 380:14, 380:16, 381:2, 381:3, 381:13, 381:15, 381:16, 381:17, 440:22, 473:7, 481:12, 497:12 optimization 480:10 optimize 409:14 optional 366:18, 398:21 oral 345:22, 346:7, 515:2 oranges 434:8	order 486:6 ordinarily 369:14 ordinary 368:16, 372:20, 373:2, 373:3, 373:7, 373:19, 374:3, 377:14, 383:1, 391:21, 393:11, 398:15, 507:7 other 350:18, 364:5, 372:3, 374:14, 374:16, 375:4, 380:16, 392:14, 431:16, 432:5, 433:19, 436:10, 439:2, 439:12, 440:8, 470:6, 472:7, 475:2, 483:3, 489:21, 492:15, 493:2, 501:1, 503:6, 504:13, 508:16, 509:11, 509:12, 510:1, 510:2 others 458:22, 491:22 otherwise 489:16, 516:9 out 353:20, 354:2, 354:9, 354:15, 407:16, 492:14 outcome 516:10 output 402:7, 405:18, 429:2, 442:1, 442:6, 452:17, 453:8, 460:3, 470:10, 471:13, 472:12, 473:1, 485:20, 501:21, 503:13, 503:18, 505:2, 506:6,	506:8, 508:1, 508:2 outputs 459:18, 460:1, 460:2, 487:6, 487:7, 488:21, 494:1, 496:12 outside 368:16, 369:13, 370:14, 370:19, 370:20, 371:11, 375:4 over 349:17, 397:7, 407:8, 463:15, 463:18, 464:7, 468:2, 479:20, 484:18, 498:10, 500:6, 513:13 overall 384:18, 453:8 overview 479:3 own 505:13 owner 345:8, 347:12, 349:6, 515:18 P packaged 366:6 page 364:9, 383:11, 383:15, 420:13, 438:1, 440:21, 441:9, 441:11, 441:21, 442:12, 467:22, 468:9, 473:4, 490:18, 495:21, 497:2, 508:11 pages 515:7 paper 350:5 papers 484:19, 484:20,	484:22 paragraph's 461:21 paragraphs 354:20, 355:9 parameters 438:12, 438:19, 487:11 parametrized 461:2, 462:10 paraphrasing 473:14 parentheses 459:5 parenthetical 355:3 part 366:4, 367:1, 368:4, 383:9, 390:12, 396:9, 401:2, 403:2, 406:2, 408:2, 449:6, 472:13 particular 357:14, 368:7, 369:8, 372:11, 378:1, 379:16, 402:21, 405:11, 405:22, 425:20, 430:14, 442:17, 448:8, 471:15, 471:20, 472:16, 479:11, 479:16, 487:8, 488:3 parties 516:6, 516:8 party 515:17 parzen 480:7, 483:7 pass 385:16, 513:10 passes 358:16, 359:19 past 423:2, 423:9, 423:10, 427:16, 432:3
---	---	---	--

patent's 497:8 patents 360:6, 367:13, 368:19, 371:22, 372:22, 375:5, 377:16, 439:3, 483:12, 490:8, 497:14, 502:5, 502:12, 504:10, 504:17 path 356:17, 371:6, 456:14 paths 431:10 pathway 421:12, 421:15, 421:16, 421:18, 421:19, 422:1, 422:2, 422:8, 436:1 pathways 421:2, 421:5, 421:7, 422:7, 425:4, 425:7, 425:15, 425:18, 425:19, 426:6, 436:5, 436:10 patterns 415:13 pdf 351:5, 420:13, 508:11 pedal 434:15, 434:16 pedestrian 357:8, 358:15, 359:14, 362:9, 363:21, 365:3, 365:8, 394:1, 397:5, 397:8, 399:7, 399:19, 399:20, 400:15, 414:8 pedestrians 356:21, 400:5 peg 361:18	pencil 350:5 people 368:16, 369:14, 415:10, 431:2 percent 462:9 perception 422:15 perceptive 345:7 perform 376:8, 405:6, 407:19, 420:21, 488:6, 492:5, 492:6, 512:11, 512:18, 512:21 performs 409:13, 428:2 perhaps 398:13, 406:22, 413:18, 432:6, 490:8 period 358:13, 362:4, 362:11, 389:8 periods 358:12 person 367:14, 388:11, 388:12, 396:19 perspective 358:7, 358:9, 359:5, 359:18, 360:10, 360:18, 361:22, 376:14 petition 512:21 petitioner 345:5, 346:9, 347:3 ph 345:23, 346:8, 515:2, 515:10, 516:2 phase 403:22 phrase 355:18, 355:20,	356:5, 362:19, 367:7, 367:16, 370:15, 371:12, 373:9, 375:5, 386:20, 387:2, 387:17, 480:12, 502:4 phrases 366:13 phrasing 385:3 physical 419:10 physics 434:6, 434:19 pick 419:18 picture 399:19 pieces 406:5, 406:7, 496:22 place 384:16, 387:10, 411:17 placed 375:19 places 438:2 plain 372:20, 373:2, 373:3, 373:7, 373:19, 374:3, 377:14, 382:22, 391:21, 393:11, 398:15, 507:6 plan 357:14, 357:17 planet 516:20 planning 356:18, 383:13 plans 355:19, 356:5, 357:2, 358:6, 358:14, 359:3, 359:13, 360:9, 360:17, 361:20,	362:13, 363:17, 365:1, 365:6, 365:11, 365:16, 366:2, 366:3, 366:7, 366:21, 367:1, 383:3, 393:16, 394:8, 396:13, 396:14, 397:18, 398:1, 400:13, 400:17, 416:16 please 364:17, 375:16, 376:21, 406:15, 410:6, 417:6, 423:16, 426:5, 430:6 plurality 401:16, 402:6, 402:17, 405:13, 405:20, 442:1, 442:7, 452:1, 452:22, 453:9, 453:14, 470:10, 471:13, 472:12 plus 457:16, 460:12 pnn 477:19, 477:22, 478:6, 478:11, 478:15, 478:18, 478:21, 479:18, 480:4, 480:16, 485:4, 485:6, 491:15, 493:10 pnnns 478:8, 478:10, 479:5, 480:20, 481:3 point 369:2, 399:14, 407:16, 411:6, 424:11, 434:21, 437:10, 437:21, 444:19, 450:6, 456:3, 456:17, 457:11, 466:9, 469:6, 479:11
--	---	---	--

pointed 411:11, 412:7, 425:17, 448:6, 450:7 pointing 412:4 points 446:19, 454:6, 465:2, 465:8, 465:19, 466:1, 467:21, 479:9 pop 417:9 posita 367:13, 373:19, 374:2, 383:1, 388:15, 389:5, 389:16, 389:17, 389:18, 390:11, 390:12, 390:22, 391:9, 445:17, 446:5, 447:15, 448:10, 449:1, 449:16, 449:19, 450:10, 476:15, 476:20, 477:3, 477:21, 478:10, 482:13, 482:14, 483:2, 483:15, 483:20, 484:4, 491:2 position 372:19, 461:3 possible 431:15, 432:7, 432:8, 433:11 posterior 480:9, 481:5, 483:8 potential 419:8, 432:4, 461:11, 462:13, 467:14 potentially 370:4, 431:15, 436:10, 466:7, 476:10 predict 356:18, 359:12,	400:16, 401:21, 402:6, 403:6, 404:6, 417:21, 418:7, 419:11, 420:8, 425:14, 431:9, 431:13, 432:2, 432:5, 433:3, 454:10, 469:5, 469:12, 474:16, 475:1, 509:7, 509:12, 510:15 predicted 452:21, 452:22, 453:16, 454:3, 454:6, 454:11, 454:14 predicting 390:2, 403:5, 404:15, 406:17, 437:8, 469:6, 469:19, 503:12 prediction 399:9, 401:1, 402:17, 402:18, 415:4, 418:15, 419:3, 420:21, 424:16, 426:21, 432:4, 432:5, 432:14, 497:7, 510:1 predictions 418:13, 420:18, 421:1, 426:20, 428:3, 430:16, 430:18, 430:21, 432:6, 435:2, 436:17, 437:4, 437:18, 455:10, 462:8 predictive 458:17, 459:10 predicts 402:10, 402:20, 413:14, 469:21 present 355:5, 432:3 presented 406:1	preserve 377:1 pretty 398:18, 431:7 previous 384:14, 385:3, 427:13, 504:2 prior 351:15, 352:5, 352:17, 370:10, 371:22, 376:1, 376:19, 415:14, 426:2, 441:18, 449:22, 450:4, 511:13, 512:21 probabilistic 390:2, 404:21, 404:22, 405:4, 405:5, 406:3, 408:4, 408:7, 409:10, 409:20, 411:14, 411:16, 477:6, 478:20, 479:12, 480:22, 481:15, 481:20, 482:15, 483:5, 484:6, 484:15, 485:3, 485:12, 485:14, 485:18, 485:19, 486:1, 486:3, 486:7, 486:17, 487:1, 487:4, 487:14, 487:19, 488:2, 488:4, 488:10, 491:4, 491:11, 491:19, 492:2, 492:3, 492:4, 492:15, 492:20, 492:22 probabilities 400:9, 431:17, 433:16, 435:4, 436:9, 455:15, 469:13, 481:2, 481:5, 481:18, 481:22, 482:2, 482:5, 482:10,	484:8, 485:4, 485:8, 490:20, 491:1 probability 397:12, 399:9, 432:8, 432:9, 436:2, 436:4, 437:7, 454:19, 455:1, 458:6, 458:17, 458:20, 459:9, 459:10, 460:4, 464:13, 465:7, 466:8, 480:6, 480:9, 481:4, 481:22, 483:6, 492:21, 507:12 probably 421:11, 433:3, 436:1, 458:15, 459:4, 494:11, 497:10 proceeding 353:6, 379:16, 379:22 proceedings 352:7, 352:18 process 381:21, 404:3, 487:10, 509:6, 510:14 produced 346:8, 511:13 projected 453:9 proof 449:21 propagation 409:13 proper 381:5, 403:7 proposing 494:5 prosecution 374:6, 380:11, 502:15 provide 383:20, 384:11,
--	--	---	--

389:10, 391:5, 403:7, 446:14, 446:16, 448:21, 478:22, 489:9, 491:9 provided 403:21, 443:6, 446:13, 446:18, 446:20, 446:22, 448:1, 481:12 provides 430:8 providing 370:8, 405:16, 414:2, 414:20 published 484:20 pull 508:8 purpose 399:18 purview 388:17, 390:10 push 434:16 put 371:22, 400:9, 472:17, 506:19	380:1, 381:11, 383:18, 384:8, 384:9, 384:10, 394:14, 410:6, 418:20, 424:10, 424:22, 425:3, 426:2, 426:5, 426:10, 434:11, 455:18, 460:11, 471:21, 473:17, 488:15, 492:18, 497:11, 504:19, 504:21, 511:1 questioning 448:6, 499:15 questions 349:18, 369:20, 437:16, 441:7, 447:9, 447:11, 468:18, 514:2 quick 418:19 quite 500:6 quote 355:22, 356:7, 356:9, 356:14, 359:8 quoted 366:14	375:21, 378:12, 380:9, 383:12, 384:6, 386:4, 387:22, 389:1, 390:11, 392:3, 415:7, 415:16, 417:13, 417:17, 428:7, 428:8, 430:1, 454:21, 471:16, 473:16, 473:18, 474:11, 474:18, 474:20, 476:15, 478:2, 489:13, 490:2, 502:13, 503:22, 505:12, 506:2, 506:4, 511:14 reading 374:1, 374:5, 374:10, 388:15, 389:5, 389:17, 389:18, 389:19, 390:22, 391:9, 403:19, 408:22, 446:5, 447:15, 448:11, 449:20, 450:10, 483:2, 484:4, 502:14, 502:18 reads 376:2, 378:3, 389:16, 483:20 real-world 425:19 really 357:6, 424:8, 437:15, 447:8, 478:13, 497:12 reason 352:21 reasonable 390:18 reasons 477:2 recall 425:6, 468:10, 497:15, 502:7 receive 351:5, 351:17,	352:8, 403:11, 403:12 received 351:7, 503:15, 505:10 receives 403:14, 407:6, 452:17 receiving 405:8, 405:22, 406:6, 429:1, 442:17, 471:15, 471:20, 472:16, 492:6, 493:10, 493:12 recess 382:7, 419:21, 468:6, 513:18 recognized 415:13 recollection 399:11 record 373:15, 377:1, 380:8, 381:4, 382:8, 419:22, 460:8, 474:11, 474:18, 474:19, 513:16, 513:19, 514:4, 515:14 recurrent 483:22, 484:1 refer 385:5, 391:2, 449:17, 465:17, 465:19, 482:15, 482:21, 497:6 reference 352:5, 352:18, 417:18, 430:15, 439:19, 468:9, 479:9, 490:18 referenced 460:5, 460:13 references 391:1 referring 354:22, 367:21,
Q	R		
qualifies 393:4 qualify 394:13, 475:9, 485:14, 486:7, 486:17, 488:9, 492:22 quantifies 458:5 quantify 481:21 query 412:15 question 354:7, 354:14, 367:4, 372:17, 373:5, 376:11, 376:13, 377:19,	raining 482:1 raised 447:21 random 438:2 randomly 367:15, 436:21 range 391:6 rather 506:17 reach 358:4, 360:21, 362:15 read 367:13, 368:10,		

371:4, 379:3, 402:19, 407:6, 425:5, 436:19, 437:1, 437:5, 437:11, 448:13, 468:14, 470:5, 472:6, 473:12, 475:5, 489:12, 490:1, 491:17 refers 356:6, 389:8, 401:14, 425:6, 449:14, 464:18, 466:21, 476:1, 476:14, 509:15 reflect 456:2, 456:16, 458:11 refresh 425:5 refusing 372:16 regard 492:19 regarding 377:4, 406:14, 473:7, 473:9, 497:13, 499:4 regards 370:9, 371:21, 377:9, 377:20, 378:3, 379:13, 379:22, 381:2, 462:18, 476:7, 477:14, 497:18, 498:4 region 496:16, 496:20 relate 377:22, 439:22, 451:10 related 467:4, 470:11, 470:13, 470:16, 481:17, 516:5 relates 451:3, 451:15, 459:20	relationship 452:5, 454:22, 459:17 relative 475:19 relevance 373:14 relevancy 372:16 relevant 358:17, 358:18, 359:21, 360:22, 371:2, 371:10, 371:17, 372:18, 373:5, 385:17, 388:19, 389:8, 391:3, 476:10 relying 373:7 remember 367:8, 368:22, 377:10, 382:14, 412:8, 420:10, 439:2 remembering 367:10, 367:17 remote 345:22, 346:7, 347:1, 515:2 render 374:12, 374:19, 375:22, 376:4, 376:9, 376:10, 379:21, 381:1, 381:3, 381:12, 381:15, 381:17, 511:12 rendered 371:21, 379:1, 379:12, 380:14, 380:16, 381:15 rendering 370:9, 379:18, 380:3 repeatedly 487:7 repeating 499:14	repeats 438:9 repetitive 366:11 reported 346:14 reporter 346:13, 375:14, 460:10, 486:13, 514:8, 515:6 reporter's 515:1 represent 365:5, 365:10, 388:6, 388:10 represented 378:16, 388:7, 388:11, 515:18 representing 349:3, 359:13, 360:9, 402:7, 405:19, 405:21, 442:16, 470:12, 471:14, 471:19, 472:15, 485:21 represents 355:18, 357:7, 363:16, 364:22, 365:15, 366:1, 366:20, 378:15, 383:2, 393:15 requested 350:10 requests 409:5, 413:6 require 393:10, 398:4, 431:19, 431:22, 499:10 required 485:13, 504:14 requirement 366:17, 492:14, 492:19 requirements 366:15, 486:6, 486:15, 492:16, 493:2, 504:13	respect 410:7, 439:21, 451:7, 462:20, 495:2, 495:9, 495:18, 496:6, 497:21, 502:22 respectfully 373:6 responding 416:5, 416:7 response 405:22, 407:11, 409:17, 411:1, 411:22, 412:4, 412:11, 412:14, 414:5, 416:5, 442:18, 471:15, 471:20, 472:16, 506:13, 507:11, 509:16 responses 407:8, 408:10, 409:3, 409:5, 409:16, 409:22, 412:13, 412:18, 412:20, 413:1, 413:6, 413:9, 413:13, 413:15, 413:21, 414:2, 414:3, 414:17, 414:20, 416:6, 496:13, 501:22, 503:14, 503:19, 504:4, 504:5, 505:3, 505:9, 506:7, 506:11, 506:13, 507:10 responsive 426:2 rest 472:22 restate 460:10 restricting 476:9 rests 424:17 results 387:1
---	--	---	--

review 393:13, 511:10	513:22, 515:2, 515:10, 516:2	374:13, 379:17, 382:17, 386:9, 389:4, 390:21, 392:4, 397:17, 398:9, 399:17, 399:20, 400:1, 402:4, 402:14, 407:21, 411:3, 413:19, 415:3, 415:8, 416:9, 418:10, 418:15, 424:5, 431:12, 432:6, 432:16, 433:1, 435:18, 438:6, 444:20, 445:12, 445:19, 445:22, 446:2, 448:15, 459:3, 459:6, 459:14, 462:21, 463:17, 469:8, 470:6, 470:8, 473:19, 475:4, 477:18, 479:22, 481:14, 500:7, 509:4	428:11, 430:10, 438:8, 441:11, 443:3, 443:4, 444:17, 445:13, 446:11, 446:19, 447:22, 448:10, 450:5, 451:20, 452:13, 452:20, 454:1, 454:16, 455:7, 457:2, 458:2, 458:17, 460:17, 463:10, 465:11, 466:17, 467:11, 480:4, 487:3, 487:4, 492:1, 493:10, 496:19, 497:2, 499:16, 504:22, 505:1, 506:5, 507:8, 510:11, 510:13, 512:5
revving 434:18	sad 368:15, 475:9, 475:15	saying 360:12, 363:10, 363:13, 364:12, 364:15, 389:4, 392:6, 392:11, 393:1, 393:3, 394:19, 398:10, 430:7, 430:20, 447:20, 448:19, 460:9, 473:6, 477:9, 508:1	scale 414:7
ridge 347:16	said 369:21, 370:2, 375:2, 381:1, 399:13, 448:13, 450:7, 473:12, 498:19, 508:12	says 383:16, 384:1, 388:9, 390:1, 391:20, 393:9, 402:5, 403:20, 407:3, 410:15, 410:17, 411:8, 413:7, 420:20, 421:4, 421:15, 423:1, 423:7, 423:22, 424:20, 425:18, 427:7,	scenario 374:21
right-hand 421:17, 435:9, 456:1	sake 503:10		scenarios 374:14, 374:16, 395:19
risk 499:13	same 349:18, 353:5, 355:12, 360:14, 364:9, 368:13, 369:7, 373:12, 375:9, 401:8, 402:13, 409:8, 410:12, 413:10, 425:17, 426:7, 436:20, 438:1, 440:15, 440:19, 455:10, 455:15, 470:6, 471:3, 476:4, 487:6, 491:22, 495:17, 496:10, 498:21, 499:8, 500:8		scene 435:13, 435:16, 447:1, 447:2
riverbank 368:2, 370:2			scheme 366:8
road 357:12, 358:10, 358:11, 359:6, 360:20, 361:1, 362:3, 364:3, 366:9, 384:20, 384:22, 386:8, 394:2, 399:16, 414:12, 432:21, 434:14, 475:5, 475:18			scope 357:20, 361:16, 369:18, 370:18, 370:20, 371:15, 376:22, 378:22, 379:8, 379:18, 380:2, 380:5, 380:21, 386:7, 391:11, 396:6, 398:14, 402:2, 455:5, 475:12, 482:18, 485:10, 486:10, 486:21, 487:22, 488:13, 493:4, 503:3,
roads 435:14			
room 349:19, 350:1			
ross 350:10	sampled 460:21, 461:12, 462:4, 462:14, 467:15		
rough 514:6, 514:10	samples 486:2		
round 361:18	satellites 435:15		
running 459:11	satisfied 504:14		
S	satisfy 366:16, 377:5		
saber 345:23, 346:7, 349:9, 349:11, 352:21, 377:3, 382:11, 410:3, 420:3, 434:11, 437:15, 447:7, 447:15, 448:3, 449:3, 468:8, 513:1, 513:14,	saw 482:13		
	say 358:12, 361:3, 362:5, 362:18, 369:22, 373:2,		

506:1, 511:7, 512:2, 512:5, 512:10 screen 350:19 scroll 442:12 scrolling 440:20, 497:1 seal 516:13 search 386:20, 387:15, 409:3, 417:8, 417:10 searchable 386:18, 416:22 searched 417:5 searching 387:1 second 354:12, 358:6, 358:12, 362:19, 366:17, 384:7, 387:4, 387:13, 399:22, 401:5, 401:6, 401:7, 405:3, 418:6, 421:18, 421:19, 422:19, 442:22, 443:2, 464:10, 464:20, 464:22, 466:16, 471:12, 478:2, 488:15 second-to-last 474:10, 474:15, 497:6 seconds 358:21, 361:3, 361:14, 362:5, 362:6, 362:7, 362:9, 385:13, 385:15, 386:11, 391:10, 396:18, 396:22, 419:12 section 356:12, 440:21,	441:6, 441:10, 441:14, 441:22, 473:9, 474:1, 501:20 seeing 388:20, 411:19, 431:12 seeming 366:10, 372:15 seems 398:14 seen 351:12, 352:2, 352:14, 480:19, 484:14 sees 365:2, 385:14, 432:12 selected 463:2 self-driving 358:19 sense 366:6, 367:12, 370:7, 374:17, 377:14, 388:22, 390:15, 391:12, 481:7 sensor 359:11, 399:16, 399:17 sent 350:9, 353:6 sentence 355:4, 355:5, 363:6, 373:18, 383:15, 391:20, 394:15, 394:18, 415:9, 417:17, 421:11, 423:5, 424:3, 427:13, 442:20, 442:22, 443:3, 443:4, 443:16, 444:6, 446:10, 447:21, 448:7, 448:8, 449:2, 450:5, 451:19, 457:2,	473:11, 474:10, 474:12, 474:15, 474:22, 475:10, 476:1, 477:16, 478:3, 489:13, 490:2, 497:6, 499:15, 499:22 sentences 473:14, 473:17, 473:18, 477:17, 478:4 separate 457:9, 457:10, 492:14 separated 472:4, 472:10 separately 468:18, 474:3 series 448:14, 450:11 serves 478:14 set 409:15, 409:18, 424:1, 428:19, 428:22, 440:15, 461:9, 461:15, 462:12, 463:2, 463:11, 463:13, 463:15, 463:18, 466:2, 467:13, 467:16, 493:9, 493:12, 515:11 setting 370:22, 376:6, 376:7, 376:13, 376:18, 493:1, 504:12 several 375:13, 411:11, 412:7, 416:18, 498:14 shift 438:21 short 362:4, 362:11, 459:12, 513:12 short-term 484:1	shorthand 346:13, 346:15, 515:5 should 353:4, 459:6 show 388:4, 393:22, 396:16, 417:3, 432:22, 449:21, 450:1, 450:2, 481:9, 507:19 showed 397:1, 416:19, 428:13 showing 452:19, 509:5, 510:13 shown 429:20, 452:13, 452:20, 459:2 shows 458:18, 458:20 sigma 463:1, 463:6, 463:20, 463:21, 464:11, 465:14 sign 433:13 signature-plkal 516:15 significantly 436:6 similar 425:21, 480:7, 500:10, 500:11, 500:13 simplicity 503:10 simplifying 419:4 single 388:1, 460:1, 460:2 sir 349:21, 350:17, 351:7, 351:20, 353:2, 353:15, 353:18, 354:1,
---	---	---	---

354:6, 354:13, 354:18, 355:15, 361:9, 378:11, 382:15, 386:16, 386:19, 386:22, 410:18, 415:2, 420:5, 420:15, 420:16, 422:16, 439:6, 439:8, 439:14, 440:14, 442:3, 442:14, 443:15, 451:2, 468:11, 470:20, 471:1, 471:6, 476:19, 494:14, 494:18, 495:3, 495:7, 495:16, 495:20, 496:2, 497:4, 501:19, 502:3, 508:9, 513:5, 513:9 sit 484:18, 484:21 sitting 361:12, 370:13, 375:2, 380:20, 381:6, 416:9, 419:20, 434:16, 437:2, 437:17 situation 359:21, 385:20, 388:18, 390:16, 428:4 skipped 433:13 sky 482:1 slight 506:18 slightly 369:4, 380:1, 496:19, 502:16, 506:11 slowing 397:16 small 463:14, 463:16, 465:14	smaller 408:5, 463:21 smiling 475:22 snowbank 368:2, 370:2 some 349:17, 356:19, 362:21, 363:20, 364:15, 370:22, 372:3, 374:14, 376:14, 377:11, 380:18, 392:14, 400:9, 421:7, 441:18, 448:21, 449:8, 481:9, 482:9, 484:19, 493:16, 498:17, 500:12, 501:1, 506:18, 509:8, 510:16 somebody 371:1, 449:15 something 361:11, 362:14, 365:14, 365:19, 368:14, 369:15, 370:11, 370:16, 371:13, 372:3, 373:10, 373:22, 374:20, 376:6, 376:17, 379:2, 381:14, 389:22, 393:3, 394:10, 396:4, 408:6, 424:6, 436:15, 444:11, 445:6, 502:19, 503:20, 504:15, 511:8, 512:8 sometimes 429:8, 429:9, 431:3, 431:4, 490:8, 502:16 somewhere 374:15, 376:14, 438:6 sorry 384:4, 423:15,	430:5, 442:21, 444:9, 457:14, 458:12, 459:11, 469:16, 472:9, 474:14 south 347:7 space 459:5, 459:6 speak 361:19, 369:21 speaking 447:14, 451:13, 476:6, 482:9, 490:21 spec 393:14, 396:12 specific 367:12, 373:8, 375:5, 389:10, 391:5, 410:7, 425:3, 430:13, 436:19, 437:12, 455:21, 465:8, 475:5, 485:7, 487:13, 493:16 specifically 406:12, 408:14, 410:3, 436:18, 438:22, 446:2, 455:22, 484:22, 504:11 specification 358:1, 358:2, 360:8, 361:5, 368:5, 368:8, 368:11, 369:3, 369:6, 369:9, 370:10, 372:3, 374:5, 374:10, 375:22, 380:11, 386:6, 387:18, 388:16, 389:19, 389:20, 393:17, 401:9, 406:13, 411:7, 476:16, 486:16, 488:2, 502:15, 502:18,	503:22, 505:14, 509:2, 511:22, 512:15 specifications 511:4 specify 385:7, 385:22, 386:3, 387:19, 391:10, 512:10 specs 360:6 speech 428:6, 429:9 speed 423:10, 432:15, 435:5, 436:12, 438:13 speegle 347:4, 348:3, 349:1, 349:8, 351:21, 352:11, 371:7, 372:12, 373:16, 375:11, 375:18, 376:21, 378:5, 381:19, 382:4, 382:8, 382:10, 406:10, 408:12, 410:1, 419:22, 420:2, 424:4, 425:1, 426:3, 437:13, 446:3, 447:5, 447:13, 468:4, 468:7, 513:10, 513:15, 514:5 spent 375:11 square 361:19, 463:2 standard 346:12, 487:9, 514:10 standing 396:19 start 396:21, 408:22, 441:6, 452:10, 460:9, 468:18
---	---	---	--

started 448:6 starting 356:11, 388:2, 401:10, 408:22, 409:8 starts 401:13, 404:13, 421:12, 440:22, 474:12, 474:15, 479:5 state 346:14, 363:20, 365:8, 366:5, 367:7, 367:11, 367:16, 367:21, 368:15, 368:18, 369:2, 369:11, 369:14, 370:15, 370:21, 371:3, 371:12, 372:2, 372:22, 373:4, 373:9, 374:13, 375:5, 376:5, 377:6, 377:13, 377:14, 378:15, 378:19, 381:7, 417:21, 419:5, 419:6, 419:14, 420:7, 422:12, 423:1, 423:3, 423:8, 423:14, 423:17, 424:1, 424:18, 426:16, 427:1, 427:15, 427:16, 427:22, 428:11, 428:13, 428:19, 430:10, 431:8, 432:11, 435:1, 435:21, 436:16, 437:3, 437:18, 443:5, 443:21, 445:2, 445:13, 455:6, 475:9, 475:19, 496:11, 509:12, 515:6 stated 515:7	statements 513:2 states 345:1, 373:18, 446:12, 446:17, 448:1, 456:10, 468:21, 474:22, 475:1, 475:4, 475:5 static 428:18, 435:12 statistic 503:19, 504:15, 505:2, 505:7, 506:8, 508:2 statistical 405:14, 487:8, 487:12, 494:1, 503:11, 503:13, 503:15, 503:18, 505:8, 506:9, 506:15, 507:8, 507:13 statistics 496:12, 501:22, 502:4, 502:10, 502:22, 504:9, 504:12, 505:5, 506:6, 509:16, 509:20 stay 396:22 step 397:13, 397:14, 397:15, 397:16, 400:2, 492:7, 509:15, 509:19, 509:22 step-by-step 430:8 stepped 399:20 stepping 399:22 steps 405:6, 405:8, 407:18, 438:9, 488:6, 492:5,	492:16, 510:7 still 349:11, 349:14, 354:12, 357:11, 363:1, 399:10, 413:15, 420:3 stochastic 409:10 stop 375:16, 400:4, 433:10, 433:13 stored 403:21 storing 412:12 story 362:16 straight 357:11, 422:3, 425:10, 434:4, 435:3, 435:20, 436:2, 436:9, 453:14, 465:11 straightforward 501:7 street 347:7, 367:15, 388:13, 414:9, 446:1 strike 371:8, 372:13, 378:6, 393:2, 406:11, 408:13, 410:2, 424:7, 425:2, 437:14, 442:22, 446:4, 447:6, 451:8, 471:21 structure 489:10 structured 405:2 student 449:12, 501:10 students 449:8 stuff 436:21, 483:13,	505:12, 509:12 style 480:7 sub-elements 495:1, 495:17 subheadings 471:9, 472:1, 472:2 subject 377:5, 379:4, 388:17 subscribed 516:12 subsequently 412:14 substance 513:8 suggested 399:8, 399:12, 476:21, 477:4 suggests 444:14 suite 347:15 sum 463:7, 465:7 summarize 375:1 summarizing 479:8 summary 496:12, 501:22, 502:4, 502:10, 502:21, 503:12, 503:13, 503:16, 503:18, 504:9, 504:11, 504:15, 505:2, 505:5, 505:7, 505:8, 506:6, 506:8, 506:9, 506:15, 507:9, 507:13, 508:2 summation 464:16, 465:1 summed 464:11, 464:17 summing 463:9, 463:15,
--	---	---	---

463:18, 464:7 support 489:19, 490:13 supposed 400:5 sure 350:21, 364:6, 364:9, 368:12, 377:18, 389:5, 426:10, 433:12, 439:9, 459:22, 477:8, 513:17 surrounding 423:3, 427:17 sworn 346:9, 515:12, 516:12 symbol 458:18, 458:20 system 359:9, 359:12, 407:3, 407:4, 407:5, 408:1, 408:18, 409:5, 409:9, 409:13, 410:5, 410:11, 410:16, 411:4, 411:9, 413:6, 422:15, 426:18, 426:22, 427:6, 433:2, 435:17, 438:9, 438:11, 452:15, 452:16, 485:19 systems 415:12, 415:14, 417:21, 418:3 T t 465:1, 465:4 t's 452:1 table 439:4, 439:13, 441:3, 470:22, 471:8, 472:1, 494:16	take 373:15, 381:22, 383:12, 384:15, 418:21, 419:18, 452:9, 464:15, 468:4, 478:17, 501:10, 513:12 taken 346:9, 372:19, 382:7, 419:21, 425:20, 448:14, 448:15, 458:4, 513:18, 515:13 takes 411:17 taking 449:16, 457:5 talk 401:2, 412:3, 427:19, 465:15 talked 367:6, 368:14, 387:14, 393:12, 399:6, 404:19, 405:17, 415:17, 449:3, 455:11, 460:22, 492:16 talking 360:8, 368:12, 371:2, 371:18, 372:9, 376:18, 382:21, 384:19, 386:6, 388:1, 388:5, 390:7, 401:4, 404:19, 405:11, 408:3, 408:7, 408:11, 416:17, 420:11, 422:14, 434:20, 449:13, 452:14, 452:15, 452:16, 453:7, 460:16, 461:21, 469:19, 470:2, 470:8, 470:19, 472:18, 477:14, 479:5, 481:3, 485:5, 485:22, 488:16,	488:18, 491:11, 491:14, 493:11, 493:21, 496:10, 496:16, 499:10, 504:2, 504:3 talks 394:7, 402:14, 411:15, 412:9, 412:10, 412:11, 416:15, 427:12, 478:17, 479:3, 479:12, 484:9, 485:11, 485:18, 487:1, 487:9, 496:12, 496:14, 503:17 target 395:13, 508:3 targeting 435:7, 438:4 taught 498:10 teach 440:6, 441:11, 442:1, 442:16, 449:4, 471:10, 471:13, 472:5, 472:10, 472:12, 472:15, 472:22, 473:21, 474:7, 477:6, 477:19, 497:3, 498:4, 501:21 teaches 451:11, 478:6 teaching 446:14, 446:17, 446:18, 448:10 teachings 443:5, 446:12, 447:22, 450:6 technical 367:12, 377:22, 390:5, 390:6, 428:8, 429:22, 481:10, 483:9, 489:9, 490:7, 490:15, 493:7	technically 359:20, 429:7 technique 431:6 techniques 409:11, 430:3 telephone 347:9, 347:17 tell 370:14, 371:9, 372:17, 373:6, 375:3, 378:18, 380:4, 395:1, 395:14, 397:1, 398:1, 399:4, 400:19, 489:14, 499:21, 500:16 telling 430:21, 462:15 tells 429:10, 465:3, 465:4 ten 463:13, 463:18, 513:16 term 353:20, 354:9, 354:15, 355:11, 363:10, 393:9, 393:14, 396:3, 396:9, 475:10, 476:5, 485:15, 486:18, 499:9, 503:4, 503:5, 503:11 terminology 370:7, 482:20 terms 364:10, 368:16, 372:20, 373:1, 373:6, 373:20, 373:21, 377:6, 413:19, 504:9, 504:11, 506:22 tesla 345:4, 349:3, 372:1, 376:1, 376:19, 377:3,
---	--	---	--

443:4, 443:6, 446:11, 446:13, 446:14, 446:16, 446:19, 447:22, 448:9, 449:22, 451:22, 476:22, 477:4, 477:18, 477:20, 511:11, 511:13, 512:20 tesla's 449:20, 514:2 testify 352:22, 380:21, 381:7 testifying 373:13, 501:17 testimony 367:11, 367:17, 377:10, 399:11, 483:14, 513:8, 515:14 texas 346:14, 347:8, 515:6, 516:18 text 386:18, 407:7, 411:7, 412:12, 416:22, 417:8 th 346:10, 516:13 thank 352:20, 353:9, 402:9, 403:9, 438:21, 462:2, 463:20, 492:12, 504:7, 513:22 themselves 432:2, 447:3, 448:19, 507:1 theory 480:1, 480:5, 482:4 thing 360:14, 368:13, 369:7, 455:10, 464:11, 470:6, 481:2, 496:10 things 372:8, 372:17,	389:14, 393:7, 400:10, 411:12, 412:7, 431:4, 437:22, 439:7, 467:9, 493:17, 498:17, 502:19 think 350:11, 358:8, 361:17, 365:22, 367:15, 368:13, 371:10, 372:18, 373:4, 377:8, 380:6, 381:19, 382:18, 385:4, 389:3, 390:19, 393:7, 393:12, 394:4, 394:12, 394:15, 395:5, 395:11, 395:17, 395:21, 396:7, 398:7, 398:13, 398:14, 399:12, 399:14, 406:21, 407:15, 408:21, 409:19, 411:11, 412:1, 413:18, 416:1, 419:6, 422:9, 422:17, 422:20, 424:11, 426:1, 427:2, 428:5, 429:12, 429:19, 433:1, 435:8, 439:8, 449:4, 456:19, 459:3, 467:8, 475:14, 479:10, 491:2, 494:10, 494:14, 500:6, 501:7, 505:15, 511:8 thinking 409:20 third 387:7, 422:1, 422:2, 488:17 thought 504:20 three 360:21, 362:15,	365:4, 365:6, 370:3, 387:4, 387:14, 388:21, 390:15, 405:7, 406:5, 407:18, 422:7, 425:3, 425:7, 425:14, 426:6, 431:9, 457:3, 472:2, 472:5, 472:17, 495:1, 496:5 threshold 384:3, 384:17, 385:1, 385:8, 385:10, 385:19, 386:1, 386:10, 386:21, 387:2, 387:11, 387:14, 387:15, 387:18, 387:19, 388:4, 388:8, 388:18, 389:7, 389:11, 390:13, 391:2, 391:6 through 387:12, 389:6, 402:4, 403:19, 412:10, 412:19, 422:3, 430:1, 450:1 throughout 476:5 time 346:12, 358:12, 358:13, 359:16, 362:5, 362:11, 380:18, 381:18, 381:20, 382:16, 384:3, 384:17, 385:1, 385:9, 385:11, 385:12, 385:19, 386:1, 386:10, 386:21, 387:2, 387:11, 387:15, 387:16, 387:18, 387:20, 388:4, 388:9, 388:18, 389:8,	389:11, 390:13, 390:21, 391:2, 391:3, 391:6, 401:8, 431:18, 434:1, 459:12, 468:3, 514:1 times 375:13, 375:16 title 356:11, 390:1, 449:6 today 349:2, 349:15, 349:20, 350:1, 351:1, 351:10, 353:1, 361:12, 370:13, 371:21, 375:2, 376:11, 380:7, 380:17, 380:20, 381:6, 382:12, 382:19, 437:2, 437:17, 475:14, 497:18, 513:2, 513:7, 514:1, 514:3 today's 513:6 together 439:16, 440:13, 472:18, 473:2, 495:1 told 419:7, 493:5, 498:9, 503:21 top 369:1, 412:8, 463:3, 497:15, 502:7 totally 477:13 town 435:14 trademark 345:1 traffic 355:19, 356:6, 357:2, 357:3, 357:8, 357:14,
---	---	--	--

358:14, 358:16, 359:4, 359:14, 359:17, 359:20, 360:10, 360:18, 360:20, 361:7, 361:13, 361:21, 362:20, 363:9, 363:17, 363:19, 364:5, 364:14, 364:17, 365:1, 365:3, 365:4, 365:6, 365:11, 365:16, 365:18, 366:2, 366:7, 366:21, 367:1, 371:4, 378:16, 383:3, 385:12, 385:16, 388:7, 388:12, 390:3, 390:7, 393:16, 393:18, 394:8, 396:13, 396:14, 398:2, 400:14, 405:9, 405:10, 405:19, 409:6, 413:2, 413:7, 413:11, 413:22, 414:1, 414:13, 414:18, 414:20, 416:6, 437:8, 438:10, 438:12, 438:15, 438:19, 448:20, 470:9, 475:18, 493:10, 493:13, 493:14, 493:15, 496:15, 496:21, 505:4, 505:7, 509:8, 510:16 train 404:2, 413:14, 469:12, 509:19 trained 403:10, 403:17, 404:7, 404:9, 404:15, 406:16, 407:22, 408:17, 410:10, 411:8,	411:18, 415:18, 443:21, 454:17, 456:11, 460:18 training 403:21, 403:22, 404:3, 404:12, 404:22, 405:4, 406:3, 406:8, 407:3, 407:20, 408:1, 408:2, 408:4, 408:6, 408:18, 409:15, 409:18, 410:4, 410:5, 410:11, 410:16, 411:4, 411:9, 415:20, 430:12, 446:6, 447:16, 449:9, 458:21, 461:9, 461:16, 462:12, 463:11, 463:12, 466:2, 467:12, 467:17, 469:9, 487:10, 488:4, 492:1, 509:6, 510:14, 510:21 trains 409:9 trajectories 444:1, 445:15, 452:21, 452:22, 453:10, 461:16, 461:17, 462:16, 463:12, 463:13, 463:18, 463:19, 464:5, 466:2, 466:3, 466:5, 467:17, 467:18, 467:20, 469:20, 469:22, 470:13 trajectory 451:22, 452:5, 453:11, 453:13, 454:3, 454:6, 454:12, 454:14, 454:18, 454:19, 455:1, 455:8, 455:14, 455:16,	456:4, 456:7, 456:8, 456:11, 456:14, 456:15, 456:17, 456:22, 457:1, 457:4, 457:6, 458:2, 458:3, 458:6, 459:21, 460:2, 460:4, 461:18, 462:20, 463:16, 463:17, 464:3, 464:6, 464:8, 465:4, 465:5, 465:9, 465:20, 466:1, 466:13, 466:17, 466:18, 467:3, 467:21, 469:12 travel 431:15 traveling 422:3, 431:13 tree's 490:11 trees 489:19 trial 345:2 tried 407:16 true 515:8, 515:14 try 365:12, 372:17, 375:1, 376:21, 386:13, 390:20, 455:19, 460:10, 506:16 trying 357:15, 359:12, 361:18, 364:8, 382:14, 392:12, 392:16, 394:22, 395:13, 398:13, 398:20, 406:22, 419:11, 424:8, 424:9, 424:15, 437:21, 459:12,	461:10, 482:20, 492:13, 504:10, 508:3 turn 353:3, 353:10, 354:3, 357:12, 360:1, 362:17, 370:5, 391:14, 394:5, 421:17, 421:20, 432:13, 433:4, 433:16, 433:21, 435:9, 435:19, 436:3, 436:11, 456:1, 464:15, 470:21, 495:21, 501:18, 508:7 turnaround 514:10 turning 360:2, 362:8, 453:4, 453:12 twisting 361:17, 393:7 two 353:7, 354:20, 355:9, 366:13, 387:6, 388:4, 410:7, 432:19, 456:20, 470:6, 471:9, 471:22, 472:7, 473:13, 473:16, 473:18, 477:17, 478:4, 507:15 two-dimensional 507:12 two-thirds 421:11, 443:17 tying 392:17 type 377:21, 385:20, 388:18, 407:4, 425:19, 425:20, 479:1, 480:22, 481:2, 482:2, 482:9, 487:13,
---	--	--	--

494:1 types 489:21 typically 415:11, 415:21, 418:3, 445:5, 461:11, 469:3, 469:10, 479:19, 482:6, 482:7, 482:9, 483:12, 484:11 typo 459:4, 459:6, 466:7, 497:10 U u-turn 396:17 uncertainty 438:17 under 349:12, 366:22, 430:22, 471:7, 472:1, 472:3, 501:21, 516:12 underlying 426:22, 475:1 undersigned 515:5 understand 349:11, 361:6, 364:20, 365:21, 366:19, 373:3, 377:3, 377:18, 379:4, 379:7, 385:11, 389:3, 389:7, 390:19, 391:1, 391:9, 392:16, 392:17, 394:14, 398:18, 398:20, 399:5, 419:17, 424:9, 426:9, 446:6, 447:16, 449:8, 449:12, 449:17, 453:6, 463:8, 464:2, 482:15, 483:16, 491:2,	501:12, 501:13, 504:8, 506:20 understanding 356:4, 364:7, 384:19, 394:9, 396:3, 398:3, 398:12, 401:22, 416:3, 442:5, 452:4, 463:5, 486:5, 508:20 understands 484:7 united 345:1 unless 374:3, 381:13 unlikely 433:5, 433:21, 436:3 unpredictable 415:11, 415:21, 416:12, 417:3, 417:7 unsure 366:11 usage 395:17 use 360:7, 361:4, 362:12, 367:21, 367:22, 368:16, 369:4, 369:14, 370:12, 395:18, 420:18, 428:5, 430:18, 430:20, 431:2, 436:20, 438:1, 482:3 user 378:16, 378:19, 382:13, 382:18, 383:21, 384:2, 384:12, 384:15, 384:16, 385:5, 388:6, 388:7, 405:22, 406:1, 407:8, 407:11, 408:10, 409:3, 409:5, 409:16,	409:22, 411:22, 412:3, 412:11, 412:13, 412:18, 412:20, 413:1, 413:6, 413:13, 413:15, 413:21, 414:5, 414:6, 414:8, 414:17, 416:2, 416:3, 442:17, 471:15, 471:20, 472:16, 475:18, 503:14, 504:4, 504:5, 505:9, 506:10, 506:12, 506:13, 507:9, 507:11, 510:2 user's 411:1 users 400:17, 409:5, 413:2, 413:6, 413:8, 413:21, 414:14, 414:17, 443:6, 446:13, 446:18, 446:20, 448:2, 475:6 uses 387:17, 426:20, 436:16, 437:3, 437:7, 437:17, 492:21, 505:16, 505:17 using 357:21, 362:5, 363:5, 364:18, 406:18, 407:22, 408:18, 409:10, 409:14, 410:11, 411:8, 417:22, 419:5, 420:7, 427:3, 429:8, 443:21, 458:3, 466:18, 475:10, 476:5, 480:7, 482:6, 485:8, 487:16, 501:1, 507:2, 507:21	utilize 404:4 utilized 370:11, 374:16, 376:7, 403:6, 508:6 utilizing 423:14, 423:17, 424:19 v vacuum 369:20, 384:21 valid 461:14 value 405:21, 414:6, 442:16, 470:11, 471:14, 471:19, 472:15, 473:2 values 402:7, 402:20, 403:8, 405:14, 405:21, 409:16, 442:2, 442:7, 452:1, 470:10, 471:14, 472:13 variable 463:14 variational 409:11 various 377:6, 489:16 vector 405:12, 405:13, 489:19, 490:13 vehicle 356:12, 356:16, 357:16, 358:7, 358:9, 358:11, 359:6, 359:9, 359:10, 359:19, 360:11, 360:19, 361:1, 362:1, 362:2, 363:22, 364:4, 365:2, 366:9, 371:5, 384:22, 386:7,
--	--	--	---

399:15, 404:10, 404:11, 404:12, 414:10, 416:8, 416:9, 418:9, 418:10, 419:3, 423:4, 425:7, 425:14, 427:18, 429:4, 433:18, 434:20, 435:5, 438:8, 438:11, 452:14, 475:17 vehicles 384:20, 390:4, 390:8, 390:10, 437:9 velocity 418:8, 423:10, 426:12 verb 505:16, 505:18 verbiage 436:21 verbs 507:1 versus 433:7, 433:17, 433:19, 436:6, 484:11, 504:5, 506:9, 507:22, 512:20 vicinity 364:1 video 396:16, 403:14, 406:18, 407:7, 407:13, 408:9, 412:12, 418:4, 418:5, 432:1, 432:21, 434:1, 445:20, 448:17, 450:11, 450:13, 450:15, 510:1, 510:2 videoconference 346:15 videos 403:21, 404:7, 404:16, 404:17,	405:11, 409:22, 414:19, 448:15 view 477:22, 480:16 vii(c 472:4 viii(c 472:3, 472:9, 474:1 virtually 516:2 vis-a-vis 512:20 visible 350:6 visually 394:3 volume 345:25 W walk 357:10 walking 367:15 want 355:17, 358:4, 359:1, 360:4, 360:7, 360:21, 362:5, 372:7, 373:14, 374:19, 374:22, 384:4, 391:19, 392:13, 395:18, 413:19, 429:14, 436:15, 436:20, 438:1, 438:22, 441:5, 447:8, 450:20, 474:17, 474:18, 479:20, 494:7, 500:22 wanted 459:13 wants 360:1 way 365:22, 369:14, 375:3, 388:3,	395:5, 395:7, 405:1, 415:17, 416:20, 421:10, 443:17, 443:19, 443:20, 457:6, 482:3, 490:4, 498:17, 506:19, 507:20, 508:6, 508:19, 511:3, 516:9 way-point 451:21, 452:6, 453:15, 454:2, 454:3, 454:5, 454:10, 454:11, 454:14, 455:2, 455:10, 455:13, 456:3, 456:13, 456:20, 457:3, 460:19, 460:21, 462:3, 462:4, 467:4, 469:13 way-points 453:15, 456:21, 457:7, 461:12, 462:6, 462:13, 465:18, 465:22, 467:14 ways 364:12, 415:11 we'll 369:10, 418:21 we're 363:1, 364:9, 368:12, 370:20, 371:2, 371:17, 371:18, 373:1, 384:19, 386:6, 396:10, 405:11, 408:7, 449:13, 453:4, 453:10, 460:7, 470:2, 470:3, 472:18, 481:3, 485:4, 488:16, 491:11, 491:14, 492:13, 496:10 we've 393:12, 404:18,	408:10, 416:14, 416:17, 452:15, 468:1, 476:5, 477:14, 484:17, 492:16 webster 448:15, 450:11 weight 480:10 went 500:6 whatever 366:3, 366:22, 399:13, 418:11, 429:7, 429:9, 435:15, 482:1, 490:9 whereas 415:12 wherein 378:15, 384:2 whether 370:1, 370:11, 370:14, 370:21, 371:10, 371:11, 372:2, 373:9, 373:21, 374:17, 374:20, 375:4, 376:1, 376:5, 376:17, 377:12, 378:3, 380:4, 382:12, 394:4, 394:18, 395:14, 396:17, 396:21, 399:21, 432:14, 435:2, 437:3, 437:17, 444:21, 473:20, 476:7, 488:21, 493:1, 499:21, 500:16, 504:12, 511:12, 511:16 whole 351:8, 391:1, 391:5, 393:9, 483:3, 483:13, 484:2, 509:13 window 350:13, 358:21,
---	---	--	---

359:18, 361:14, 480:7 windows 350:6, 350:19, 483:7 within 362:4, 362:11, 377:15, 384:3, 384:17, 385:8, 385:10, 385:12, 385:15, 385:19, 386:7, 388:8, 388:16, 390:10, 390:17, 391:11, 423:3, 424:2, 425:20, 427:17, 454:3, 454:11, 454:14 without 381:4, 480:10 witness 346:8, 375:12, 447:9, 469:15, 513:11, 515:10, 515:15 word 359:1, 359:2, 361:7, 361:10, 363:6, 364:11, 364:18, 366:18, 367:21, 367:22, 368:3, 369:21, 370:3, 392:18, 417:2, 417:7, 417:10, 428:5, 443:17, 443:18, 446:21, 450:8, 450:9, 489:5, 489:8, 500:13, 500:20, 507:2, 507:3, 507:4 wording 361:4, 367:20, 368:6, 369:1, 370:12, 376:8, 377:10, 388:1, 392:13, 392:14, 395:18, 420:10,	438:2, 483:11, 501:2 words 360:5, 360:7, 361:17, 362:12, 369:14, 375:19, 376:5, 377:14, 429:7, 431:2, 431:4, 491:18, 502:16, 505:20, 506:3 work 404:4, 490:5 worked 484:14, 484:17 working 367:4 works 382:3, 513:17 wouldn't 380:17, 388:21, 388:22, 390:15, 391:12, 399:10, 448:12, 449:1, 466:9, 488:22 written 461:19, 462:17, 467:19, 468:20, 468:22 X x-y 461:3 x^ti 464:19 xmy 465:17 xti 464:18, 465:10, 466:4 Y y^ti 464:19 yeah 363:1, 391:8, 400:20, 403:6, 404:5, 417:7,	423:17, 431:11, 455:18, 459:19, 464:4, 476:11, 508:9, 508:12, 509:21 years 484:18, 498:10 yesterday 349:18, 350:9, 367:6, 367:22, 368:11, 368:14, 368:21, 375:13, 377:9, 377:11, 377:19, 380:7, 404:20, 405:17, 439:2, 449:3, 461:1, 475:14, 513:3, 514:1 yield 400:5 york 448:16, 450:12 yourself 416:10, 417:6 yti 464:19, 465:10, 466:4 Z zhu 350:8, 352:17 zoom 350:12 . .1975 347:17 .2536 347:9 .349 348:3 0 0 458:22 0049970 348:10 01 382:2	01573 345:11 01574 345:13 01575 345:15 01576 345:17 01577 345:19 0160535 348:13 0164018 348:15 02 382:2, 382:9 046 502:5, 502:11, 502:22, 504:16 05 419:20 08 420:1 1 1 346:11, 463:15, 514:12, 516:3 10 362:7, 382:2, 385:15, 387:8, 420:1, 436:8, 463:15, 495:4, 495:5, 495:6 10,614,344 345:12 100 432:20, 462:9 102 452:16 104 407:9, 410:21 11 414:4, 419:20, 509:4 11,126,889 345:14 11,467,579 345:18
---	--	--	---

11,520,346 345:20 11,753,046 345:16 110 407:8 112 407:3, 407:5, 408:1, 408:18, 410:5, 410:11, 410:16, 411:9 114 473:3, 473:12 117 474:9, 474:14, 474:21 12 345:24, 346:10, 515:3, 516:3 120 401:15, 401:20, 402:10, 402:15, 403:2, 403:4, 403:9, 403:13, 404:1, 406:14, 406:16, 407:22, 408:15, 408:17, 410:4, 410:10, 410:17, 411:8, 411:13 122 359:9, 438:11 123 403:10, 403:15, 403:20, 412:17 125 401:3, 402:17 126 482:22, 489:7, 489:13 13 379:14, 407:2, 440:1, 440:2, 441:1, 451:4, 451:10, 451:16, 472:8 130 402:18, 402:19,	402:20, 403:1 1300 347:7 132 489:7 136 420:20, 443:20, 454:10, 460:18 14 346:11, 348:10, 356:10, 516:3 145 446:1 15 358:12, 361:2, 361:14, 362:5, 388:3, 389:7 16 346:11, 438:4, 438:6, 514:12, 516:3 18 516:13 19 348:10, 348:15, 495:4, 495:5, 495:6 1a 406:8 1b 406:8 1c 406:8 1d 406:8 1e 406:9 1st 347:7 2 2- 348:10 20 348:9, 348:13, 351:4, 351:6, 351:7, 351:10, 351:11, 351:12,	351:14, 351:15, 358:6, 358:12, 361:3, 362:5, 379:14, 420:4, 440:1, 440:2, 441:1, 451:4, 451:10, 451:16, 467:22, 472:8 2019 348:10, 348:15 2020 348:13 2025 345:11, 345:13, 345:15, 345:17, 345:19 2026 345:24, 346:11, 515:3, 516:3, 516:14 2051 479:11 21 348:12, 348:13, 351:4, 351:18, 351:22, 352:1, 352:2, 352:4, 352:5, 420:13 22 348:14, 351:5, 352:9, 352:12, 352:13, 352:14, 352:16, 352:17, 467:22, 468:9, 487:3, 490:18 2205 516:18 23 383:11, 383:15, 485:20 25 362:6, 422:11, 422:14 27 478:16 28 495:21, 516:19 29 497:2	2d 461:2 2d-gaussian 460:21, 462:5, 462:10 2x2 461:3 3 30 348:15, 361:14, 418:6, 423:21, 424:3 31 440:21, 441:9, 441:11, 485:22 340 347:15 344 503:6, 503:8, 503:11, 504:3, 505:8, 505:16, 506:10, 507:8 346 350:10, 351:16, 353:7, 354:3, 354:4, 354:5, 354:8, 354:10, 354:16, 355:1, 355:13, 369:7, 371:19, 439:1, 439:12, 494:7, 494:14, 494:15, 494:17, 496:9, 497:14, 497:21, 498:13, 498:16, 498:18, 499:5, 499:11, 501:14, 502:11, 502:14, 502:15, 502:17, 503:1, 503:4, 503:17, 504:1, 504:16, 504:22, 505:6, 505:17, 506:5, 507:22, 508:1, 508:7, 508:10, 508:14, 508:20, 508:21,
--	---	--	--

Transcript of Eli Saber, Ph.D., Volume 2
Conducted on August 12, 2026

555

510:8, 511:2, 511:5, 511:10, 511:14, 511:20, 511:22, 512:14, 512:15, 512:20 35 402:14, 441:21 351 348:9 352 348:12, 348:14 37 409:9, 442:12 38 402:14, 417:15, 417:18, 417:21, 438:5, 438:6 39 402:14, 417:15, 417:18, 417:21 4 40 436:8 401 347:7 410 509:15 414 509:22 47 401:10, 408:22, 409:12, 438:7 5 5- 348:13, 348:15 51 473:4 512.322 347:9 53 356:11, 359:7, 443:12, 443:13 54 356:14, 383:6, 383:20, 384:11, 479:2, 480:3	55 356:14, 359:7 56 382:1, 411:13 57 353:3, 353:17, 353:19, 355:4, 355:17, 355:20, 363:2, 373:17 58 354:3, 354:5, 354:8, 354:13, 354:14, 355:5 59 356:18 5n 460:1, 460:2, 460:12 5n+1 459:18, 459:19, 459:20, 460:4, 460:5 6 60 356:19, 435:22, 436:4 60527 347:16 606 428:21 61 356:20 64 388:2, 389:6, 495:22, 496:2 65 403:19, 497:5 66 499:7, 499:11, 499:16, 500:10 67 382:21, 403:19 69 391:14, 391:16, 391:20, 393:8, 500:12 7 704 438:9, 438:12	706 438:10 708.675 347:17 72 414:22, 415:2, 424:19, 441:15, 441:16, 441:18 74 501:18 740 489:16 745 347:15 77 441:21 78704 347:8 79 442:4, 442:11 8 346:11, 516:3 800 453:8 805 453:1, 453:10, 453:12, 453:13, 455:22, 456:4, 456:8, 456:14, 456:15, 456:17 81 420:13, 420:14, 420:17, 424:9, 424:17, 425:5, 425:6, 430:16 810 453:5, 453:10, 453:11, 453:16, 456:2, 456:16 83 452:10 84 442:13 85 442:20, 443:2, 447:21, 453:20,	454:1, 454:9 86 455:3, 459:21, 460:6, 460:13, 460:16, 462:3, 466:22, 467:5, 467:10, 468:15, 468:19, 468:20 889 439:8, 502:5, 502:11, 502:22, 504:16 89 450:21, 450:22, 459:16 8c 472:19, 473:9 9 355:17, 382:1, 382:9 90 454:15, 454:16, 455:1, 455:7, 455:9, 456:6, 457:12, 457:14, 458:1, 458:2, 466:12, 466:16, 467:4, 468:17 91 451:15, 451:19, 457:18, 458:1, 458:8, 458:14, 458:17 94 476:17 95 477:17 9b 471:7
---	---	--	---