

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

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6 ---oOo---

7 APPLE, INC.,

8 Petitioner

9 v.

10 QUALCOMM INCORPORATED,

11 Patent Owner

12 Case IPR2018-01250

13 Case IPR2018-01251

14 U.S. Patent No. 8,447,132

15 ---oOo---

16
17 Deposition of

18 ALAN BOVIK, PhD

19 Thursday, March 28, 2019
20
21
22

23 Reported by:

24 KIMBERLEE SCHROEDER, CSP RPP CCRP

25 License No. 11414

Job No.: 2019-69200

Apple Inc. v. Qualcomm Incorporated

IPR2018-01250

Qualcomm Ex. 2004

Page 1 of 257

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I N D E X

DEPOSITION OF ALAN BOVIK, PhD

EXAMINATION

PAGE

By Mr. Robinson
By Mr. Graubart

5, 205
203

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EXHIBITS

PAGE

Exhibit 1001	United States Patent 8,447,132	8
Exhibit 1003	Declaration of Alan C. Bovik, PhD, PE	10
Exhibit 1004	U.S. Patent Application Publication, Needham, et al.	93
Exhibit 1005	United States Patent Application Publication, Nonaka, et al.	132
Exhibit 1008	United States Patent Application Publication, Zhang, et la.	174
Exhibit 1009	United States Patent, Konoplev, No. 8,265,410	172
Exhibit 1012	Provisional Application for Patent Cover Sheet	114
Exhibit 1017	Declaration of Alan C. Bovik, PhD	10

1 BE IT REMEMBERED that on Thursday,
2 March 28, 2019, commencing at the hour of 9:11 a.m., at
3 the Law Offices of Fish & Richardson, P.C., 111 Congress
4 Avenue, Suite 801, Austin, before me, KIMBERLEE
5 SCHROEDER, a Certified Shorthand Reporter in and for the
6 State of Texas and California, duly authorized to
7 administer oaths pursuant to Section 28(a) of the
8 Federal Rules of Civil Procedure and 602.002 of the
9 Texas Government Code, personally appeared

10 ALAN BOVIK, PhD,
11 called as a witness herein, who, having been duly sworn,
12 was thereupon examined as hereinafter set forth.
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1 P R O C E E D I N G S

2 ---oOo---

3 ALAN BOVIK, PhD,

4 after being first duly sworn, was examined and testified
5 as follows:

6 EXAMINATION

7 BY MR. ROBINSON:

8 Q. Thank you for being here today.

9 A. Thank you.

10 Q. Have you been deposed before?

11 A. I have.

12 Q. Approximately how many times?

13 A. I think this is my 40th.

14 Q. Fortieth. All IPRs?

15 A. No, all kinds of cases. All previously
16 patent-related, district cases, ITC cases, IPRs, the
17 gamut.

18 Q. Between those three, can you give me a rough
19 breakdown, just approximate?

20 A. Oh, of depositions?

21 Q. Yes, please.

22 A. Percentages, this will just be in something I
23 haven't calculated. I'll make my one best guess. I'd
24 say probably 10 or 12 IPR depositions. You know, could
25 be more. An ITC, probably a smaller fraction of the

1 rest than the district cases. I don't know. Probably
2 three or four.

3 Q. Fair enough. It's not your first rodeo?

4 A. Not at all.

5 Q. I won't spend too much time on preliminaries
6 then. The one thing I ask if I ask a question and you
7 don't understand, please ask me to clarify.

8 A. Fair enough.

9 Q. Let's try not to talk over each other. Other
10 than that, I think you know more or less how this works.

11 You understand that we are here today on the
12 1250 and 1251 IPR proceedings concerning US patent
13 8,447,132.

14 A. That is correct.

15 Q. And so if I refer to the '132 patent or '132
16 patent, you'll understand what I'm referring to?

17 A. Yeah, sure.

18 Q. What is a digital image?

19 A. Well, Counselor, before I start answering
20 questions, I'm going to request a copy of the '132
21 patent and my two declarations just as a matter of
22 course. If you don't have a copy, I brought copies.

23 Q. Okay. I have copies, and I'll get those out
24 for you at an appropriate time. Right now, I'm just
25 asking you based on your years of experience in this

1 field --

2 A. M-hm.

3 Q. -- how you would define a digital image?

4 A. Well, since this is an IPR deposition, really
5 your questions are kind of limited to the four corners
6 of my report. And so, I mean, the term "digital image
7 processing" is a general term. But, you know, this and
8 other questions I would like to be able to cast against
9 the content of my reports.

10 And so just as a matter of precedent, I would
11 like to begin. I'll ask my counsel to hand it to me so
12 I have my copies, and then you can -- I can refer to
13 them, if you don't object. And --

14 Q. Mr. Bovik, I would ask that you not refer to
15 those just yet at this point.

16 Do you understand your report is from the
17 perspective of a person of ordinary skill in the art?

18 MR. GRAUBART: Objection. Form.

19 THE WITNESS: My report is, you know, reflects
20 my beliefs about this case. And I do express opinions
21 about what a person of ordinary skill in the art may
22 believe and so on.

23 MR. ROBINSON: Q. What is your opinion about
24 what a person of ordinary skill in the art would
25 understand a digital image to be?

1 A. So I'll give you the simple answer, and keep
2 in mind that this answer, since you haven't pointed to
3 anything in the patent or in my reports, I'll set my
4 answer outside of that. So it's in some sense it's
5 outside of this case, my answer. It's out there in the
6 world instead and doesn't really have a bearing on any
7 of the salient matter within the report.

8 A digital image is an image which is -- has
9 been digitized or was captured in a native digital
10 format.

11 Q. Is that your understanding of what a POSITA
12 what think a digital image is as of 2009?

13 A. Oh, that wasn't what my answer was, because
14 POSITA is in something that is within the four corners
15 of my report, and you're drawing me that way. I haven't
16 really tried to create a construction of that term yet
17 within the context of this.

18 The answer I gave would not be in consummate
19 with what a POSITA would believe. But I haven't tried
20 to, you know, create a construction.

21 Q. Dr. Bovik, would you refer to -- I'll hand you
22 what's been marked as Exhibit 1001, which is the '132
23 patent? '132 patent.

24 (Exhibit No. 1001 was marked for
25 identification.)

1 THE WITNESS: Do we need to put stickers on
2 them?

3 MR. ROBINSON: They've already been marked.

4 THE WITNESS: They've already been marked.
5 Okay.

6 MR. ROBINSON: Q. Would you please refer to
7 claim 1, column 11?

8 A. I think you gave me two copies. One for you.

9 MR. ROBINSON: One for counsel.

10 THE WITNESS: I'll hand this one back. Yeah.

11 MR. ROBINSON: Q. Would you please refer to
12 claim 1, column 11?

13 A. Yeah. Line 1 of column 11.

14 Q. Claim 1 of column 11.

15 A. Oh, claim -- m-hm. (Reviewing document.)

16 Q. What would a POSITA as of 2009 understand a
17 digital image data recited in claim 1 to refer to?

18 MR. GRAUBART: Objection. Form.

19 THE WITNESS: And I'm going to ask you also
20 to, since you were kind enough to give me a copy of the
21 '132 patent, and since, once again, I'm going to remind
22 you these proceedings are about what I already have
23 expressed, I'll cast my answers against what I already
24 declared.

25 MR. ROBINSON: I'll hand you what's been

1 marked as Exhibit 1003. It's a copy of your
2 declaration.

3 (Exhibit No. 1003 was marked for
4 identification.)

5 THE WITNESS: Oh, so you already have the
6 exhibit numbers on? Okay. Whatever. You're going to
7 give me 1017 also?

8 MR. ROBINSON: I'll hand you 1017. It's
9 already been marked.

10 (Exhibit No. 1017 was marked for
11 identification.)

12 THE WITNESS: (Reviewing document.) Okay,
13 thank you. And repeat the question.

14 MR. ROBINSON: Q. What would a POSITA as of
15 2009 understand the digital image data resided in claim
16 1 referred to?

17 MR. GRAUBART: Objection. Form.

18 THE WITNESS: POSITA would understand that
19 this is image data that's in a digital form.

20 MR. ROBINSON: Q. What would that image data
21 include?

22 A. It could include a lot of things. It's going
23 to include visual information that's in a digital form
24 that's intended usually for a cumulative view, but not
25 always. Sometimes a computer algorithm may process it.

1 Q. How is that visual data defined?

2 MR. GRAUBART: Objection. Form.

3 THE WITNESS: It depends on the context. You
4 know, if you want to point me to a concern context, then
5 in that context, I'll be able to answer.

6 MR. ROBINSON: Q. What are some examples of
7 how that digital image data could be defined in the
8 context of claim 1 of the '132 patent?

9 MR. GRAUBART: Objection. Form.

10 THE WITNESS: Well, you're using the word
11 "defined," okay. And I don't really know how to answer
12 that. I mean, I already kind of gave you an answer.
13 It's image information that's in a digital format.

14 So --

15 MR. ROBINSON: Q. Does that image information
16 or visual information, which I believe you referred to
17 it earlier, include component parts?

18 A. It could. But again, we need a context there
19 to understand what exactly we're talking about.

20 Q. What type of context would help you understand
21 what I'm talking about?

22 A. Whatever context you want to ask your
23 questions within a certain framework.

24 Q. Are there different image systems that would
25 help you understand the context?

1 MR. GRAUBART: Objection. Form.

2 THE WITNESS: Well, I would say that, you
3 know, these documents contain examples of, you know,
4 concepts and systems and so on that involve digital
5 images. If you want to draw me to a particular thing,
6 then I can answer kind of specific questions that way.

7 MR. ROBINSON: Q. What if it were an RGB
8 image?

9 A. Is that a question?

10 Q. Yes. Would that context help?

11 A. It would inform me that the image data is in
12 RGB form.

13 Q. Would you explain what RGB form is?

14 A. Well, there's multiple types, actually.
15 There's RGB that we sometimes called raw, but I'm not
16 going to limit it, you know. Any terminology I use
17 outside, since we're not really talking about anything
18 specific within the specification of claims, I'm talking
19 out there in the world, and anything I say from this
20 moment until the end of this answer doesn't necessarily
21 apply to anything in here.

22 But it's red, green and blue. Typically, in
23 some scenarios, you have a, say, a camera which has a
24 color filter array superimposed on a array of sensors
25 which limit bandwidths to red range, green range, or

1 blue range. So some pixels get red, some get green,
2 some get blue.

3 And that's what we call the output of that.
4 Then once it's digitized, we often call a raw RGB image.
5 And I say that because following that, a very typical
6 operation is to interpolate that data, so that instead
7 of having just a red sample or a green-valued sample or
8 blue, you have a red and a green and a blue sample. It
9 becomes a multivalued digital image then.

10 That's called color-interpolation or
11 demosaicing. That kind of thing. Then you might call
12 that an RGB image also.

13 So those are some examples of RGB. But
14 everything I said before, I'm not really talking about
15 the patent here or my report. You haven't -- I'm not
16 finished, sir. You haven't drawn me there yet.

17 Q. Would anything about that answer change if I
18 asked you to answer from the perspective of a POSITA in
19 2009?

20 MR. GRAUBART: Objection. Form.

21 THE WITNESS: I don't know. You just say a
22 POSITA, but I think you're not really asking me a
23 question about anything specific.

24 I mean, if there was a POSITA in 2009 and he
25 was unaware of these patents, I think he might agree

1 with what I just said.

2 MR. ROBINSON: Q. So if there was a POSITA in
3 2009 and he was unaware of these patents, he would agree
4 with what you just said?

5 A. Yeah, I'm not saying he would disagree if he
6 was familiar with those patents. I'm just saying that
7 my answer is divorced from these patents because you
8 aren't casting within the context of them. I'm merely
9 answering the question out there independent of material
10 relevant to this case, meaning specific language in the
11 patents, specific language in the references, specific
12 language in my reports, specific language in the
13 petitions. You asked me a question about out here in
14 the real world.

15 And language is important, because in a minute
16 you may point me to language in the specification or
17 prior art and say, "Is that what you meant?" And my
18 answer is no, I was talking about outside the four
19 corners of my report and these other documents.

20 Q. What did you do to prepare for your deposition
21 testimony here today?

22 A. Well, as you already know, there had been a
23 previous expert, Professor Larry Davis, who had been
24 engaged in this and had to leave the case on, I guess,
25 short notice. I don't know the details or why.

1 Counsel contacted me somewhere between two and
2 three weeks ago and said, "We need help on this. We
3 need your opinions on this case." And since then, I
4 have been reviewing all the documentation in the case,
5 the patents, the prior art, Professor Davis's
6 declarations, the petitions, responses, et cetera.

7 I've had multiple conversations with Counsel.
8 I've done a lot of independent thinking to understand
9 all of this and to come to my own conclusions.

10 Q. Approximately how much time did you spend
11 reviewing the documents?

12 A. Oh, well, I haven't broken it down into review
13 of documents versus discussion with Counsel versus, you
14 know, sitting and reviewing my notes or whatever. But I
15 believe that everything collectively here is approaching
16 around 30 hours of effort.

17 When I -- when Counsel approached me, I told
18 them they were lucky because I had a lull in my
19 activities and was able to focus myself during that
20 period

21 Q. Thank you.

22 Would you please refer to Exhibit 1003 at
23 paragraph 7.

24 A. 1003 is my declaration. One of my
25 declarations. Paragraph 7, you said?

1 Q. Yes.

2 A. M-hm. I'm there.

3 Q. So on paragraph 7, you define who you believe
4 to be a person of ordinary skill in the art, or POSITA,
5 with respect to the '132 patents field or art.

6 A. Yeah.

7 Q. I would like to ask you a series of questions
8 from the perspective of that POSITA.

9 A. Okay.

10 Q. What is a correction in the context of digital
11 imaging?

12 A. So, you know, again, you're asking me a
13 correction in the context of digital imaging. You're
14 not asking me a correction in the context of the '132
15 patent or Needham or the other prior art pieces or what
16 I expressed in my report.

17 Do you mean to narrow the range to, you know,
18 the corners in documents in this case? Or do you mean
19 for me to speculate what it might mean in some other
20 context?

21 Q. Did you consider what a POSITA would
22 understand a correction to be independent of the '132
23 patent?

24 A. Correction -- I'll answer this outside the
25 patents, to help you understand.

1 The term "correction" is not a term that means
2 anything specific in the field of digital image
3 processing. Could be mean a number of things. Could
4 mean a lot of things. And those tend to be
5 context-specific. Okay.

6 So a correction could mean -- could mean, for
7 example, I'm outside the patents and all the documents
8 in this case again. It could mean that an image is too
9 dark, so you brighten it. Or it's too bright and you
10 darken it. Or it's noisy and you try to remove -- you
11 know, remove the noise. Well, you can't actually remove
12 the noise; you can reduce it. Typically, when you talk
13 about noise removal, you mean noise reduction. Okay.
14 It's impossible to remove.

15 You might try to improve the appearance of a
16 face in an image or something like that. All those
17 answers, I could go on for a very long time to give you
18 examples of different contexts, and we wouldn't be any
19 closer to understanding necessarily what is specifically
20 meant in these documents.

21 Q. Is "correction" a term that was used in the
22 art as of 2009?

23 MR. GRAUBART: Objection. Form.

24 THE WITNESS: I would say that "correction" is
25 a term that has been used in the art, but it doesn't

1 mean it's used the same way each time it's used because
2 people have different applications. Okay? Different
3 reasons for using the term and so on.

4 It's not something where you just know
5 immediately what somebody means. If I say "image
6 correction" to a colleague, they'll say, "Correcting
7 what? What do you mean? What's the context? What
8 field are you working in? What application?"

9 You have to understand, you know, in science
10 and engineering, we're visual creatures. So image
11 processing pervades medicine, biomedicine, science,
12 physics, astronomy. And all these application have
13 different goals. And so correcting an image in
14 astronomy may mean something different than correcting
15 it in the digital mammography area, which I've worked
16 in, by the way.

17 So, you know, I could just say, "Look,
18 Counselor, you're asking me these hypothetical,
19 speculation things. I'm choosing to answer you, but I
20 think we're not getting anywhere with regards to the
21 specifics of correction in this case."

22 Q. Is there a common thread between all those
23 examples in that each of them involve modifying digital
24 image data to try to improve the image?

25 MR. GRAUBART: Objection. Form.

1 THE WITNESS: I would say that, you know, when
2 you're correcting an image, you're processing the image
3 some way or another. That's fair enough. Again, I'm
4 not thinking about anything specific at all.

5 MR. ROBINSON: Q. So a POSITA in 2009, before
6 looking at the '132 patent, would have some experiences
7 of their own and knowledge of this art; correct?

8 MR. GRAUBART: Objection. Form.

9 THE WITNESS: Of which art, Counselor?

10 MR. ROBINSON: Q. Let's go back to
11 Exhibit 1003 at paragraph 7.

12 A. (Reviewing document.)

13 Q. Your definition of a POSITA specifically
14 references the field of digital image and/or image
15 processing.

16 A. Yeah.

17 Q. Is that the art that you consider to be
18 relevant to the '132 patent?

19 A. Sure. Sure.

20 Keep in mind that, you know, any definition of
21 a POSITA here, it's been expressed in six lines. It's
22 just an attempt to capture what that person's
23 characteristics ought to be. But sure.

24 Q. Now, I've asked you a number of questions with
25 reference to this POSITA that you've defined in this

1 art. You've repeatedly said you would have to speculate
2 to tell me what that POSITA would know or think or
3 understand about different terms.

4 Are you able to explain today what that
5 POSITA's beginning perspective and knowledge base would
6 have been before encountering the '132 patent?

7 MR. GRAUBART: Objection. Form.

8 THE WITNESS: Counsel, I have to confess, I
9 don't really understand your question or where it's
10 aimed.

11 MR. ROBINSON: Q. Are you able to answer
12 questions about that POSITA's perspective without
13 speculating?

14 A. Naturally, if I'm asked a question that isn't
15 speculative.

16 Q. Would a POSITA have any understanding of image
17 correction independent of context?

18 MR. GRAUBART: Objection. Form.

19 THE WITNESS: A POSITA would understand that
20 there are methods for image correction that are directed
21 towards context with different goals. You know,
22 sometimes those goals would be broadly speaking --
23 again, outside, you know, the art, the patent here --
24 broadly speaking towards visual improvement of the
25 picture. But it might not be.

1 It might be instead to make a computer vision
2 algorithm more efficacious when processing the image
3 that has been corrected, or it might be to make the
4 image yield more information to a certain kind of image
5 expert, like say a fingerprint reader. Okay?

6 Or, or, or. Okay?

7 You'll understand there are a huge range of
8 possibilities for what image correction could mean.
9 Certainly, you know. And he would also realize that if
10 you selected a particular application, he might have a
11 better idea of what image correction might be in that
12 particular context.

13 Once again, all this answer is -- has nothing
14 specific to do with the '132 patent.

15 MR. ROBINSON: Q. Would a POSITA have
16 believed that there was any difference between image
17 correction and image processing?

18 A. "Image processing" is a very broad term. You
19 take an image, and you process it. Okay? Correction
20 would be one way of processing an image. I mean, when I
21 say "one way," one slice of that huge cloud of
22 possibilities, which there's not one way. There's many
23 ways within that slice.

24 Q. So a POSITA would not have understood the
25 terms "image processing" and "image correction" to be

1 coextensive?

2 MR. GRAUBART: Objection. Form.

3 THE WITNESS: If you mean by "coextensive,"
4 you mean synonymous? Is that what you meant? I got to
5 confess I don't use the word "coextensive" very often.
6 Sounds like a lawerly word I should learn.

7 If mean synonymous, I don't think they're
8 quite synonymous because there are tasks in
9 image-processing where you're doing something different
10 than correction.

11 MR. ROBINSON: Q. Would a POSITA have
12 understood image correction and image adjustment to be
13 synonymous?

14 A. I don't see any reason why they would have
15 that thought. I mean, an adjustment could be part of a
16 correction. But you might adjust for some other reason.

17 Again, that answer is outside the '132 patent
18 and the other documents in this case because you haven't
19 drawn me to anything in these. So if asked later, you
20 know, "Dr. Bovik, were you talking about the '132
21 patent," my answer will be, "No, I was asked about
22 things, in my mind, unrelated."

23 Q. I'll tell you what, if you want me to just
24 agree to that so you don't have to keep saying it, it
25 might save us a little bit of time.

1 A. Well, Counsel, I'm careful in a legal
2 proceeding. Maybe I'll try to find a shorthand. I'm
3 not trying to burn time. I'm just being careful.

4 Q. So your answer a moment ago, not in the
5 context of '132 patent, just from the perspective of a
6 POSITA, was that -- I'm going to quote, "I mean, an
7 adjustment could be part of a correction, but you might
8 adjust for some other reason."

9 A. M-hm.

10 Q. Is it accurate to say then that a POSITA would
11 have thought a correction to be an adjustment, but that
12 an adjustment might not be a correction?

13 MR. GRAUBART: Objection. Form.

14 THE WITNESS: That's not what I said. I won't
15 agree to that.

16 MR. ROBINSON: Q. Okay. Let's break it down.

17 An adjustment could be part of a correction,
18 but you might adjust for some other reason?

19 A. Well, again, my usual caveats, okay, about
20 '132. I don't know what you mean by an "adjustment."
21 Okay? Image adjustment is not a term of the art. I'll
22 say that right now. So I'm giving you a little bit of
23 leeway in that you know it means modifying the image in
24 some way or another, something, I suppose. Okay?

25 And yeah, I will say that a correction -- an

1 adjustment in that sense could be part of some
2 correction, again, with my caveat.

3 Q. Is "image correction" a term of the art?

4 MR. GRAUBART: Objection. Form.

5 THE WITNESS: You see the term quite a lot,
6 but it is always within a context. If somebody just
7 reads the term "image correction," they won't know what
8 it specifically means. If I pick up a book and I just
9 blindly close my eyes and put my finger and it happens
10 to land on image correction, and I read nothing else, I
11 won't know what's being done to the image, other than
12 for some tasks, some tasks it's being modified for some
13 reason. Again, with my caveats.

14 MR. ROBINSON: Q. Would a POSITA have
15 recognized the terms preprocessing and post-processing
16 in connection with image processing?

17 MR. GRAUBART: Objection. Form.

18 THE WITNESS: A POSITA would have encountered
19 those terms. And again, they're very general terms. I
20 can't speculate. I mean, I could speculate on what they
21 might mean, and my usual caveats about outside the '132,
22 but preprocessing is a term of an image you see a lot.
23 So is post-processing. Sure. It doesn't mean any very
24 specific algorithm or anything.

25 MR. ROBINSON: Q. Generally speaking, what

1 would a POSITA have understood preprocessing to refer
2 to?

3 MR. GRAUBART: Objection. Form.

4 THE WITNESS: Well, the term "preprocess" --
5 and again caveats -- you know, it's got the prefix
6 "pre." So it's processing that comes before, say, some
7 other processing.

8 MR. ROBINSON: Q. Is there an event or other
9 processing prior to which a POSITA would have understood
10 preprocessing to have occurred?

11 MR. GRAUBART: Objection. Form.

12 THE WITNESS: Well, you know, because I don't
13 know the context, I don't know one way or the other.
14 But there could be.

15 MR. ROBINSON: Q. In the context of a
16 POSITA's knowledge and experience, was there an event or
17 other processing to which that POSITA would have
18 understood preprocessing to occur in advance?

19 MR. GRAUBART: Objection. Form.

20 THE WITNESS: I don't know what you mean by
21 "event" here. If you tell me what you mean by "event,"
22 I can maybe give you a better answer.

23 MR. ROBINSON: Q. Dr. Bovik, you referred to
24 the prefix pre, which I think you said refers to before
25 something. What's the something that a POSITA would

1 have understood to have happened after processing?

2 MR. GRAUBART: Objection. Form.

3 THE WITNESS: Well, what I said was -- and
4 it's really just an example because we have zero
5 context, and it's outside the patents or any documents
6 associated with it. It's processing that occurs before,
7 an example I gave, was some other processing. Okay?

8 So you know, you might -- I'll leave it there.

9 MR. ROBINSON: Q. What are some examples of
10 the other processing that a POSITA might have expected
11 to come after preprocessing?

12 MR. GRAUBART: Objection. Form.

13 THE WITNESS: Wait. Run that by me again.

14 MR. ROBINSON: Q. What are some examples of
15 the, to use your term, other processing that a POSITA
16 might have expected to come after preprocessing?

17 MR. GRAUBART: Objection. Form.

18 THE WITNESS: So I mean, you might compress an
19 image before you transmit it. So the compression of an
20 image might be, you know, before, you know, steps of
21 processing that are taken like packetization to transmit
22 an image. And that doesn't have much to do with what
23 we're talking about today. But it's one processing
24 before another.

25 MR. ROBINSON: Q. Could a POSITA have

1 understood preprocessing to precede storage of digital
2 image data after it's generated by a sensor?

3 MR. GRAUBART: Objection. Form.

4 THE WITNESS: You could have scenarios like
5 that, I suppose. Sure. Why not?

6 MR. ROBINSON: Q. Could a POSITA have
7 understood post-processing to follow storage of digital
8 image data generated by a sensor?

9 MR. GRAUBART: Objection. Scope. Form.

10 THE WITNESS: Perhaps, in some scenario. Once
11 again, this answer and the last one are both outside the
12 scope of the patents here. There could be processing,
13 which you could call post-processing, which is after
14 storage.

15 I mean, it hasn't described what other events
16 may have occurred along the chain there either and what
17 the "post" is referring to. So you might modify an
18 image, store it, then post-process it and then do
19 something else and something else.

20 I mean, there's nothing special being applied
21 to these terms. There's no -- there isn't anything, you
22 know, again, I'm speculating. My answers are just
23 speculation here because I don't -- we have no anchor.
24 We don't have anything tying this to any reality.

25 MR. ROBINSON: Q. So a POSITA wouldn't have

1 had any idea what post-processing or preprocessing meant
2 in this field without more context?

3 MR. GRAUBART: Objection. Form.

4 THE WITNESS: I would say a POSITA would know
5 that, given a context, he might have some idea. He
6 would know that there is a very large variety,
7 vocabulary, set of context, applications, so on, for
8 which there are different and diverse and variegated
9 methods of preprocessing and post-processing, because
10 it's true.

11 MR. ROBINSON: Q. Would a POSITA have had no
12 idea what preprocessing meant in this field without
13 additional context?

14 MR. GRAUBART: Objection. Form.

15 THE WITNESS: It's not what I said. My
16 previous answer fills in.

17 I'll just point out, again, Counselor, I don't
18 feel I've been asked a question relevant to the '132
19 patent yet at any point today other than your first
20 question about the digital image data.

21 MR. ROBINSON: Q. Dr. Bovik, your declaration
22 includes a number of opinions about what a POSITA would
23 have understood and believed.

24 Are you telling me that the baseline
25 understanding of the POSITA, the context of their

1 knowledge and experience would have no bearing on the
2 formation of those opinions?

3 MR. GRAUBART: Objection. Form.

4 THE WITNESS: Oh, not at all.

5 MR. ROBINSON: Q. Then certainly you can
6 understand why it's important to explore that baseline
7 knowledge and understanding, that baseline perspective
8 of a POSITA prior to reading the '132 patent; can you
9 not?

10 A. Oh, I can understand that, but I'm not sure I
11 would quite agree that the questions you've been asking
12 me are doing just that. But that might be a matter of
13 opinion.

14 Q. A moment ago when I asked whether a POSITA
15 would have any idea what post-processing or
16 preprocessing meant in this field without context, you
17 said, "I would say a POSITA would know a given context
18 -- that given a context, he might have some idea."

19 I'm asking you whether the converse of that is
20 true, specifically, that a POSITA would have no idea
21 without more context?

22 A. I'm not sure there's a well-faring question,
23 so I'll answer it my own way.

24 If you merely said if a POSITA was asked
25 what's post-processing, then that POSITA would probably

1 say, "Well, I need a context to understand what
2 'post-processing' might mean." I think a POSITA would
3 react in a same way as I am reacting.

4 Q. Without context, would a POSITA be unable to
5 formulate any explanation of what post-processing meant
6 in this field?

7 MR. GRAUBART: Objection. Form.

8 THE WITNESS: He would say it's processing
9 that comes after something else. He would be able to
10 say that. But not much else.

11 MR. ROBINSON: Q. Would a POSITA be able to
12 give any examples of what post-processing might follow?

13 A. He could give you examples. Probably just
14 pull something out of his head. They might be different
15 examples from another POSITA. I think if you ask a
16 hundred POSITAs, they would probably all come up with a
17 different example if you asked them for one example
18 because they might be leaning towards some application.

19 Somebody -- one POSITA might be a, you know,
20 an engineer working at Apple and smartphones. Another
21 one might be work anything in a biomedical laboratory
22 with microscope images. And another one might be
23 working at Google in the Cloud, you know. And each one
24 would have their own perspective. If you asked each for
25 one example, you would probably get a different example

1 for each one.

2 Q. Do you have experience working with POSITAs in
3 each of those areas you just listed?

4 A. Actually, yes.

5 Q. What are the examples those POSITAs might have
6 given?

7 MR. GRAUBART: Objection. Form.

8 THE WITNESS: Post-processing -- you know,
9 Counselor, what I'm going to do is I'm going to help us
10 out here because that question is outside the confines
11 of my report. I'm not going to answer it because I
12 think we need to stick to the subject matter.

13 MR. GRAUBART: Would you like my view on this?

14 I don't want to speak on the record and
15 interrupt the deposition unless you would like me to.

16 MR. ROBINSON: Have at it.

17 MR. GRAUBART: I think we've been going a long
18 line of questioning that are completely outside the
19 scope of his direct testimony that aren't tethered to
20 the context of the '132 patent or his declarations,
21 expressly by the scope of the questions, not tied to
22 those.

23 I've been letting it go forward and noting my
24 objection. At some point we will reach a point we might
25 need to ask the Board to intervene to suspend the

1 deposition to keep it within the scope. I tend to agree
2 with Dr. Bovik's position here that his answer -- the
3 question doesn't call for anything that's within the
4 scope of his direct exam.

5 I'm not going to instruct him not to answer.
6 It's his decision. I think I agree with his take on
7 this.

8 MR. ROBINSON: So you're going to tell me a
9 POSITA's understanding of terms used in the art before
10 reading the '132 patent are irrelevant to how that
11 POSITA would understand the '132 patent?

12 MR. GRAUBART: The terms you're asking about
13 aren't ones he's offered an opinion on, nor are you
14 asking about a POSITA's view of those terms in the
15 context of the '132 patent, its intrinsic record, or the
16 art. You're asking more abstractly about terms he
17 didn't opine on without context in the record.

18 MR. ROBINSON: I'll ask you this: If the '132
19 patent doesn't redefine these terms, is a POSITA's
20 understanding of the terms in the art relevant?

21 MR. GRAUBART: A POSITA's understanding of
22 terms in the patent are going to be governed by their
23 usage in the context of the patent, if that's what
24 you're asking me. And the only terms that are within
25 the scope of Dr. Bovik's direct examination are the ones

1 that he opined on. I don't believe you have been asking
2 about any of those.

3 MR. ROBINSON: It's the meaning in the art
4 informed by the patent; right? The baseline is the
5 meaning of the art. And a lot of these opinions depend
6 on language in the claims despite the fact he didn't
7 offer explicit construction.

8 So, at this point, I'm just trying to
9 understand what a POSITA would have understood these
10 terms are before coming to the patent? What was the
11 POSITA's baseline? So far, he's essentially sidestepped
12 every question.

13 MR. GRAUBART: I think he's offered you his
14 understanding the best he can, noting expressly that
15 it's not something he's considered or offered an opinion
16 on, and that it's outside the scope of what he's
17 previously testified. So I think that's where we are.

18 MR. ROBINSON: All right. We'll try to power
19 through here. At some point, I mean, I'm either going
20 to have to call the Board and ask that he answer
21 questions directly or ask for more time on the depo.
22 We'll try to get through it.

23 Q. Would a POSITA have recognized gain in the
24 context of image processing?

25 MR. GRAUBART: Objection. Form.

1 THE WITNESS: Before I answer the question, I
2 just want to make clear that I'm trying to assist the
3 Court as much as possible by directing my questions in a
4 way that inform the Court about this case. I'm not
5 trying to be evasive in any way. I think it's proper
6 for me to point out when questions are being speculative
7 or outside the scope or not confined within the
8 boundaries of my report or anything else.

9 That's with all due respect. I'm not trying
10 to difficult in any way.

11 With that said, you asked me about would they
12 know what gain is. Outside the scope of the '132
13 patent, again, it would depend on the situation. I can
14 give a few examples, but it wouldn't exemplify in any
15 way necessarily what's relevant to this case.

16 So a person of ordinary skill in the art might
17 understand there's a gain associated with a photosensor
18 or processing the data following the photosensor. That
19 is one possible example. Or it might be a gain in an
20 algorithm to amplify or attenuate some information.
21 Those are just broad examples.

22 They wouldn't think anything specific,
23 necessarily. You know, if they read the '132, they
24 would see the term "gain," and they would begin to
25 understand the context, okay, for it. Then they would

1 understand what is meant by "gain" there perhaps.

2 But out there, you know, it could mean a lot
3 of things.

4 Q. What would a POSITA understand the word "gain"
5 to mean in the context of the '132 patent?

6 A. Oh, so, for example, in column 3, where I'm
7 referring to the -- of the '132 specification, column 3,
8 line 3, this is just talking about some aspect of
9 processing on image data within an image that is not
10 associated with a face.

11 It says -- I'll just read this -- "For
12 normal," parenthesis, "e.g. non-face," end parenthesis,
13 "image data, the DRC unit applies a digital gain to any
14 given pixel depending upon whether it is part of such a
15 specified type of object and the image. For example, a
16 higher gain may be applied to pixels that are part of a
17 face than for other pixels of the image."

18 If you were to go on, it might be that the
19 gain means a brightening of the face, for example, make
20 it more prominent and visible. That's just, you know,
21 in reading this, this is what they will understand.

22 Q. You said it might be that the gain means a
23 brightening of the face. Is that what the gain means in
24 the context of the '132 patent? Or no?

25 MR. GRAUBART: Objection. Form.

1 THE WITNESS: It doesn't have to be. It could
2 be. I mean, there could be something else that to which
3 a gain is applied. It's part of the process.

4 If we look at claim second, all right. And
5 I'm talking about, again, the '132 now. In claim
6 second, which depends upon claim 1. It says, the second
7 limitation, just pick something out. "Determining a
8 different amount of gain to apply to the second portion
9 than an amount of gain determined for the first
10 portion."

11 So these are different portions of the image.
12 It could be a brightening. But it could be, you know, a
13 gain on something else. It could be local contrast, for
14 example. It could be something related to color. The
15 claim does not limit that. And the specification is
16 just, you know, trying to help a POSITA understand the
17 claims basically.

18 Q. You used the term brightness a moment ago.

19 What would that have meant to a POSITA in the
20 context of the '132 patent?

21 A. If you look at column 9, near the bottom,
22 okay, say, line 62, the inventor of the '132 basically
23 defining brightness to be the same as luminance.
24 Luminance in this context is being equated to
25 brightness.

1 Luminance is a scientific term. So if you ask
2 me what luminance is, this is a term where a POSITA
3 would understand what it means. Okay?

4 Luminance is a perceptual quantity. It's a
5 quantitative number that is, in the context of RGB
6 images, it's a linear combination of the R and the G and
7 the B components, giving greater emphasis to green
8 wavelengths, because the human visual system is more
9 sensitive to that. Lesser to red and even lesser to
10 blue. Okay?

11 And if you form that linear combination --
12 it's a sum; it's adding up those components but with
13 different weights -- you get luminance. And that is,
14 you know, a weighted kind of how many photons were
15 collected. So it also relates to the very intuitive
16 sense of brightness. And here, the inventor is choosing
17 to equate them.

18 That's a very specific answer.

19 Q. Thank you.

20 You reference photons collected. Is that an
21 indication of the photons that are reflected to the
22 human eye given a particular color or combination of
23 colors?

24 A. Well, I was talking in the context of, you
25 know, the digital image analysis and processing that's

1 occurring here. So instead it would be the photons
2 collected by the photo sensor in the camera, say, for
3 example.

4 Q. Okay. Which then relates to how the image is
5 subsequently perceived by the human eye?

6 A. Only if this processing is intended for a
7 human eye at some point. Not every digital camera
8 output ever reaches a human eye.

9 I'll give you an example.

10 Q. The emphasis of the green is a reference to
11 the human eye's greater perception of green; correct?

12 A. Yes, yes. Would you like me to clarify that?

13 Q. By all means.

14 A. Okay. So an algorithm might have a luminance
15 computed using this usual weighting which is derived
16 from perceptual principles, longstanding, to create an
17 image that has a luminance component and then to
18 chromatic components. That might still be processed by
19 algorithms which create representations and do whatever
20 without it ever reaching a human eye, even though there
21 is that perceptual element.

22 Q. When you use the term "perceptual," what do
23 you mean by that?

24 A. Relating to perception in this context, visual
25 perception.

1 Q. Is there a difference between --

2 A. Could be a machine perception, too, but in
3 that previous context, I was relating to the human
4 perception.

5 Q. Okay. You reference perceptual principles.
6 Are there also non-perceptual principles or approaches?

7 A. Yeah, sure.

8 Q. Can you give me an example of how those two
9 things would differ, perceptual and non-perceptual?

10 A. Well, I'm going to preface it by saying when
11 I'm using "perceptual," it is related to an image, say,
12 that's eventually meant for a human to watch. Okay?
13 Again, I'm outside -- I'm moving outside the patents
14 here because I don't see any tie here to the '132 patent
15 that I've been asked about or anything.

16 You can have an algorithm that is intended to,
17 you know, is based on a perceptual design. Okay? Maybe
18 you have a model of how people see. Okay? You might
19 have an algorithm that is not. It may, nevertheless,
20 you know, create an algorithm, a picture that is somehow
21 beneficial for the viewer, even if it wasn't based on a
22 perceptual model.

23 I'm not defining "perceptual," by the way, I
24 mean, from the context of the '132. So if you want to
25 bring me towards that, then I can try to relate it to

1 what's in the '132.

2 Q. I'm just trying to understand the words you,
3 yourself, are using, Dr. Bovik.

4 Is there an example of a non-perceptual
5 algorithm or non-perceptual approach to image
6 processing?

7 A. If you have an image that is, you know, of one
8 size, say, you know, a thousand by a thousand, and it's
9 X-Y dimensions, okay, and if you reduce it to another
10 image that's smaller, okay, just by subsampling to a
11 smaller image that's say 500 by 500, that is an example
12 of processing. In doing that, you may or may not use
13 perceptual principles. Usually, it's not perceptual.
14 You're just down sampling it using an interpolation.

15 Q. Thank you.

16 How would a POSITA understand the term
17 "chromaticity" in the context of the '132 patent?

18 A. Do you want to point me to where it's used in
19 the '132, just to save me time?

20 Q. Sure. Column 3, roughly line 28 to 32.

21 A. Column 3, line what?

22 Q. 28 to 32.

23 A. (Reviewing document.) So the inventor doesn't
24 explain what he means there. And he doesn't explicitly
25 define the term "chromaticity" anywhere. So I will say

1 that in my mind, I think he's just talking about
2 color-related.

3 If you look at column 5, he talks about a
4 couple of color spaces around lines 39 and 40. He talks
5 about the YCbCr space, the YUV space. These are color
6 representations. You'll also notice he mentions R, G
7 and B. These are all color spaces.

8 Broadly speaking, I think he's using it in the
9 sense of related to color. I will point out the YCbCr
10 and YUV spaces are often called chromatic
11 representations. It's been transformed from RGB to
12 luminance and then to so-called chromatic components, Cb
13 and Cr or UNV.

14 Color-related.

15 Q. Is that how a POSITA would have understood the
16 term "chromaticity" outside the context of the '132
17 patent but in the field?

18 A. I think that a POSITA would, if they just said
19 -- heard the word "chromaticity," they would know that
20 it's related to -- and they knew we were talking about
21 digital image processing, they would know that it's
22 related to color and color representations and such in
23 the broadest possible sense.

24 Q. How would a POSITA have understood the term
25 "intensity dynamic range" in the context of digital

1 image processing?

2 MR. GRAUBART: Objection. Form.

3 THE WITNESS: Again, this -- you want to show
4 me where that appears? I know it's in here somewhere.

5 Keep in mind when I recognize terminology that
6 appears in the patent, I'm going to ask you for that so
7 I can speak to it.

8 MR. ROBINSON: Q. To begin with, I'm asking
9 you independent of this patent whether a POSITA would
10 have had some understanding of intensity dynamic range
11 based on their own experience and knowledge?

12 MR. GRAUBART: Same objection.

13 THE WITNESS: Oh, sure. Again, my answer has
14 nothing to do with '132. But they may understand
15 intensity is loosely equated with brightness, okay. How
16 many pixels strike a sensor, for example. That's not a
17 formal definition, necessarily.

18 Sometimes it's defined by some authors as R
19 plus G plus B, which is different than luminance which
20 is a weighted R, G and B when they're added together.
21 You see intensity like that. A POSITA might understand
22 it that way. But they might not. They might just
23 understand oh, it's like brightness or gray level.
24 Okay?

25 If they heard "intensity dynamic range," they

1 would understand probably, well, in some context, which
2 they don't understand, it might mean the range of values
3 that that intensity can take in some context.

4 MR. ROBINSON: Q. All right. In the context
5 of the '132 patent, "dynamic range" is used throughout
6 the description. Starting with the title, how would a
7 POSITA have understood "dynamic range" in the context of
8 the '132 patent?

9 A. In reading the patent, you know, it is used in
10 different ways in different places, different
11 embodiments. Figure 4 is an embodiment. So if I look
12 in column 8 and find a specific example, you know, here
13 he's talking about some blending operation, and he talks
14 about -- this is line 63, the dynamic range of the
15 blending process. So that's a range of values that can
16 occur in the blending process.

17 By the way, I just want to point out, I happen
18 to notice at column 6, line 9 -- I forgotten about
19 this -- the inventor sort of defines chromaticity to be
20 color balance, column 8, line 9. I think I would stick
21 with my idea of related to color. I'm okay with him
22 saying the chromaticity is a balance of colors.

23 I just want to point that out for
24 completeness.

25 MR. GRAUBART: Counsel, we've been going a

1 little more than an hour. I don't need a break, but I
2 mention it in case Dr. Bovik would need a break.

3 THE WITNESS: Do you have a break point
4 coming? I don't have to break this second.

5 MR. ROBINSON: We can take a break now if you
6 want. I'm flexible.

7 THE WITNESS: Sure.

8 (Recess taken: 10:15 a.m. - 10:23 a.m.)

9 MR. ROBINSON: Q. Dr. Bovik, would you refer
10 back to Exhibit 1001, the '132 patent.

11 A. I've got it.

12 Q. The title of "Dynamic Range Correction Based
13 on Image Content" --

14 A. M-hm.

15 Q. -- how would a POSITA understand that "dynamic
16 range correction"?

17 A. He would understand it by reading the patent
18 and thinking about it, reading the claims and
19 specification.

20 Q. You've done all of those things; haven't you,
21 Dr. Bovik?

22 A. Yeah, sure.

23 Q. Based on that review and your knowledge of a
24 POSITA, what would a POSITA understand "dynamic range
25 correction" to mean in that context?

1 A. Well, I mean, it's a range of some values
2 which are being modified for the purpose of, you know,
3 correcting them. He talks about a lot of things in
4 here. He talks about contrast. He talks about
5 brightness.

6 Keep in mind, I can give you a better answer
7 if you point me to something, especially in the claims,
8 which is what this is really all about.

9 Q. Let's start with column 4, lines 15 through
10 25.

11 A. Column 4, 15 through 25.
12 (Reviewing document.) M-hm, question?

13 Q. To what does that dynamic range refer?

14 A. Well, it's fairly nonspecific. It does talk
15 about, you know -- first of all, just so we understand
16 the context of that, that paragraph begins with, "The
17 various embodiments presented below," meaning that there
18 is multiple contexts that is being referred to here.

19 Okay?

20 It does refer to, as is shown in Figure 1 of
21 the patent, that, you know, they're assuming this
22 happens after demosaicing or color-interpolation
23 process, as is mentioned above there also. I mean, he
24 describes, you know, that it could be a single gain
25 factor applied to the pixel to change, obviously, its

1 values.

2 But it could also be something else, such as
3 changing, you know, chromaticity which would mean maybe
4 more than one gain factor. It could be, you know,
5 enhancing image details. It could be brightness, could
6 be color, could be some combination. And as he talks
7 about contrast later, it could be that.

8 If you look at the bottom of column 3, lines
9 59 through 64, which comes right before what you
10 referenced me to, but gain adjustment or DRC, where DRC
11 is dynamic range correction. Other types of corrections
12 or adjustments, he's just giving examples, contrast
13 enhancement, color manipulation, sharpness adjustment,
14 okay, it falls under noise reduction, skin smoothing,
15 you know.

16 So that's why I've been saying, you know --

17 Q. Are you saying --

18 A. I'm not finished. That's why I've been
19 saying, even within the specification here, it's pretty
20 broad, these terms.

21 Q. Are you saying all of those things you just
22 listed are examples of dynamic range correction?

23 A. What I'm saying is the inventor of the patent
24 is teaching that his types of corrections could be made
25 based on these and adjusting these. That's what I'm

1 saying. He's the one writing it.

2 Q. I'm asking you about dynamic range correction.
3 Specifically in column 4, lines 15 through 25,
4 to what does dynamic range refer?

5 A. He's kind of nonspecific. You see? He's --
6 he mentions chromaticity or other factors as well or
7 pixel gain. I mean, he's -- I'm depending upon the
8 inventor to explain that.

9 And, you know, keep in mind, we're just
10 plucking these words out of the title. I mean, what is
11 important here is what are the claims about. Are they
12 even about dynamic range correction regardless of the
13 title of the patent?

14 Q. Would a POSITA have been able to offer any
15 explanation of what dynamic range means in the context
16 of column 4, lines 15 through 25?

17 A. A POSITA -- I mean, I'm limited to this here
18 in my answer; I accept that -- would understand that it
19 could involve one or more pixel-dependent gain or
20 attenuation factors or other factors such as changing
21 chromaticity, okay, which could enhance perception of
22 image details in this broad description that involves
23 multiple embodiments. Okay?

24 So a POSITA can only be as specific to the
25 context given is what's written is the context.

1 Q. Line 25, it refers to the extreme ends of a
2 systems dynamic range. Would a POSITA have had an
3 understanding of what that meant?

4 A. He would have to guess a little bit because it
5 doesn't explain it. It doesn't say the systems dynamic
6 range is this or that. So he may guess at things like,
7 well, you know, the range of brightnesses or the range
8 of luminances or the range of colors or the range of
9 chromaticities that are allowed by that system. Okay?
10 Et cetera.

11 Q. So a POSITA, in 2009, would have understood
12 that dynamic range could have referred to any of those
13 factors you just listed?

14 A. Could be, but we're talking about the systems
15 dynamic range. The word "system" is modifying the term
16 "dynamic range" here. I think that's a difference
17 dynamic range than dynamic range correction.

18 So the implication being that it's not clear
19 to me that we're -- this patent is intending to correct
20 the systems dynamic range or anything like that,
21 whatever, you know, what's specifically intended there.

22 Q. My question specifically related to the
23 meaning of the systems dynamic range. In response, you
24 listed things like range of brightness, range of
25 luminance, range of colors or range of chromaticities

1 that are allowed by that system.

2 Would a POSITA have understood that the
3 dynamic range of a system could include any of those?

4 MR. GRAUBART: Objection. Form.

5 THE WITNESS: Just for clarity, I said
6 "et cetera." Okay. I don't know, at least I said
7 "et cetera." You would have understood, well, it might
8 be one of those that's being referred to. But because
9 in the words prior to that, it's talking about gain of
10 pixels, chromaticity, and image details, you wouldn't
11 really know which one it is specifically.

12 As I said, I'll use the word guess. He would
13 guess that it's one of these, you know, things or
14 something related to it. I think the patent has failed
15 to explain what is meant by it.

16 Q. I think so the answer is yes, a POSITA could
17 have understood that the dynamic range of a system could
18 have included any of those four things that you
19 specifically listed?

20 A. My answer is my answer. I'm not agreeing to
21 what you said. I needed to elaborate a bit and clarify
22 it.

23 Q. Let's refer to column 5, lines 53 -- 52 to 53,
24 where it says, "Figure 7 illustrates an example of the
25 effects of dynamic range correction such as may be done

1 by using the gain lookup table 207."

2 A. M-hm.

3 Q. Does Figure 7 help you understand what is
4 meant by dynamic range in the context of the '132
5 patent?

6 A. Figure 7 is an example involving intensity.
7 So, you know, again, this is part of an embodiment, I
8 presume, as part of the specification. It's teaching a
9 POSITA to understand the claims, generally, how to
10 practice them. I don't think he's defining dynamic
11 range here. I think he's modifying intensities using a
12 gain lookup table to do a kind of dynamic range
13 correction. One of many possible.

14 Q. Would you please refer to column 9, 54 through
15 column 10, line --

16 A. Column 9, 54.

17 Q. Through column 10, line 28. If you would
18 briefly review those, let me know when you're done.

19 A. So 54 up to 28 here. Okay.
20 (Reviewing document.) Okay.

21 Q. Does that portion of the '132 patent give any
22 guidance to a POSITA what is meant by dynamic range?

23 A. It gives an example. As it says, it's an
24 example. It's part of, you know, it's an embodiment as
25 expressed through this figure. So here, histograms of

1 luminance or brightness are being manipulated.

2 Certainly, you can do a type of dynamic range
3 correction in such a scenario. It's not limiting other
4 types of dynamic range correction that might involve
5 color chromaticity, contrast, or something else. It's
6 teaching by example.

7 Q. What does it mean to maximize a dynamic range?

8 A. You want to point to where it's used, and I
9 can give you a context? Otherwise you're getting --

10 Q. Let's start with the component parts of that
11 phrase. What would a POSITA, based on their own
12 experience and education, have understood maximizing a
13 value to involve?

14 MR. GRAUBART: Objection. Form.

15 THE WITNESS: You know, I don't really see
16 that being pointed to anywhere here. And you know, I
17 don't see any context.

18 You know, if you're maximizing something,
19 you're in the broadest sense -- again, we're outside
20 this case -- you're trying to make a value as large as
21 possible. It might be subject to some constraints and
22 conditions or something else. So it's hard to say
23 anything global, you know, that's globally true about
24 that.

25 You need the context, Counselor.

1 MR. ROBINSON: Q. Are there different ways of
2 adjusting dynamic range.

3 MR. GRAUBART: Objection. Form.

4 THE WITNESS: I would say regardless of how
5 you are defining dynamic range and of what, I would say
6 that there are different ways of adjusting a dynamic
7 range of a quantity.

8 Again, this is outside the patent. It might
9 be a dynamic range of some quantity unrelated to images,
10 even. So even if it's images, there are different ways.

11 MR. ROBINSON: Q. In your previous answer,
12 you said that dynamic range could involve contrast
13 enhancement.

14 A. It could.

15 Q. Could a POSITA have understood there to be
16 different ways of adjusting the dynamic range of
17 contrast?

18 MR. GRAUBART: Objection. Form.

19 THE WITNESS: Yes, certainly.

20 MR. ROBINSON: Q. Can you give me an examples
21 that a POSITA would have been aware of?

22 A. For example, if they took my class, I would
23 teach them something called a full-scale contrast
24 stretch. And that is a classic way, one amongst many,
25 of adjusting a dynamic range of contrast. And

1 brightness too, or color, you know.

2 Q. To be clear, when I ask about a POSITA, I'm
3 referring to a POSITA in 2009 that you defined in
4 paragraph 7 of Exhibit 1003. Would your answer just now
5 about your class have been the same as of that
6 timeframe?

7 A. Oh, sure.

8 Q. Okay.

9 A. That's only an example. It's not meant to
10 limit it. There are many ways of doing it.

11 Q. Are there other ways that a POSITA would have
12 been aware of of adjusting the dynamic range of
13 contrast?

14 A. Sure.

15 Q. Can you give me another example?

16 A. There's many. You can do -- you can choose to
17 do a local operation, you know, adjust it on a local
18 basis as opposed to a global basis, for example. The
19 entire image, you can try to change the contrast of the
20 whole image or you can try to change it locally, for
21 example. That's only an example.

22 Q. Are there any other examples that a POSITA
23 would have been aware of?

24 A. I think many. He would realize there are lots
25 of ways. Not linear. I mean, there's a lot of ways.

1 Q. Would a POSITA have been aware of ways to
2 adjust the dynamic range of color manipulation or adjust
3 color?

4 A. He may not understand until he read this what,
5 you know, if you want to point me to something. This is
6 language from the specs somewhere. If you want to point
7 me there, I can tell you what he would have understood
8 about that.

9 Q. Let me rephrase that a little bit.
10 Your answer earlier related to column 4, lines
11 15 through 25, said that dynamic range could refer to
12 the range of colors or range of chromaticities.

13 Start with more basic question.

14 Is there a difference between the range of
15 colors and the range of chromaticities that might be
16 allowed by a system?

17 A. This was column what again? I gave a series
18 of answers. I didn't -- you asked me to read that, and
19 not every answer I gave after that was necessarily
20 referring to that, that segment that you at one point in
21 time asked me to read.

22 To be clear, my follow-on answers I wasn't
23 necessarily thinking about those columns, except
24 immediately the preceding following answer.

25 Q. You're right. Let's be clear. Line 25 --

1 A. Of.

2 Q. -- refers to the extreme ends of a systems
3 dynamic range, column 4, line 25.

4 The question was: Would a POSITA have had an
5 understanding of what that meant?

6 Your answer was, "He would have to guess a
7 little bit, because it doesn't explain it. It doesn't
8 say the systems dynamic range is this or that. So he
9 may guess at things like, well, you know, at the range
10 of brightness or the range of luminance or the range of
11 colors or the range of chromaticities that are allowed
12 by that system. Okay? Et cetera."

13 In your answer to that question, about column
14 4, line 25, is the range of colors and the range of
15 chromaticities allowed by a system two different things?

16 A. So my answer -- first, I, want to point out,
17 we're talking about the systems dynamic range of what it
18 allows. Okay. I'm not sure where it says "allows" in
19 the spec. It does say "extreme ends."

20 I don't think the patent is teaching changing
21 in that dynamic range. I'll be very definite about
22 that. I think it's talking about changing the dynamic
23 range of images in whatever sense of the word you want
24 to use for that.

25 So when we're talking about the systems

1 dynamic range, we're talking about something else. I
2 don't think the patent is teaching changing that.

3 So with that, you know, important prefatory
4 remark, you asked me is changing the systems dynamic
5 range of chromaticity versus the systems dynamic range
6 of color, are they the same? Is that what you're
7 question was?

8 I'm trying to reconstruct.

9 Q. Yes.

10 A. I mean, the system may not specify dynamic
11 range of chromaticity. Or of color. Or it might.

12 So chromaticity and color are related, I will
13 say. I already talked quite a bit about how
14 chromaticity is ordinarily defined in a scientific
15 sense, meaning it's a transformation from an RGB space
16 to a chromatic space. But in the broadest sense, a
17 POSITA would understand, well, he's talking about
18 related concepts when he's talking about chromaticity
19 and color.

20 I already also mentioned that I do want to
21 point out, at least in the context of an embodiment, if
22 not the whole specification, the inventor stated that
23 chromaticity is color balance. And I didn't think if
24 that's actually a definition. I want to point that out,
25 column 8, line 9. Anyway, they're related.

1 Q. Would it be possible for a system to have a
2 dynamic range of colors that differs from a dynamic
3 range of chromaticities?

4 A. You know, I don't know what system you're
5 talking about. Secondly, I didn't say that color and
6 chromaticity were synonymous.

7 Q. Would it be possible for a system to have a
8 dynamic range of colors that is separately identifiable
9 than its dynamic of chromaticity?

10 MR. GRAUBART: Objection. Form.

11 THE WITNESS: Well, Counselor, I'm going to --
12 just because I want to be careful and I want to be as
13 informative to the Court as possible, I don't really
14 know what in the context of your question how
15 "chromaticity" is being defined.

16 When I've talked about chromaticity, it's been
17 outside the '132 patent. I don't want to give an
18 incorrect sound bite about what chromaticity is or how
19 it relates to a color dynamic range. So it's very
20 difficult for me to answer that question in an
21 informative way. It would require a speculative answer.

22 MR. ROBINSON: Q. Dr. Bovik, I'm asking you
23 to clarify your words that you used in response to a
24 question about column 4, line 25, of the '132 patent.

25 You would have to speculate to clarify the

1 words that you used in that answer? Is that what you're
2 telling me?

3 A. Oh, no.

4 I merely pointed out that the dynamic range
5 could be expressed in terms of a variety of factors. I
6 was just giving some examples. I wasn't nailing them
7 down to how they were defined in the context of the '132
8 patent. I think that's important.

9 We're talking about the '132 patent here. So
10 if you're going to ask me about some system, you know,
11 and its dynamic color range and its dynamic chromaticity
12 range, I don't know what you're talking about. That's
13 why I can't answer it.

14 Q. Dr. Bovik, column 4, lines 15 through 25 of
15 the '132 patent use the term "chromaticity." I believe
16 that's what we were referring to in that series of
17 questions in which you gave that very specific response
18 to column 4, line 25.

19 When you said "dynamic range of colors" and
20 also referred to a dynamic range of chromaticities, were
21 you saying that those two things were identical, or were
22 you saying that those two things could be different?

23 A. The only thing I've said about -- first of
24 all, it says, "such as changing chromaticity." It's not
25 saying this is what, you know, changing dynamic range

1 is. Just "such as."

2 Secondly, the only thing I said about color
3 chromaticity is that they're related. Okay. I've been
4 very clear about that.

5 Thirdly, I pointed out a number of times that
6 the inventor here uses -- I'll just say it this way --
7 the inventor seems to use "chromaticity" rather loosely,
8 okay, in the spec. And I think that's important,
9 because he talks about chromaticity in the context of
10 chromatic spaces, he gives examples of chromatic spaces,
11 he talks about chromaticity as color balance, which is
12 kind of unusual to just call it that.

13 So I think he's using the term "chromaticity"
14 to mean color-related. That's not the same as saying
15 that chromaticity equal color. I'm struggling here like
16 you to understand what he means by "chromaticity."

17 Q. I'm asking you what you meant by the words
18 that you used. So, again, in response to the question,
19 line 25, it refers to "extreme ends of a system's
20 dynamic range." Would a POSITA have had an
21 understanding of what that meant?

22 You answered you would have had to guess a
23 little bit because it doesn't explain it. "It doesn't
24 say the system's dynamic range is this or that, so he
25 may guess at things like, well, you know, the range of

1 brightness or the range of luminance or the range of
2 colors or the range of chromaticities that are allowed
3 by that system."

4 A. Et cetera.

5 Q. "Okay. Et cetera."

6 I'm simply asking you in that list of four
7 things that you listed as things that a POSITA might
8 guess at in the context of dynamic range, would a POSITA
9 have thought a dynamic range of colors was identical to
10 the dynamic range of chromaticities, or could those be
11 two different dynamic ranges?

12 A. So are we talking about a POSITA who's reading
13 this patent, or a POSITA who has never seen this patent?

14 It matters.

15 Q. The question was in the context of line 25 of
16 the patent. It is a POSITA reading the patent. I'm
17 asking you about your words you offered in response to
18 that question.

19 A. My point was that a POSITA would wonder what
20 the heck is meant here. Okay? That was the nature of
21 my answer. So a POSITA would wonder, well, is he
22 talking about brightness, luminance, chromaticity,
23 color. And you know, if he's a knowledgeable POSITA,
24 meaning a real POSITA, he would not equate color and
25 chromaticity, necessarily. He would understand that,

1 you know, you can have a chromatic space that involves,
2 say, color differences, for example.

3 Color differences don't necessarily have the
4 same dynamic range as colors. Okay? Unless you
5 transform them to have the same dynamic range. So
6 there's not enough information here.

7 Q. So a dynamic range of colors could be
8 different than a dynamic range of chromaticities?

9 A. Yes, both in the context of outside the patent
10 and within, because I don't know what chromaticity is in
11 the patent except when he calls it color balance, which
12 at other times he calls it pixel characteristics. And
13 the problem here is that the patent is just not
14 explanatory, so one is left wondering.

15 Q. Are there different ways of adjusting a
16 dynamic range of colors that a POSITA would have been
17 aware of?

18 MR. GRAUBART: Objection. Form.

19 THE WITNESS: A very large range of
20 possibilities.

21 MR. ROBINSON: Q. Would a POSITA have been
22 aware of different ways of adjusting dynamic range of
23 chromaticities?

24 A. Absolutely. A wide range of possibilities.

25 Outside the '132 patent for both of those

1 answers.

2 Q. Would a POSITA have been aware of different
3 ways of adjusting the dynamic range of brightness?

4 MR. GRAUBART: Objection. Form.

5 THE WITNESS: Again, we're talking outside the
6 patent. I don't know if he's read this patent or
7 thinking about anything specific. Given that, a POSITA
8 would know different ways of changing within an image.

9 Let's backtrack that to all my answers. I'm
10 not talking about a system dynamic range here. I don't
11 see the point of that. The POSITA would know different
12 ways of changing the dynamic range of brightness of
13 images.

14 MR. ROBINSON: Q. So along that same vein, to
15 be clear, when I ask about changing the dynamic range of
16 image characteristic, I'm not suggesting that this is
17 changing the system's dynamic range. But instead,
18 asking about changing the dynamic range of a
19 characteristic within the available dynamic range of a
20 system. Is that consistent with the way you've been
21 answering the question?

22 A. So I think that you're importing a lot into
23 column 4 I don't see there. I don't see anything about,
24 you know, the characteristic of dynamic ranges. I'm not
25 sure what you're associating that with. I don't see its

1 relationship to a system's dynamic range.

2 Q. Let's break that down. I was literally just
3 trying to summarize the same clarification you just
4 offered.

5 Column 4, line 25, talks about the system's
6 dynamic range. I believe you stated earlier that a
7 system's dynamic range is the maximum range available
8 within a system. Essentially the limits.

9 MR. GRAUBART: Objection. Form.

10 THE WITNESS: I don't think I said that.

11 MR. ROBINSON: Q. How would you describe a
12 system's dynamic range?

13 A. I think I've said it a few times. He hasn't
14 explained what he means.

15 Q. Would a POSITA have understood what he meant
16 by "the extreme ends of a system's dynamic range"?

17 A. A POSITA, as I've said, because of everything
18 it says before that, a POSITA would wonder. I've said
19 that five or six times now. Maybe not that many.

20 A POSITA would wonder what's he is talking
21 about. Is he talking about chromaticity, color,
22 brightness, luminance, contrast, whatever. He doesn't
23 explain it here. Okay.

24 Q. Would a POSITA --

25 A. We don't know what the system is. We don't

1 know if what sort of numerical attributes the system
2 has. I mean, the '132 patent operates in a rather broad
3 space.

4 And I'm still answering the question.

5 Let's look at column 1. I'll give a couple
6 examples of other reasons why column 4 is not
7 explanatory when it says "system's dynamic range."
8 Okay? Column 4, line 22, it talks about a limited
9 dynamic range of an image sensor.

10 Q. I think you might have misspoke. Column 4,
11 line 22?

12 A. I'm sorry, column 1, line 22. Thank you.

13 Q. Okay.

14 A. It also talks about a dynamic range of the
15 display device. Okay? So I don't know what part of the
16 system is even being referred to in column 4. It's just
17 not explanatory. It's not explanatory in terms of range
18 of what nor of where. So I don't know.

19 Q. So setting aside for a moment the
20 characteristic to which the dynamic range refers, would
21 a POSITA have at least understood the dynamic range of a
22 system referred to the difference or range of values for
23 a particular characteristic between the minimum and
24 maximum available for that system?

25 MR. GRAUBART: Objection. Form.

1 THE WITNESS: You know, I'm not going to
2 import something it doesn't say. I don't know if they
3 would think that or not. It's just a -- I would have to
4 be speculating. Again, you know.

5 MR. ROBINSON: Q. A person of ordinary skill
6 in the art, as of 2009, with a bachelor of science
7 degree in computer science or similar technical field,
8 three to five years of educational practicum or work
9 experience in the field of computer vision and/or image
10 processing, would have no idea what the term "dynamic
11 range" means in the context of the '132 patent?

12 MR. GRAUBART: Objection. Form.

13 THE WITNESS: That's not at all what I said,
14 and completely mischaracterizes all my prior testimony.

15 MR. ROBINSON: Q. How would the POSITA
16 understand the term "dynamic range" in the context of
17 the '132 patent?

18 MR. GRAUBART: Objection. Form.

19 THE WITNESS: Well, the POSITA would
20 understand that the patent specification is guiding him
21 with a teaching of various embodiments towards how, you
22 know -- at least this is the intention of the
23 specification -- to give examples of how dynamic range
24 might be, you know, used and so on for correction.

25 You know, if you look at claim 2, for example,

1 okay -- first of all, claim 1 doesn't even talk about a
2 dynamic range correction. Claim 2 does. It says where
3 the correction comprises a dynamic range correction.

4 I don't think that the specification is trying
5 to limit to a specific, you know, type of dynamic range
6 of any specific kind of quantity. It's giving examples
7 here. Okay? So could that dynamic range have a maximum
8 and minimum that are clearly defined?

9 Are we talking about an image, first of all?
10 I assume so. Will that image dynamic range, you know,
11 is it what's allowed for, or is it the dynamic range of
12 the image in its current state? All right. So I think
13 we need to be more specific.

14 MR. ROBINSON: Q. Let's start with the
15 dynamic range that's allowed for.

16 MR. GRAUBART: Object to form.

17 MR. ROBINSON: Q. If you have a system, be it
18 -- let's start with the image sensor in column 1, lines
19 roughly 22, 23. If that image sensor has a dynamic
20 range that it allows for, what's that referring to?

21 A. Well, I mean, an image sensor when it captures
22 pixels, it may only allow for, you know, a certain
23 amount of pixels to be counted, so to speak, which later
24 converts to a brightness.

25 But I don't see how this relates to the claims

1 or limitations. There's nothing about limitations of a
2 sensor or how many photons it can pick up or anything
3 like that. It's just saying, like in claim 2, wherein
4 the correction comprises a dynamic range correction,
5 there isn't anything about that.

6 Q. Let's go to a second example in column 1,
7 line 23, where it talks about a limited dynamic range --
8 excuse me -- line 22 to 23 in column 1, where talks
9 about a limited dynamic range of a display device.

10 MR. GRAUBART: Object to form.

11 MR. ROBINSON: Q. What would a POSITA
12 understand that to be?

13 A. Broadly speaking, a display device is a given
14 pixel and at any given setting might only be able to
15 give out a certain amount of photons. It also talks
16 here in more technical language, with regards to
17 displays, that you know, and sensors that, you know,
18 image sensors have contrast ratios of about 200 to 1.
19 Okay? Meaning range of contrast as opposed to range of
20 brightness or chromaticities or anything like that.

21 And again, you know, I don't see how this
22 relates to the claims in any way. I don't think it does
23 really.

24 Q. What is your understanding of the use of
25 "i.e.," i, period, e, period?

1 A. I think it means "in effect."

2 Q. Does the sentence, "For example, current image
3 sensors provide contrast ratios in the range of 200 to
4 1, i.e., a dynamic range of about 46 decibels," help a
5 POSITA understand what is meant by dynamic range in the
6 context of the '132 patent?

7 A. I think it only is, in a very limited example
8 only of column 1, lines 19 to 26, where he happens to be
9 talking about an image sensor. And he's just giving
10 example.

11 Q. Would it help POSITA -- sorry, go ahead.

12 A. You know, I don't think it's teaching anything
13 about how practice the claims, really.

14 Q. Do you think it would help inform a POSITA's
15 understanding of the use of the term "dynamic range" in
16 the claims?

17 MR. GRAUBART: Object to form.

18 THE WITNESS: I think a POSITA would know,
19 understand, that image sensors that have different image
20 sensor dynamic ranges would capture images that might
21 have different image dynamic ranges.

22 So a sensor might be a poor sensor that has a
23 very limited dynamic range in some characteristic, and
24 maybe that's why he wants to, you know, might create
25 images that have image dynamic ranges that are limited

1 in some sense of the word. And that might be a reason
2 for wanting to do some kind of dynamic range correction
3 in some sense of the word, which isn't really -- I mean,
4 I think that a POSITA would understand that. I mean
5 that in the broadest sense possible.

6 MR. ROBINSON: Q. Let's take a look at the
7 last clause of that sentence, specifically the sentence
8 that spans column 1, line 23 to column 1 to column 26.

9 The sentence concludes, "Whereas, the human
10 visual cortex has a dynamic range approaching
11 80 decibels."

12 Does that help inform a POSITA's understanding
13 of the use of dynamic range in the '132 patent?

14 MR. GRAUBART: Object to form.

15 THE WITNESS: I think it's just a statement of
16 something that he drew from some literature.

17 Noting your earlier discomfort in my answers,
18 I've given you significant leeway in the questions being
19 asked of me and even my answering them. There's nothing
20 in the recent line of questions that has anything to do
21 with my report and the opinions I've given, and really,
22 this proceeding is intended to be about what the
23 opinions I've expressed and what's contained in my
24 report.

25 I'm just going to point out that, going

1 forward, I'm going to be a little bit more insistent
2 about you asking me about the opinions I've rendered
3 rather than things outside of that, which is correct, I
4 believe, for an IPR proceeding in a deposition.

5 Q. I'm sorry, Dr. Bovik, are you objecting to my
6 line of questioning now?

7 A. I'm only making an observation, Counselor.

8 Q. Okay. You would agree, wouldn't you, you've
9 offered a number of opinions on the '132 patent?

10 A. Certainly.

11 Q. And a number of opinions on the meaning of
12 various terms within the '132 patent?

13 MR. GRAUBART: Object to form.

14 THE WITNESS: If you show me a term that I've
15 talked about, I'm happy to talk about it in the context
16 of my report.

17 MR. ROBINSON: Q. In your comparison of the
18 claims of the '132 patent in the prior art, did you at
19 least consider what those terms in the '132 patent
20 claims meant to a POSITA?

21 A. Of course.

22 Q. Even if you didn't issue an explicit opinion
23 on the meaning of the term?

24 A. I certainly did, but nevertheless, you know,
25 your questioning here is really limited to the opinions

1 I've expressed in the document.

2 Q. Dr. Bovik, are you telling me that in saying
3 that something in the prior art falls within the scope
4 of a claim or the terms of a claim that I'm not entitled
5 to ask you about the meaning of the terms if you didn't
6 offer explicit instructions?

7 MR. GRAUBART: Object to form.

8 THE WITNESS: I didn't say anything like that.

9 MR. ROBINSON: Q. Okay. Would a POSITA
10 understand the meaning of the term "intensity" in the
11 context of digital image?

12 MR. GRAUBART: Object to form.

13 THE WITNESS: I answered that one already.
14 You asked me that a long time ago. Same answer.

15 MR. ROBINSON: Q. Would a POSITA have
16 understood the term "contrast" in the digital image?

17 MR. GRAUBART: Object to form.

18 THE WITNESS: Oh, we're talking outside the
19 patents, just if they never approached this patent and
20 were just sitting there thinking about contrast?

21 MR. ROBINSON: Q. Yes, just based on their
22 education and years of experience.

23 A. Contrast, if the contrast -- contrast is
24 defined in a number of ways. For example, there's the
25 Michelson contrast. If you have an image or a piece of

1 an image, it's the difference of the largest value and
2 the smallest value of typically luminance or brightness
3 in that patch divided by the sum of the two.

4 Or it might be you may measure the average
5 value of brightness in that patch and compute the
6 squared error of all the pixels within the patch, and
7 average that squared error over that patch. That's
8 called the RMS contrast.

9 Those are two solidly defined contrast
10 definitions he might any think of just sitting here.

11 Q. Any other examples?

12 A. You know, that's -- those are good scientific
13 answers. If he was thinking scientifically, he would
14 probably think of one of those two first. But, again,
15 that's outside the '132 patent.

16 Q. How would your answer to that question differ
17 in the context of the '132 patent?

18 A. I mean, a POSITA would still carry that with
19 them. A POSITA would understand that, you know, the
20 '132 inventor is using their own terminology. So
21 a POSITA would -- I think I'm going to ask you to point
22 me to a use of the word "contrast." Maybe, I don't
23 know, we've almost completely avoided the claims in the
24 prior art in our discussion so far, which is what this
25 proceeding is really supposed to be about.

1 But, you know, I mean, in claim 8, okay, a
2 POSITA would read, you know, practice, you know, the
3 method in claim 7, which depends upon claim 1 and all
4 that's in there, "We're determining the amount of gain
5 to apply to the first portion of the digital image data
6 comprises, determining the amount of gain to apply to
7 the first portion of the digital image data so as to
8 maintain local contrast of the first portion of the
9 digital image data."

10 So, here, a POSITA would read, "Oh, a local
11 contrast." So he would understand that's some
12 measurement of contrast in a local region. He would
13 probably think about contrast that is at least similar
14 to the kinds of contrast that I scientifically define
15 without actually writing equations.

16 He would go to the specification and say,
17 "Well, what do I mean? What does he mean," you know, by
18 this "maintaining contrast." He might turn to column 9,
19 okay. Column 9, lines 33 through 35, it says, "The
20 local contrast may be controlled by selectively using
21 various sections in a cascade."

22 I mean, I -- when I try to understand
23 "maintain," you know, what did claim 8 mean by "to
24 maintain local contrast," I searched the entire
25 specification because it didn't explain it. And I think

1 that the only reference to "local contrast" is here in
2 column 9, where -- where the maintaining is controlling
3 it.

4 That controlling could be to make the
5 contrast, you know, more visible, you know, maintaining
6 a contrast might be making it more visible or more
7 amenable or more -- down in the same column 9, lines --
8 line 40, you know, it could be based on spatial
9 measurements taken together with the user preference for
10 the amount of local contrast that I also think is
11 maintaining local contrast.

12 I think in all those, the contrast would
13 comport, if not in the equation form, because the
14 specification doesn't state the equation for contrast,
15 it would at least comport with the spirit of the amount
16 of variation of the values locally relative to perhaps
17 the average value.

18 Q. Did you consider the explanation at column 3,
19 lines 28 to 32?

20 A. I did, yes. I think that, you know, again,
21 referencing, just so we have some sort of handle, claim
22 8 where we're talking about maintaining the local
23 contrast, you know, here it describes making object edge
24 detail more visible to improve local contrast.

25 I think this is another example of controlling

1 or maintaining the local contrast. And you know, if you
2 have an image and you apply some process that improves
3 the contrast using the science definitions I've given,
4 typically, it may make edge detail more visible. And it
5 also may have negative effects. They make noise more
6 visible, for example.

7 Q. Would a POSITA have an understanding of the
8 term "wrinkle-reducing parameters"?

9 MR. GRAUBART: Object to form.

10 THE WITNESS: Wrinkle-reducing parameters?

11 First of all, can you point that to me in the
12 '132 patent?

13 MR. ROBINSON: Q. At this point, I'm just
14 asking if a POSITA based on their years of education and
15 experience in this art would have an understanding of
16 this term.

17 MR. GRAUBART: Object to form.

18 THE WITNESS: So I think earlier I answered
19 the question. I forget what the question was. I
20 mentioned in my answer often there are algorithms which
21 attempt to reduce or remove noise. Sometimes they're
22 called noise removal algorithms, but it's impossible to
23 actually remove, but they're still called that. And we
24 still say it's noise removal, even if it's just reducing
25 it.

1 I would say that reducing wrinkles would be an
2 attempt to make the wrinkles less evident, which would
3 include trying to eliminate them entirely in an image.
4 Or in other words, to remove them. I think that remove
5 and reduce here could be -- I would say reduce would at
6 least include remove in that regard.

7 Q. Would a POSITA, given that term alone,
8 understand how to apply wrinkle-reducing parameters to a
9 digital image?

10 A. Do what?

11 Q. Would a POSITA, in 2009, have understood just
12 how to apply wrinkle-reducing parameters to an image,
13 would have understood how to do that?

14 A. They would probably have some ideas in mind of
15 how to do that. I think more specifically, if they're
16 given an invention for reducing wrinkle parameters, they
17 would understand how to read, you know, the teachings
18 about wrinkle-reducing. Wouldn't be beyond a POSITA to
19 understand how somebody's invention for wrinkle
20 reduction or removal would work.

21 Q. So let's go back to chromaticity for just one
22 moment. Would a POSITA, in 2009, based solely on their
23 education and experience, have understood the term
24 "chromaticity distribution"?

25 MR. GRAUBART: Object to form.

1 THE WITNESS: I mean, broadly speaking, they
2 would need a context. But broadly, just to understand,
3 you know, exactly how distribution is being used, but,
4 you know, typically distribution is often used to refer
5 to if it's in an image. And we're talking about image
6 here.

7 It's referring to, you know, an empirical, you
8 know, I'll just use the word empirical probability
9 distribution of whatever color feature is being measured
10 here. Okay? Could be the colors themselves, the R, G
11 and B, or some color-derived features. In other words,
12 that kind of distribution is, you know, usually called a
13 histogram. But it's also called a distribution.

14 Q. If a POSITA, in 2009, were told to analyze a
15 chromaticity distribution, would a POSITA know what to
16 do?

17 MR. GRAUBART: Object to form.

18 THE WITNESS: If they knew what the purpose of
19 the analysis was for, then they likely would have
20 understood that there's a suite of approaches they could
21 deploy. I'm being speculative here again because I
22 don't know what the context is that we're talking about
23 necessarily.

24 But in a normal situation where they had a
25 context, I would think they would understand that

1 there's some general approaches or broad set of methods
2 to deploy to analyze.

3 MR. ROBINSON: Q. So column 3, lines 31 to --
4 30 to 32, talk about "making object edge detail more
5 visible, i.e., to include local contrast."

6 A. M-hm. I see that.

7 Q. Would blurring decrease local contrast?

8 A. Blurring can affect local contrast, and it can
9 reduce local contrast. It doesn't necessarily.

10 Q. Can you give me an example of a blurring
11 function that would not decrease local contrast?

12 A. Well, first of all, there's a lot of blurring
13 functions. Let's just go down here and look at line 39
14 where he mentions something called a two-dimensional
15 low-pass filter. That's an example of a blurring, a way
16 of blurring. Okay. Not the only way, but it's a way of
17 blurring.

18 So suppose I supply that filter with an image
19 that's constant. That constant image has zero contrast
20 using all the definitions I gave you. In other words,
21 every value in the image is constant. Let's say it's a
22 luminance or a grayscale image.

23 Low-pass filtering has no effect on that image
24 nor on its contrast. That's an extreme example. There
25 may be part of the image that is so smooth, that the

1 low-pass filtering either, you know, effectively has no
2 effect on the contrast.

3 Q. What do you mean by "smooth" when you describe
4 part of an image?

5 A. Smooth in terms of images is pretty much --
6 this is just an intuitive sense. I mean, if an image is
7 smooth in a region, it's not changing very fast. It may
8 be intrinsically that way. Like a picture of the sky
9 without clouds is very smooth. Or it may be that you
10 apply a, you know, an appropriately designed smoothing
11 filter by selecting the appropriate parameters of that
12 filter to smooth, smooth the image.

13 Q. Is it correct then to say that "smooth"
14 indicates relatively little contrast, at least with
15 respect to some reference that has more contrast?

16 A. Can be. I mean, you need a context here. I
17 wouldn't limit it to that.

18 Q. Your answer a moment ago said there may be
19 part of the image that's so smooth, the low-pass
20 filtering either effectively has no effect on the
21 contrast.

22 I think that suggests a link between smooth
23 and contrast. I'm just trying to understand that link.

24 A. It's just meant as an example. I gave an
25 example of a constant image. I haven't, you know --

1 actually, I forget what the question is. My apologies.

2 Q. Is there an inverse relationship between
3 smooth and contrast, meaning smoothness increases as
4 contrast decreases?

5 MR. GRAUBART: Object to form.

6 THE WITNESS: No. The definition of contrast
7 is not meant to be specifically a measure of smooth.
8 It's meant to be a measure of contrast.

9 I'm trying to be explanatory. I didn't mean
10 to mislead by saying, you know, smoothing is
11 specifically for contrast reduction. You can reduce the
12 contrast of a picture without doing any smoothing.
13 There's nothing synonymous here.

14 MR. ROBINSON: Q. Does smoothing necessarily
15 reduce the contrast?

16 A. I already said no. I think I said no. I said
17 something like no. You asked me if blurring reduces the
18 contrast. I think of, you know...

19 Q. All right. Just to make sure we're clear, are
20 you using smoothing as synonymous with blurring?

21 A. Smoothing can be blurring.

22 Q. Is smoothing necessarily blurring?

23 A. No. We haven't defined smoothing. I think an
24 author could define smoothing how they want and what
25 they're smoothing. No, I don't think it necessarily

1 means that. I can think of examples where you're
2 smoothing something, but you're not necessarily
3 blurring.

4 Q. Can you give me one of those examples, please?

5 A. Yeah. I mean, in classical image video
6 compression standards, there's something called an
7 in-loop filter. What it's meant to do is to remove
8 blocking artifacts. Okay?

9 But it's meant to do that without changing the
10 content of the video. So the video looks the same, but
11 the blocking artifacts are removed. A deblocking
12 algorithm is an example of, you know -- I forget the
13 question again here. I'm getting a little tied up with
14 smoothing and blurring. I'll finish my example.

15 MR. ROBINSON: Q. An example of where you're
16 smoothing but not necessarily blurring.

17 A. That's what I thought. Okay.

18 So in that case, you're removing the blocks,
19 but you're not blurring the image. That's an example.
20 So I think removing blocks from an image could be viewed
21 as smoothing. That's just one interpretation. I'm not
22 trying to define smoothing here. I think you need a
23 context to define smoothing.

24 Q. Would a POSITA have understood smoothing to
25 include that block removal example you just gave?

1 A. Oh, sure, a very famous example of an in-loop
2 filter.

3 Q. M-hm. Can you give me an example in the
4 context of editing a still digital image of something
5 that involves smoothing but would not necessarily
6 involve blurring?

7 A. Deblocking a still image, just to stay on the
8 same vein.

9 Q. What is deblocking in the context of a still
10 image?

11 A. Still images get compressed too, particularly
12 by an algorithm called jpeg. If you compress too much,
13 you get blocking artifacts. You can apply a deblocking
14 algorithm to try to remove those blocking artifacts.

15 Q. What is a blocking artifact in that context?

16 A. The image looks blocky.

17 Just to give you some context, in jpeg, you
18 break the image in little pieces, which are typically
19 8x8 size, and then you transform them to another domain.
20 And that other domain, which is called a
21 discrete-cosine-transform domain, you actually eradicate
22 information. You quantify it. And then you transform
23 back. And there may be some other steps, but not so
24 relevant.

25 Because of that loss of information, those

1 little blocks you may notice they are indeed separate
2 little blocks with little sort of visible boundaries
3 that appear between them.

4 Q. So...

5 A. And that's a very unpleasant experience
6 deblocking.

7 Q. This is probably a stupid question. I know
8 it's not my first of the day.

9 Does blocking artifacts refer to something
10 that might be more colloquially referred to as pixelated
11 edges?

12 A. Oh, they're broadly related. I would say
13 pixelation is a kind of different, you know, blocking
14 that occurs than what occurs in jpeg.

15 Q. Would a POSITA have been aware of any ways of
16 blurring that did not involve smoothing?

17 MR. GRAUBART: Object to form.

18 THE WITNESS: You know, again, if an image is
19 already smoothed, for example, if you blur it, you're
20 not smoothing it. It's already smooth. Say a constant
21 image, picture of the sky and I blur it, maybe nothing
22 happens or at least nothing visual happens.

23 MR. ROBINSON: Q. Does the effect of a
24 blurring function depend on the input image?

25 MR. GRAUBART: Object to form.

1 THE WITNESS: I'm sorry, one more time?

2 MR. ROBINSON: Q. Just to tie back to your
3 last answer, you said, "If an image is already smoothed,
4 for example, if you blur it, you're not smoothing it.
5 It's already smooth. Say a constant image, a picture of
6 the sky and I blur it, maybe nothing happens or at least
7 nothing visual happens."

8 I just want to understand that. I think that
9 means that the effect of a blurring function on an image
10 depends on the image that you start with.

11 A. Depends on what we mean by "blur" here, too,
12 Counselor. We haven't really said what we mean by
13 "blur." I've kind of gone along with this.

14 I think that, you know, a blur can be linear
15 or nonlinear. It can be arise from many different
16 things. It may or may not be processing. It may be
17 part of a photographic process. You know, it's -- it
18 may be something undesirable. It maybe something
19 desirable.

20 You know, so, we're kind of in the land here
21 of nonspecifics.

22 Q. Would a POSITA have understood the term
23 "blurring" in the context of digital image processing?

24 MR. GRAUBART: Object to form.

25 THE WITNESS: Everything, all the examples I

1 just gave are in the context of digital image
2 processing. That's why I'm putting out this very -- we
3 need to get a little bit more specific.

4 MR. ROBINSON: Q. Maybe we can start with an
5 answer to my nonspecific question.

6 Would a POSITA have understood the term
7 "blurring" in the context of digital image processing?

8 MR. GRAUBART: Object to form.

9 THE WITNESS: A POSITA would have understood
10 that that could mean a lot of things. It could have
11 been, you know, an intentional blur, an unintentional
12 blur. It could have arisen from a defocusing of a
13 camera. It could have arisen from an algorithm. It
14 could have arisen from a lot of different things.

15 He would have a broad notion of many
16 possibilities. Again, I'm not assigning this within the
17 context of anything either in the '132 patent nor in any
18 of the prior art references that I've brought forth in
19 the context of the '132 patent. It's outside all of
20 those prior references as well as the '132.

21 MR. ROBINSON: Q. Would a POSITA have
22 understood the term "blurring" in the context of an
23 intentional function performed on a digital image?

24 MR. GRAUBART: Object to form.

25 THE WITNESS: Well, I mean, maybe you want to

1 point to me where it's used. Okay? I mean, because
2 there are so many ways of applying intentional blur that
3 have different purposes. I really do need some context.

4 MR. ROBINSON: Q. Okay. The POSITA you've
5 defined would also need that context.

6 A. Oh, yeah.

7 Q. To understand the meaning of blurred in the
8 context of an intentional function performed on a
9 digital image.

10 A. He would understand that there's a variety of
11 ways of blurring and a variety of different purposes for
12 blurring. That would modify the nature of the blur. If
13 it was intentional, okay. It may not have anything to
14 do with producing images that are meant to be viewed.

15 Q. I want to tie back to some of the questions I
16 asked earlier about an image correction.

17 A. M-hm.

18 Q. I think it's fair to say that a POSITA would
19 have understood that an image correction involves some
20 change to an image?

21 I'm not limiting that to a particular purpose.
22 I'm just saying it involves some change to an image.

23 MR. GRAUBART: Object to form.

24 THE WITNESS: If you have an entire image and
25 you're correcting it in some manner, I don't have a

1 problem with some changes being applied to the image.

2 MR. ROBINSON: Q. In the context --

3 A. I mean.

4 Q. Sorry. Go ahead.

5 A. Let me just say a correction algorithm, when
6 applied, might turn out nothing changes. I just want to
7 make sure. Just because I don't know if the person
8 knows what image is coming or not, for example, or
9 whether it needs to be corrected.

10 Q. So the output -- make sure I'm using the same
11 words. The output of a correction algorithm depends on
12 the image that's coming in or the input image?

13 A. I think generally if you have say an
14 algorithm, the output of the algorithm depends upon the
15 input, if that's what you're asking. Generally
16 speaking, yeah.

17 Q. Okay. Is it a fair inference from that that a
18 correction algorithm -- that a POSITA would have
19 understood that a correction algorithm in this image
20 processing context that we're talking about specifies
21 some change relative to the input image?

22 MR. GRAUBART: Object to form.

23 THE WITNESS: No. I mean, your algorithm may
24 not know anything about the input image until he
25 receives it. I don't really know where that's going.

1 MR. ROBINSON: Q. Well, the -- excuse me.

2 The correction algorithm can't do anything to
3 an input image until it receives the input image; right?

4 A. I think we can agree to that.

5 Q. At that point, to the extent that an algorithm
6 depends on the input image, it knows what it needs to
7 act on the input image; is that right?

8 A. I don't agree that the algorithm depends upon
9 the input image.

10 Q. Let me repeat the question.

11 Once the input image is received, to the
12 extent that an algorithm depends on that input image,
13 the algorithm should know what it needs to act on that
14 image?

15 A. I don't know what you mean by the algorithm
16 depending upon the image, whether it's to an extent or
17 otherwise. When an algorithm is operating on an image,
18 the output depends upon the image.

19 You know, it could be that the algorithm -- I
20 mean, there exist algorithms that self-modify, depending
21 upon the image or the algorithm that maybe adapt in some
22 way. I don't see anything like that in your question.
23 It's not generally a truth.

24 Q. All right. I'm not trying to be clever here.
25 I'm just going to ask you one simple clarification on a

1 statement you made in your last answer.

2 "When an algorithm is operating on an image,
3 it's the output that depends on the image." When you
4 refer to "the image" in that sentence, are you saying
5 that when an algorithm is operating on an image, it's
6 the output that depends upon the input image that it's
7 operating on?

8 MR. GRAUBART: Object to form.

9 THE WITNESS: Again, this has nothing to do
10 with the patents, prior art, reports. I think it's fine
11 to say that if I have an image and I applied an
12 algorithm to it, then the output depends upon the input.
13 And depends on the algorithm, too. I mean, otherwise
14 you got to point me to specific stuff in these
15 documents.

16 MR. ROBINSON: Q. Would anything about that
17 last answer change if I asked you specifically about the
18 perspective of a POSITA in 2009?

19 A. I think a POSITA would understand if you have
20 an algorithm that's meant to operate on images, then the
21 output would depend on the algorithm and on the image in
22 some sense of "depend." We haven't even said what
23 "depend" means.

24 I mean, that's how speculative and
25 hypothetical these questions are. It's hard for me to

1 give you anything. I want to be specific. I want to
2 help.

3 Q. Would a POSITA have understood the meaning of
4 the word "depend" in the context of this?

5 MR. GRAUBART: Object to form.

6 THE WITNESS: I don't see "depend" anywhere in
7 here. Point me to "depend," and I'll tell you whether a
8 POSITA would understand "depend."

9 MR. ROBINSON: Q. Do you mean to suggest that
10 a POSITA would need to see it in print to understand the
11 meaning of "depend" in the context that we've been
12 discussing, an algorithm depending on an input --

13 A. Yes. "Depend" could mean many things.

14 Q. What could "depend" mean in this context of an
15 algorithm's output depending on its input?

16 A. A lot. It could mean, for example, the
17 algorithm is adaptive to the input, okay, in some way.
18 So it would change the nature of the dependency, okay.
19 I could conceive an algorithm that does nothing. Okay?

20 Well, then the output very much depends on the
21 algorithm but not the input, okay, because -- let's
22 suppose an algorithm just outputs zeros, all right, then
23 you know, the output depends only on the algorithm.
24 Doesn't matter what you feed it. Okay.

25 I don't know what "depend" means here. You

1 got to explain, Counselor. Otherwise, I'm just throwing
2 hypothetical meaningless answers out there, which don't
3 tie in any way to this case

4 Q. Can you give me an example of any algorithm in
5 this art that a POSITA would have used or been aware of
6 that just output zeros and input with a digital image?

7 A. No, but I'm trying to show how your questions
8 are ill-posed. That's why I give an answer. It's not
9 meant to be difficult. It's meant to say that you're
10 just pulling this word out of the air that's out of the
11 air and you're not pointing to me its use, either in my
12 own report, which is what this proceeding is about, nor
13 is it in the patent, which this proceeding is about, nor
14 is it in the petitions or the prior art that I
15 presented, which we haven't even talked about, really,
16 at least not in any direct way. I think we've talked
17 about material in some of the prior art without actually
18 stating it to be so.

19 Q. Would you agree the word "depend" is a
20 well-understood and commonly used term in the English
21 language?

22 MR. GRAUBART: Object to form.

23 THE WITNESS: I think "depend" is used a lot
24 in the English language, and it has different contexts,
25 you know. Something might depend weakly or strongly.

1 You know. We're not just talking about the English
2 language here; we're talking about very specific
3 technology. We're failing to get into the specifics.

4 MR. GRAUBART: Counsel, we've been going about
5 an hour and a half since our last break. We're getting
6 close to noon. I'll put it to Dr. Bovik.

7 THE WITNESS: Let's take a break, and I mean,
8 I'm here all day. Let's take a break and think about
9 lunch maybe around 1:00-ish, if Counselor is okay with
10 that.

11 MR. ROBINSON: Eat lunch at 1:00 or take a
12 lunch break now and come back at 1:00?

13 THE WITNESS: Eat lunch around 1:00, unless
14 you're like ravenous now or something.

15 MR. ROBINSON: No, I'm good.

16 MR. GRAUBART: That works.

17 MR. ROBINSON: Take 10, come back at noon.

18 MR. GRAUBART: That's fine with me.

19 (Recess taken: 11:49 a.m. - 12:00 p.m.)

20 MR. ROBINSON: Q. Dr. Bovik, during the break
21 we just concluded, did you discuss with Petitioner's
22 counsel your testimony today?

23 A. I did not discuss anything substantive about
24 this case.

25 Q. Did you discuss any nonsubstantive aspects of

1 your testimony?

2 A. Well, I wondered about whether or not I will
3 continue to consider, you know, questions that are
4 outside the case. And that's all.

5 Q. Were you given any instructions in that
6 regard?

7 A. I absolutely was not.

8 Q. During the previous break, did you have any
9 discussions with counsel for petitioner about your
10 testimony today?

11 A. I did not.

12 MR. ROBINSON: Let me hand you what's been
13 marked as Exhibit 1004.

14 (Exhibit No. 1004 was marked for
15 identification.)

16 MR. ROBINSON: Q. Do you recognize this,
17 Dr. Bovik?

18 A. Yeah. This is one of the prior references.

19 Q. This is the Needham reference; correct?

20 A. That's correct.

21 Q. In the context of this Needham reference, how
22 would a POSITA have understood the term "intensity
23 dynamic range"?

24 A. (Reviewing document.) For example, in
25 paragraph 3, talks about, "Rescaling may work well when

1 the cause for poor digital photo quality, e.g., small
2 intensity dynamic range, is responsible for the overall
3 degradation of the entire digital photo."

4 So referring to a dynamic range of intensity.
5 I think long ago I said dynamic range could be
6 interpreted range of values it might take.

7 Q. Would a POSITA understand the intensity
8 dynamic range then to be range of values that intensity
9 might take.

10 A. What was the first part of the question?

11 Q. Would a POSITA understand the intensity
12 dynamic range to be a range of values that intensity
13 might take?

14 A. Or at least related to it, I would say that
15 would be fine.

16 Q. All right. Are you able to answer this
17 question with a yes or no: Would a POSITA understand
18 the intensity dynamic range as used in the Needham
19 reference to be a range of values that intensity might
20 take?

21 A. A POSITA might have that understanding.

22 Q. Are you able to say definitively what
23 understanding a POSITA would have of that term in the
24 context of the Needham reference?

25 A. (Reviewing document.) You see, I'll tell you

1 what, I'll just say yes to that.

2 Q. All right. Would you please say definitively
3 how a POSITA would understand the term "intensity
4 dynamic range" in the context of the Needham reference?

5 A. Well, I -- I think it's pretty much what I
6 said earlier when you asked me about what dynamic range
7 means. It's a range of values that intensity would
8 take -- or does take. I mean, if it's an image that has
9 an intensity dynamic range, then I would say it's the
10 range of values the intensity is taking in that image.

11 Q. You mean the range from the lowest intensity
12 in the image to the highest intensity in the image?

13 A. That would be one way of measuring it. I
14 don't object to that as something we might use as an
15 example.

16 Q. Is there another way of measuring or defining
17 the intensity dynamic range of an image?

18 A. That would be the most common.

19 Q. Are there any other ways that a POSITA would
20 have known of in 2009?

21 A. Well -- (Reviewing document.)

22 Again, I'm not trying to be in any way elusive
23 here, I'm just recognizing that you're not pointing to
24 any use of the term "intensity dynamic range" in
25 Needham. It's mentioned many times, okay. And I'm just

1 pointing out, you know, why don't you point me to a use
2 of it in Needham. It appears in multiple places.

3 That way, I can opine upon how that POSITA
4 would understand the use of the term "intensity dynamic
5 range" in Needham, rather than giving a blanket
6 statement that Needham might modify someplace or might
7 be in some subtle way even contradictory to that
8 understanding that I gave.

9 I mean, specifics matter here. They really
10 do.

11 Q. Approximately how many hours have you spent
12 studying the Needham reference?

13 A. I didn't measure how many hours I spent that.
14 I can tell you the term "intensity dynamic range"
15 appears multiple times throughout it. I mean, for
16 example, it appears in paragraph 28. It appears in
17 paragraph 32 where it says, you know, "As another
18 example to enhance the contrast 740 of an image feature,
19 an intensity dynamic range may be specified as an
20 operational parameter so that the contrast in the
21 detected image feature will be scaled to the specified
22 dynamic range."

23 So this is a dynamic range. It's a target for
24 that image, which some algorithm may produce. I just
25 think it's appropriate when answering questions about a

1 reference and a term that's in that reference that you
2 direct me to where it's used. I'm happy to be as
3 specific as you want there.

4 Q. I'm going to object to everything after the
5 first sentence of that answer as nonresponsive.

6 Would you say that you've thoroughly reviewed
7 the Needham reference?

8 A. Yes.

9 Q. Are there any uses of "intensity dynamic
10 range" that you can point me to as being inconsistent
11 with other uses of "intensity dynamic range" within this
12 patent application.

13 A. I don't think there's the word "inconsistent."
14 I can't think of any, nor am I finding any right now
15 where the term is used inconsistently relative to
16 another. I've already said I think the dynamic range is
17 the range of values it can take -- or it does take. I
18 should say does take. I'm not sure what more you're
19 looking for. I did point out the dynamic range might
20 change for an image.

21 Q. Paragraph 22 of Needham refers to weights that
22 may be assigned to different image features to specify
23 the relative importance, refers to correction
24 operations.

25 A. Yes.

1 Q. And it refers to correction parameters.

2 How do those three terms differ in the way
3 that Needham uses that?

4 A. I'm sorry, so paragraph 22, weights and what
5 else?

6 Q. Weight, correction operation, and correction
7 parameter. How would a POSITA understand those three
8 terms?

9 A. (Reviewing document.) Let's set aside the
10 correction operation first. Okay? A correction
11 operation is an algorithm which corrects an image
12 according to some specified criteria. All right.

13 The correction parameters, as I explain in
14 paragraph 52 of my report. The correction unit 270 can
15 apply different amounts of a correction to different
16 image features. Weights can be assigned to different
17 image features, such as a face, such as a building, such
18 as a, whatever, a car, to specify their relative
19 importance and to use to control the amount of the
20 correction parameter when applying the correction
21 operation to the image feature. This is explained in
22 paragraphs 22, 27, 35 of Needham.

23 So, really, the weights control how much of
24 the correction occurs, meaning control correction
25 parameter.

1 Q. How does the correction parameter influence
2 the correction operation?

3 A. Well, for example, on a human face, it may
4 correct in one way. In a background, it may correct in
5 another.

6 Q. How does that relate to the correction
7 parameter?

8 A. You would modify the correction parameter, for
9 example, to be different values or to operate
10 differently in different parts of the image, according
11 to the weights. It says here, "Weights may be assigned
12 to different image features to specify their relative
13 importance." This is from paragraph 22. "Such weights
14 may be used to control the correction parameters during
15 the correction." Okay?

16 It explains very clearly here. "For instance,
17 the correction operation of maximizing the intensity
18 dynamic range is applied to both human faces and
19 buildings and a human face feature has a higher weight
20 than a building feature, the intensity dynamic range
21 used for correcting human faces in an image may be
22 larger." Okay?

23 So it may be that a correction parameter
24 relates to how large the intensity dynamic range is in
25 some region of the picture, or it might be something

1 that controls contrast.

2 Q. If the correction parameter relates to how
3 large the intensity dynamic range is, what would the
4 correction operation be?

5 A. Well, I mean, in paragraph 22, it says the
6 correction operation of maximizing intensity dynamic
7 range. Naturally, that would be, you know, within a
8 context of, you know, where in the image, how much that
9 -- what that maximum intensity dynamic range is allowed
10 to be might be different in different places, according
11 to the correction parameter.

12 So for a face, you might be allowed a larger
13 dynamic range to maximize intensity. In a different
14 part of the image, you might have a smaller allowable
15 intensity dynamic range that you can maximize the image
16 to meet.

17 Q. So paragraph 22 also says, "Weights may be
18 assigned to different image features to specify the
19 relative importance." Isn't it the weight rather than
20 the correction parameter that is imparting or causing
21 that difference between different areas of the image?

22 A. They're both part of it.

23 Q. So what would the correction parameter be then
24 in this example?

25 A. It doesn't say exactly, but it could be, for

1 example, you know, the allowable dynamic range that you
2 can maximize the image in that region to fill.

3 Q. But Needham doesn't say that?

4 A. That's what occurs to me. He does say -- he
5 does say it. He says, "The intensity dynamic range used
6 for correcting human faces in an image may be larger
7 than that used for correcting buildings in the image."
8 So he says exactly that, really.

9 Q. Where does he say that is the correction
10 parameter?

11 A. Well, I mean in the immediately preceding
12 sentence, he says, "For instance, if the correction
13 operation of maximizing intensity dynamic range is
14 applied to both faces and buildings, and human face
15 feature has a high weight" -- actually the same
16 sentence; there's a comma separator -- "has a higher
17 weight than the building feature, the intensity dynamic
18 range used for correcting," and everything else I read.

19 Clearly, it's the correction operation could
20 be and likely is modifying the allowable dynamic range,
21 according to the region as expressed by the weight given
22 on that region. That's my reading.

23 Q. But what's the correction parameter and how
24 does it relate to that correction operation and weights?

25 MR. GRAUBART: Object to form.

1 THE WITNESS: The correction parameter would
2 be the size of the intensity dynamic range for a region,
3 in the way I've been explaining.

4 MR. ROBINSON: Q. Where does Needham say
5 that?

6 A. Doesn't have to say those exact words. It's
7 obvious here. The correction operation of maximizing
8 the intensity dynamic range, if it wasn't controlling
9 the size of that allowable dynamic range, then this
10 invention wouldn't be doing anything different, but it
11 is doing something different.

12 It is modifying that intensity dynamic range
13 locally based on the weights. And that modification of
14 the intensity dynamic range is, you know, the correction
15 parameter.

16 Q. Different than what?

17 A. I don't understand your question.

18 Q. You testified that, "If it wasn't controlling
19 the size of that allowable range, then this invention
20 wouldn't be doing anything different, but it is doing
21 something different."

22 Different than what?

23 A. Oh, than just maximizing the dynamic range
24 everywhere equally, the same maximum dynamic range.
25 Clearly, the dynamic range is changing on a local basis.

1 The weights tell the algorithm to change it. The
2 correction parameter is how large that dynamic range is.
3 That's the best reading of this.

4 Q. What else could that correction parameter be?

5 A. Well, it would be -- I don't see any other
6 immediate interpretation from this one example here of
7 correction.

8 Q. In this example, at paragraph 22, Needham is
9 applying the correction operation of maximizing
10 intensity dynamic range to the face and the building.
11 It's your understanding or your opinion that a POSITA's
12 understanding is that the correction parameter changes
13 based on whether it's being applied to a face or whether
14 it's being applied to a building?

15 A. Well, it says "for instance," okay. Could be
16 that, you know, the correction parameter has one value
17 on the face and has another value on the building.
18 There's other things in the picture. Right?

19 For instance, and, you know, keep in mind that
20 in paragraph 21 preceding this, it's talking about one
21 or more correction operations. And I bring that up
22 because it's talking about correcting it according to
23 size of the face. So you might have a different
24 criteria for adjusting the dynamic range of a face of a
25 certain size. It goes to the correction parameter's the

1 same that are changing the target intensity dynamic
2 range that you want to maximize to.

3 Q. Does that mean the correction parameters
4 correspond to different correction operations?

5 A. Well, I don't think you necessarily apply --
6 you know, let's look at paragraph 20 right above. It
7 really answers that question. "Further, when one or
8 more correction operations are applied to individual
9 image features" -- image features are things like faces
10 and buildings in Needham. Okay? Features are objects
11 in Needham -- "different types of correction operations
12 may be applied to different image features." Okay? So
13 there is different correction operations, part of your
14 question.

15 "For example, maximizing the intensity dynamic
16 range" -- in effect, he says enhancing the contrast,
17 well, it may have that effect -- "may be performed on a
18 human face image feature" -- that would imply some sort
19 of correction parameter we've already been talking
20 about -- "and a different correction operation that
21 increases the brightness may be applied to the image
22 feature that represents the sky." Sky being another
23 object. So you have perhaps a different correction
24 parameter there.

25 So if you're asking can different correction

1 operations have different correction parameters -- I
2 think your question was along those lines -- then yes.

3 Q. Paragraph 20 gives an example of different
4 corrections being applied to different features;
5 correct?

6 A. Yes, sure.

7 Q. Paragraph 21 says that different correction
8 operations can be performed on different occurrences of
9 the same type of feature. Correct?

10 A. I mean, what it says is, "The one or more
11 correction operations performed on different occurrences
12 of the same image feature types, e.g., different human
13 faces, may also differ and may be controlled by one or
14 more operational parameters."

15 Q. So those different correction operations in
16 paragraph 21 would together change the dynamic range of
17 different instances of a human face?

18 A. No, they don't have to. Just says, for
19 example. Could be some other kind of correction
20 operation. Brightness changing.

21 Q. In the example of paragraph 21, different
22 correction operations applied to the different human
23 faces in an image could result in a larger dynamic range
24 of the larger face.

25 A. I think -- is there a question there?

1 Q. Would a POSITA understand paragraph 21 to say
2 that different correction operations applied to
3 different human faces in an image could result in a
4 larger dynamic range of a larger face?

5 A. I think the example is just one of the
6 correction operations. Okay? It says one or more, and
7 then when it says "for example," that's just one of the
8 correction operations. Another correction operation
9 could be just doing something else. Maybe affecting
10 color of skin. It may be affecting, you know, the
11 degree of blur of a background. It may be doing any
12 number of other things of the other correction
13 operations if there are other correction operations.

14 Q. Is the last sentence of paragraph 21 referring
15 to the intensity dynamic range, or is it speaking more
16 broadly than that in its mention of dynamic range?

17 A. Well, I mean, there's two sentences there, for
18 example, the intensity dynamic range used for correcting
19 a particular face may be determined, blah, blah, blah.
20 And then I think in the second sentence, it's carrying
21 on from that.

22 So the large of the face, same example, the
23 large of the dynamic range that may be used. Okay?
24 Meaning this is referring to the correction parameter.
25 I'm talking about if you have a bigger face, it may

1 allow a bigger dynamic range for that bigger face. But
2 this is all just, you know, one example, "for example,"
3 this one example.

4 Q. In your previous testimony, you stated that
5 POSITA could understand dynamic range to refer to a
6 variety of characteristics of an image.

7 Would a POSITA understand the last sentence of
8 paragraph 21 and its reference of dynamic range to be
9 talking about intensity dynamic range or dynamic range
10 more generally?

11 A. In the last sentence, I think it's connected
12 to the one previous. I think just in this one example,
13 this one instructive example that is not all
14 encompassing, I think he means intensity dynamic range.
15 Comes right after the previous sentence talking about
16 the same thing. Doesn't mean that's the only thing that
17 Needham is teaching.

18 Q. Is it your opinion that a POSITA would
19 understand the last sentence to exclude other types of
20 dynamic range?

21 MR. GRAUBART: Object to form.

22 THE WITNESS: I don't think it excludes other
23 forms of dynamic range from the general teachings of
24 Needham. I just think we have two sentences in a row.
25 He talked about intensity dynamic range once.

1 I think for that particular example, I think
2 he's -- he intended -- he didn't say it, but I think he
3 intended that dynamic range in this single context is
4 intensity dynamic range in the second sentence as well
5 as in the first sentence.

6 MR. ROBINSON: Q. On the first sentence
7 refers to different -- refers to one or more correction
8 operations and also refers to being controlled by one or
9 more operational parameters. Is the relationship
10 between the size of face and the size of dynamic range
11 controlled here by the correction parameters?

12 A. So you mischaracterized what I said. When I
13 mentioned first sentence, I meant the sentence
14 beginning, "For example," comma.

15 Q. I wasn't characterizing your testimony at all.
16 I was referring to the first sentence of paragraph 21.

17 A. Okay. In any case, just so there's no
18 confusion, when I said "first sentence," I meant, "for
19 example, comma," and the rest of that. Everything I
20 said relative was in reference to that first sentence
21 and second sentence.

22 So now, I better get the question again about
23 the first sentence of the whole paragraph.

24 Q. The first sentence of the paragraph 21 refers
25 to one or more correction operations, and also refers to

1 the correction operations being controlled by one or
2 more operational parameters.

3 Is the relationship described in paragraph 21
4 between head size -- sorry -- face size and intensity
5 dynamic range controlled by one of the correction
6 parameters?

7 A. Well, I think it gives an example. The first
8 sentence is more general. It devolves to an example,
9 "For example." I think that the, you know, the size of
10 the dynamic range, I think it's teaching that one of the
11 operational parameters, meaning correction parameters,
12 would be the size of the dynamic range in that example.
13 Doesn't say anything about the other correction
14 parameters operations.

15 Q. So just to summarize, paragraph 21 lists an
16 example of different types of features being corrected
17 with different types of correction operations?

18 A. I don't think it says that. I mean, it talks
19 about one or more correction operations on a same image
20 feature even. Okay? So I think -- I think Needham was
21 talking about applying multiple different operations
22 possibly to multiple different features or objects.

23 Q. All right. Let me quote paragraph 20.
24 "Further, when one or more corrections operations are
25 applied to individual image features, different types of

1 correction operations may be applied to different image
2 features."

3 A. You're reading paragraph 21?

4 Q. No. Paragraph 20.

5 A. Oh, 20. I'm sorry, I thought we were on 21
6 still. We've been there so long. Okay. Paragraph 20.

7 (Reviewing document.) I mean, I think what
8 you read is what is written.

9 Q. Then it's followed by, "For example,
10 maximizing intensity dynamic range, i.e. enhance the
11 contrast, may be performed on a human face image feature
12 and a different correction operation that increases the
13 brightness may be applied to the image feature that
14 represents the sky."

15 Is it a fair characterization in paragraph 20
16 that it provides an example of different correction
17 operations being applied to different types of features?

18 A. Sure. Where one feature is a human face
19 object and another is a sky object.

20 Q. And then paragraph 21 provides an example of
21 different dynamic ranges being applied to a correction
22 operation of two different instances of the same type of
23 feature.

24 A. Is that a question? Am I supposed to agree?

25 Q. Yes.

1 A. Well, let's just be really clear. You know,
2 we may say that the human face is the feature, human
3 face object is the feature, but, you know, that face may
4 have different sizes. So it's not the same instance of
5 a face, object, or feature. So if you have a bigger
6 face and a smaller face, then the dynamic range applied
7 to those same class of -- objects from the same class of
8 features, we may have -- the dynamic ranges may be
9 different.

10 Q. Paragraph 22 gives an example of a single
11 correction, i.e., maximizing intensity dynamic range
12 being applied to different types of features just with
13 different weights.

14 A. Well, I think it's applying -- we're talking
15 about the '132. I think it's applying different amounts
16 of correction, to use the claim language from claim 1 of
17 the '132 patent. So for one -- for the face, if you
18 have one dynamic range that you maximize, change the
19 pixel, the intensities in that face to meet -- to
20 maximize that one range, you have a building with a
21 different range that you maximize to. You're applying
22 different amounts of correction to those two regions to
23 use the claim language.

24 Q. So Needham contemplates several different
25 types of correction operations; correct?

1 A. Well, I'll point you to it talks about
2 increasing brightness, for example.

3 Q. In paragraph 22, Needham doesn't say that it's
4 applying an intensity dynamic range correction to the
5 face and the building because there's a face in the
6 image; does it?

7 A. I don't think that Needham is saying that the
8 example that begins with "for instance" in paragraph 22
9 requires that the input image have faces in it. They
10 may or may not.

11 Q. And in paragraph 22, Needham doesn't say that
12 it's applying an intensity dynamic range correction to
13 the face and the building because there's a building in
14 the image; does it?

15 A. I think the algorithm would be applied whether
16 or not there's a building in the image. You know, and
17 keep in mind, it's just a "for instance" here.

18 Q. Would that algorithm also be applied whether
19 or not there's a face in the image?

20 A. I already said that. Yeah. There's nothing
21 that says here that you wouldn't -- couldn't apply to
22 algorithm. I mean, I don't think the example is
23 limiting. It just says "for instance," "faces,"
24 "buildings." There might be three or four other
25 features that are treated differently and have different

1 dynamic ranges applied to them according to a correction
2 parameter. The algorithm would still be functional.

3 Or it might be that some images don't need
4 correction because -- maybe the intention is that it
5 doesn't have faces or buildings. And in that instance,
6 the designer of the algorithm doesn't care whether
7 there's a more visible face or not.

8 I mean, keep in mind the last sentence here,
9 you know, we're talking about a hypothetical example --
10 not hypothetical, but an exemplary example. "In this
11 way, the human faces may be corrected so they become
12 more visible than buildings."

13 Q. So the weighting in this example of paragraph
14 22 is what's used to sort of distinguish the application
15 of a single correction parameter to two different types
16 of features?

17 A. I think it only gives -- I think it's really
18 teaching to make faces more visible. It gives an
19 example of buildings as something that would be made
20 less invisible relative to the face. I don't think the
21 intention is there would only be pictures of faces and
22 buildings. Again, this is a teaching. This is teaching
23 to help the POSITA understand.

24 Q. Would you please refer to Exhibit 1017, which
25 is your declaration from the 1251 proceeding.

1 A. Yes, sure.

2 Q. Specifically page 52, element (e)?

3 A. Let me get there. 52 (e), yeah.

4 Q. Which recites, "Processing the converted image
5 using wrinkle-reducing parameters."

6 A. M-hm.

7 Q. In the right-hand column, you quote four
8 excerpts from Konoplev provisional, which is
9 Exhibit 1012. I'll hand you a copy of that as well.
10 (Exhibit No. 1012 was marked for
11 identification.)

12 MR. ROBINSON: Q. You, in the first one on
13 paragraph 25 of Exhibit 1012, it states, "In one aspect
14 of the invention there is provided a method for
15 automated enhancement of digital images containing
16 portraits or images of human faces by correcting
17 imperfections such as wrinkles, skin blemishes,
18 freckles, pimples, et cetera."

19 Does that sentence that I just read explain to
20 a POSITA how to process a converted image using
21 wrinkle-reducing parameters?

22 A. All of these four paragraphs on the right-hand
23 column and even in the following are, you know, related
24 to processing it with wrinkle-reducing parameters. I
25 mean, this line here is the bottom of the box on the

1 page. Because the, you know, the next part of the
2 limitation begins with wherein, the four paragraphs
3 following that also relate.

4 Q. We'll get to those paragraphs as well. I'm
5 just starting with that first, just one sentence that
6 you quoted from paragraph 25 of the Konoplev provision.

7 Is that sentence enough to inform a POSITA how
8 to process a converted image using wrinkle-reducing
9 parameters?

10 A. Well, no. It's not intended to. In one
11 aspect of the invention, there's a method for automated
12 enhancement of images or portraits, by correcting
13 imperfections such as wrinkles, skin blemishes,
14 freckles, pimples. This is not an algorithm.

15 Q. So let's go on to the second sentence quoted
16 there in paragraph 52 of the right-hand column.

17 "Human faces are processed through the
18 smoothing filter using a different set of smoothing for
19 wrinkle removal."

20 Does that sentence explain to a POSITA how to
21 process a converted image using wrinkle-reducing
22 parameters?

23 A. Well, yeah. I mean, if you have a smoothing
24 filter where smoothing is being used for wrinkle
25 removal, then you can modify that smoothing filter. You

1 can always modify the filter, change its size, its
2 weights if it has weights, change the degree of effect
3 that it has -- the effect it has on the image or, on
4 particular, on the wrinkles.

5 So it is, you know, again, it's not a detailed
6 algorithm. But it's explaining you can change the
7 filter parameters, but to effect wrinkle removal and
8 reduction.

9 Q. Does that sentence explain what the filter
10 parameters should be for wrinkle removal?

11 A. Well, I mean, like I said, you know, you don't
12 expect just one phrase to explain everything. In fact,
13 that's only one sentence. I go on and say that, you
14 know, if you look at page 53, "Filtering parameters are
15 received. The filtering parameters are: an initial
16 radius, a final radius, a imperfection reduction mode,"
17 et cetera.

18 Filter parameters can also be weights of
19 linear filter, if it's linear filter, the size of a
20 linear filter. This would be understood by a POSITA for
21 sure. Okay? A smoothing filter has parameters like
22 this.

23 If it's a nonlinear filter like a median
24 filter, it might be the geometry of a median filter or
25 the size of it. This would be understood by a POSITA as

1 well. It substantially informs.

2 Q. Would a POSITA immediately understand how to
3 select initial and final filtering radii in this
4 context?

5 A. Oftentimes, when you apply a filter for a
6 purpose like wrinkle-reduction removal, you may have to
7 experiment a little bit. Okay. They may have an
8 initial sense, you know, because they may look at the
9 wrinkles in an image or a class of images or in a
10 database of images, and notice that those wrinkles are
11 typically, you know, occupy a region that is some size.

12 So they may, accordingly, choose a filter that
13 has certain parameters such as the size, radius,
14 weights, geometry of the filter. A POSITA will
15 understand that, you know.

16 Q. How much experimentation would it take for a
17 POSITA to sort that out?

18 A. Probably not much. I mean, it all depends on
19 what they're doing it for. Let's just suppose they're
20 on the Apple iTeam for cameras. So, you know, they
21 determine what's the typical size of the face on the
22 picture taken by a typical iPhone user. They have a lot
23 of data. Or Facebook or somebody like that.

24 They would come up with some practical
25 estimate, the size of the -- the sizes or regions that,

1 you know, wrinkles might cover. Once they decided that,
2 they wouldn't have too much trouble experimenting
3 briefly with, you know, different kinds of filters
4 because they hire people of ordinary skill in the art,
5 and they might try, they might say, "Well, let's try a
6 median filter that's got a 5x5 square geometry." If it
7 works, they may have little more experimentation. Or
8 none.

9 Q. Did the Apple iTeam have that experience for
10 cameras for a typical iPhone user back in 2009?

11 MR. GRAUBART: Object to form.

12 THE WITNESS: The iPhone came out before then,
13 they certainly had a camera team. I think there was a
14 camera in the iPhone; wasn't there? I can't remember
15 for sure. I think so.

16 I can tell you the Apple camera team were of
17 ordinary skill of the art with respect to that, most
18 likely. Keep in mind, they're very secret there, so I
19 didn't know who was working on what.

20 MR. ROBINSON: Q. Did Facebook include,
21 provide wrinkle-reducing filters back in 2009?

22 A. I don't know. They're secret, too. I would
23 have to go ask somebody at Facebook what they were doing
24 in 2009. I was just giving you examples of what could
25 be. What could be. Okay.

1 Call it company x who acquires pictures, and
2 they want to reduce wrinkles. I didn't mean to say
3 anybody was doing anything.

4 MR. ROBINSON: Q. How long ago -- excuse me.

5 In 2009, how long would it have taken a POSITA
6 to figure out the wrinkle-reducing parameters?

7 A. I don't know the application, so how long is
8 really a relative thing. If there's an absolute, would
9 it take them a day or a week? If this is a product
10 being deployed and sold to thousands or millions of
11 people, then spending, you know, a month on it might be
12 just fine. It might be worth it, does a better job if
13 you spend a month. But it might not take them anywhere
14 near that long. Might be take him a few days. I don't
15 know.

16 There were tools back then for finding eyes
17 and things, for analyzing faces. They could bring those
18 to bear. So I don't know where the wrinkles are that
19 you're talking about.

20 Q. Staying with your opinions related to the
21 Konoplev provisional, (f), spanning pages 53 and 54 of
22 Exhibit 1017.

23 A. M-hm.

24 Q. First sentence, "In one aspect of the
25 invention, there is provided a method for automated

1 enhancement of digital images containing portraits or
2 images of human faces by correcting imperfections such
3 as wrinkles, skin, blemishes, freckles, pimples,
4 et cetera."

5 That's paragraph 25 of the Konoplev
6 provisional.

7 Does that sentence explain to a POSITA how to
8 reduce blemishes in a converted image?

9 A. It's not meant to be explanatory about it.
10 It's just supposed to say -- it's just saying in this
11 invention, there is provided a method for enhancing
12 images by correcting imperfections of such types as
13 listed there.

14 Q. The next sentence spanning pages 53 and 54,
15 "Subsequently, the parts of image containing human faces
16 are processed through the same smoothing filter using
17 yet another set of parameters for removing brown spots
18 from the faces, i.e., pimples or other blemishes."

19 Does that sentence explain how to reduce
20 blemishes in the converted image?

21 A. No. What's being described here is function.
22 You know, function is being described here. It's not an
23 algorithm. It's not -- it's not trying to give an
24 algorithm or specific circuit or structure, anything
25 like that. It's just explaining that there's a

1 filtering process that has parameters which can be
2 modified to remove these.

3 Q. That sentence doesn't explain what those
4 parameters are or how to determine them?

5 A. I think a person of ordinary skill here as
6 well as in the section (e) part that we just talked
7 would understand that there's a design choice.

8 Q. The next sentence, "According to the exemplary
9 embodiment, facial spots, such as pimples, are processed
10 by analyzing a second derivative of the edge pixel
11 value. The level of pixel coloring over is set based on
12 the second derivative of the edge pixel value."

13 Does that sentence explain to a POSITA how to
14 remove blemishes from a converted image?

15 A. (Reviewing document.) It's instructing the
16 reader of the patent how they might proceed to
17 accomplish this. Again, it's not a specific algorithm.
18 It's teaching you can use second derivatives, which are
19 a measure of change to help you identify these
20 blemishes.

21 Q. Does this explain how to analyze a second
22 derivative of the edge pixel value?

23 A. It doesn't, you know, give an algorithm
24 specifically, but it certainly -- a person of ordinary
25 skill in the art would understand there's a way of using

1 this information to do this. Doesn't go into granular
2 detail.

3 Q. On the following sentence, "Then the facial
4 skin is enhanced by the skin-recognition filter applied
5 to the detected facial areas using spots/blemishes
6 reducing parameters."

7 That's from paragraph 48 of the Konoplev
8 provisional.

9 A. Yes.

10 Q. Does that sentence explain to a POSITA how the
11 skin-recognition filter is applied or how to determine
12 the spot/blemish reducing parameters?

13 A. So, I mean, it's not in isolation. It's along
14 with everything else, you know. I mean, two paragraphs
15 above on page 54, it says through the same smoothing
16 filter using different parameters. So, you know, then
17 there's giving a general teaching here, which a POSITA
18 could put into practice, design his own way possibly
19 using this guidance.

20 Q. How long would it take for a POSITA to figure
21 out how to analyze the second derivative of the edge
22 pixel value?

23 A. Not very long. I mean, that's -- that's
24 something a POSITA would know how to do.

25 Q. Give me a quantitative minimum, I guess.

1 A. Of time?

2 Q. M-hm.

3 A. Probably just a -- probably wouldn't need much
4 time at all to understand how to approximate a digital
5 second derivative, which is what it's talking about
6 here. If he's a person of ordinary skill in the art
7 dealing with images, he pretty much would know how to do
8 that if he chose to use that method for this.

9 Q. What's "much time at all" in this context? A
10 day? A week?

11 A. Counselor, I mean, for example, students who
12 have experience with image processing or have had an
13 image-processing class, they would have had exposure to
14 that already. They wouldn't have to go and find it.

15 So to actually implement it, depending on how
16 good a programmer they are. How long it took them to,
17 you know, find a library that maybe does it already.
18 Any kind of quantitative answer I'd just be speculating
19 on a particular situation.

20 Q. How long would it take for a POSITA to decide
21 how to set the level of pixel covering over based on the
22 second derivative of the edge pixel value?

23 A. Take a little experimentation. Depend on the
24 situation, the images they're using. I can't give you
25 anything specific.

1 Q. How much experimentation?

2 A. I don't know the situation. I don't know how,
3 for example, it gives a range of blemishes. I don't
4 know if these blemishes are obvious, like big dark
5 moles. I don't know if they're subtle. I don't know if
6 these blemishes are intended to be discovered on people
7 of different ethnicities or not. Sometimes a mole is
8 easy to find, and the same mole might be hard to find in
9 a different person. I don't know how answer that. It's
10 too --

11 Q. So it depends on the size or characteristics
12 of the pimples or blemishes?

13 A. It could depend on that, in part. It could
14 depend on other things. I mean, pimples, people get all
15 kinds of pimples. Some people have horrible, you know,
16 acne. Other ones have isolated little tiny ones. I
17 don't know what the target here is.

18 Q. When you say it could depend on that, in part,
19 or depend on other things, what do you mean by "depend"?

20 A. It would guide the design choice.

21 Q. Larger blemishes might take longer to figure
22 out the appropriate relationship between pixel covering
23 over and second derivative of edge pixel value?

24 A. I don't have specific reason to think that. I
25 don't know what kind of blemish it is.

1 Q. Are there types of blemishes that make it
2 harder to sort out that relationship between the level
3 of pixel covering over and the second derivative of the
4 edge pixel value?

5 A. I think it's fair to say that some blemishes
6 may be more subtle than others. Some types of blemishes
7 may be more subtle than others. The way you approach
8 the problem might be modified because of that. You
9 might make different design choices. The guidance here
10 would still broadly apply.

11 Q. The variations in blemishes and pimples make
12 it impossible for you to tell me how long it would take
13 for a POSITA to determine the relationship between a
14 level of pixel covering over and the second derivative
15 of the edge pixel value?

16 A. I think if you ask me any image-processing
17 task, I can't tell you how long it would take a POSITA
18 to figure out how to do that image-processing task, just
19 because a POSITA isn't a robot. They're not replicated
20 like robots. They're human beings who take different
21 amount of time to do things. Some are faster on some
22 tasks than other tasks, you know.

23 Q. Some take a significant amount of time?

24 A. I don't even know what at that means.

25 "Significant" is relative. If you have a deadline for a

1 product, a short of amount of time suddenly becomes a
2 significant amount of time. You know, there's just way
3 too open-ended questions. And...

4 Q. So elements (g) and (h) of claim 1, scanning
5 pages 54 and 55 --

6 A. M-hm.

7 Q. -- quote a number of sentences in the
8 right-hand column for those two claim elements.

9 A. M-hm.

10 Q. Do any of those sentences explain to a POSITA
11 how to analyze the chromaticity distribution and modify
12 the facial areas based on the distribution analysis --

13 THE REPORTER: How to analyze what?

14 MR. ROBINSON: Q. Would any of these
15 sentences explain to a POSITA how to analyze the
16 chromaticity distribution and modify the facial areas of
17 the converted image based on the distribution analysis?

18 A. You know, I have to take all the paragraphs
19 together. That's what, you know, I'm mapping onto (g)
20 and (h) here.

21 You know, I think any POSITA would understand
22 what's being taught here, which is a way of doing this,
23 would be to, you know, calculate a histogram of color
24 parameters, and what those parameters might be would
25 depend on a specific task of modifying. And a POSITA

1 would understand, by reading this, generally how they
2 might proceed.

3 And you know, I think an ordinary POSITA
4 wouldn't take very long to figure out how to do this
5 just like it wouldn't take very long how to figure out
6 (e) and (f).

7 Q. Do any of those quoted sentences in the
8 right-hand column for elements (g) and (h) explain to a
9 POSITA how to analyze the chromaticity distribution or
10 how to modify the facial areas of the converted image
11 based on that distribution analysis?

12 A. I think like with (e) and (f), it broadly
13 guides the reader of the patent towards a way of doing
14 this. You know, it's not an algorithm. It's not a
15 specific structure. It's just, you know, broadly
16 guides, as a specification is supposed to, informs how a
17 person of ordinary skill in the art might proceed in
18 practicing the claim.

19 Q. What is the way of analyzing the chromaticity
20 distribution toward which this collection of sentences
21 guides a POSITA?

22 A. Well, what's being guided is that these are
23 images of -- on facial areas. It's face area parts of
24 the image. You know, the goal is to achieve the most
25 natural colors. A person of ordinary skill in the art

1 would realize that human skin, including on the face, is
2 very characteristic. Human skin, if properly
3 photographed, occupies a very small part of color space.
4 It's well-known.

5 A POSITA would understand that they would
6 modify the color distribution so that the colors in the
7 face area, color distribution of the face area, would
8 agree with what naturalistic faces appear, meaning those
9 colors would, you know, the goal would be to have those
10 colors agree with the known portions of color space.

11 Q. Is that description you just offered true of
12 all ethnicities and races of humans?

13 A. Yes. It is a fact.

14 Q. Where does the claim language for element (g)
15 or (h) reference the most natural colors?

16 A. I'm sorry, where does what?

17 Q. The claim language for element (g) or (h) for
18 paragraph 54, where do those reference the most natural
19 colors?

20 A. Well, I mean they don't. But the
21 specification does. It's teaching how to practice this.

22 Q. So the sentence that you just quoted from
23 paragraph 30 of the Konoplev provisional application
24 doesn't just talk about the most natural colors of the
25 face area; does it? It also mentions the most natural

1 colors for the whole image.

2 A. It says for the face area or for the whole
3 image. It doesn't say "and." That's an important
4 difference. It certainly admits the possibility of only
5 doing it for the face.

6 Q. How would the POSITA determine the most
7 natural colors for the whole image if it includes a face
8 or doesn't include a face at all?

9 A. I would have to know the application of what,
10 you know, images are being contemplated, you know. It
11 might be that what if the people in it are -- it's
12 basketball videos. It's always about basketball games.
13 And we have a known set of jersey colors. Okay? Faces
14 in the background, and the wood of the court -- I'm just
15 throwing this out there -- it may be there's a priori
16 knowledge that can be used with regards to the natural
17 colors in the image.

18 Q. M-hm. Is any of that described in Konoplev's
19 provisional?

20 A. What I just said is not in there, but I think
21 a person of ordinary skill in the art would have in
22 mind, that, you know, depending on their application as
23 they try to practice the patent, that they would have
24 the option of, you know, doing that for the whole image.

25 I think the point of this, though, is for the

1 face area of the image.

2 Q. Despite the fact that several of the sentences
3 that you quote here also refer to the whole image or the
4 entire image?

5 A. Keep in mind that element (g) here is
6 calculating at least one chromaticity distribution in a
7 facial area of the converted image. This is how I'm
8 mapping this. But I can't imagine how that can even
9 apply there. It might be that you seek to make the
10 facial area, you know, have naturalistic colors. You
11 might make the rest of the image black.

12 That would certainly affect the -- that would
13 be affecting the natural colors. And is black a natural
14 color? I think so in the absence of light. That's kind
15 of an extreme case. Certainly fits it. It certainly is
16 an exemplar example I wouldn't find disagreeable.

17 Q. So natural colors, I mean, could include the
18 full spectrum of colors?

19 A. Yes. It could be the absence of color.

20 Q. Paragraph 92 on page 50 of Exhibit 1017, you
21 say that, "The following claim chart shows the
22 disclosure of Konoplev's provisional application
23 provides support for at least the independent claims in
24 Konoplev.

25 What do you mean by "support" in that

1 sentence?

2 A. I mean, basically it teaches the same thing as
3 those independent claims.

4 Q. Did you intend for "support" in that sentence
5 to mean any kind of a legal standard?

6 A. Well, you know, I'm not a legal expert. I'm a
7 technical expert. So what I mean is they technically
8 support -- they disclose what's disclosed in the
9 independent claims. I'm not a lawyer, so I'm not trying
10 to give a -- anything beyond a technical opinion of
11 support.

12 Q. What's the -- what does "technical support"
13 mean?

14 MR. GRAUBART: Object to form.

15 THE WITNESS: Well, what I'm saying is that
16 the technical content of the Konoplev provisional, I
17 find to -- let me turn that around.

18 I believe that the technical content in the
19 Konoplev patent can be found in the Konoplev
20 provisional, the same technical approaches as in those
21 independent claims.

22 MR. ROBINSON: Q. What do you mean by
23 "technical approaches"?

24 A. Well, in the same way that I'm a technical
25 expert. I, you know, I think I'm here for my opinions

1 related to my expertise on image processing and image
2 analysis and computer vision and related concepts and
3 techniques and methods. That stuff is what I'm calling
4 "technical."

5 MR. ROBINSON: Should we go ahead and break
6 for lunch?

7 MR. GRAUBART: Sounds good.

8 (Whereupon, the lunch recess was taken at
9 1:17 p.m.)

10 ---oOo---

11 AFTERNOON SESSION

12 (Time Noted: 2:03 p.m.)

13 MR. ROBINSON: Q. Dr. Bovik, did you discuss
14 at all during our lunch break the substance of your
15 testimony today?

16 A. I did not.

17 Q. Did you discuss any other aspects of your
18 testimony today?

19 A. No.

20 MR. ROBINSON: I'm going to hand you the
21 Nonaka reference that's been marked as Exhibit 1005.

22 (Exhibit No. 1005 was marked for
23 identification.)

24 MR. ROBINSON: Q. I'll ask you to refer to
25 paragraph 56 of Exhibit 1003, which is your declaration

1 in the 1250 proceeding.

2 A. Paragraph 56, yes.

3 Q. So paragraph 56, you say that, "If no face is
4 detected in the image, the optimization processing
5 section 5b does not perform any corrections."

6 You cite paragraph 58 of Nonaka.

7 Is that statement always true?

8 A. So, you know, paragraph 58 is part of a
9 description of a possible embodiment. What's being
10 taught is that in that embodiment if there's no face
11 detected in the image, then the optimization doesn't
12 perform any corrections. Doesn't mean always in any
13 other sense.

14 Q. So in paragraph 42, doesn't Nonaka also
15 describe that when a face is in a dark part of the
16 screen --

17 A. Paragraph 42 of Nonaka?

18 Q. Of Nonaka.

19 When a face is in a dark part of the screen,
20 the face-detecting section might not be able to detect
21 the face. In that instance, "the optimization
22 processing section 5b and the exposure control section
23 12a perform processing and control so as to brighten the
24 dark part."

25 A. (Reviewing document.) So that's just an

1 example of what I was talking about in my previous
2 answer.

3 Q. How so?

4 A. Well, you asked if a face was always detected.
5 I said, well, that paragraph 58 is part of an
6 embodiment. In that embodiment, I said it was teaching
7 that if no face is detected, then it doesn't perform any
8 corrections.

9 But, you know, I said this is -- I don't
10 remember exactly what I said. But this is, you know --
11 I said something along the lines, wasn't explaining what
12 always happens, in any case. Here's another case where
13 you have a face in a dark region.

14 Q. So are paragraphs 42 and 58 of Nonaka
15 describing different embodiments or two different
16 aspects of the same embodiment?

17 A. These are both in the section first
18 embodiment, but, you know, in paragraph 58, it doesn't
19 say anything about "always." So there could be a
20 situation as explained in the same embodiment, very
21 dark.

22 Q. Are paragraphs 42 and 58 talking about the
23 same image?

24 A. I mean, in paragraph 58, it's talking about
25 different scenarios. I mean, paragraph 58 talks about

1 Figure 6, which has only a landscape without a person.
2 It also talks about Figure 3 where there is a person. A
3 person is detected at the backlight part.

4 And paragraph 42 isn't referring to any
5 particular image that I see here.

6 Q. Does Nonaka rely upon a reference image or an
7 image for monitoring to speed or simplify processing of
8 an image to be captured?

9 A. I'm not sure what you're referring to. Maybe
10 you can point me to that. I don't have it memorized.

11 Q. Start with the abstract of Nonaka.

12 A. And you want to ask your question again?

13 Q. Does Nonaka rely upon a reference image or an
14 image for monitoring to speed or simplify processing of
15 an image to be captured?

16 A. I don't see that mentioned in the abstract.

17 Q. What's your understanding of Nonaka's
18 discussion in its abstract of an image to be captured
19 and an image for monitoring?

20 I'm sorry, an image signal for use as a
21 photographed image versus an image signal for use as an
22 image for monitoring.

23 A. So, I mean, Nonaka is describing a wave of,
24 you know, doing image correction which uses an ancillary
25 image.

1 Q. How does it use ancillary image?

2 A. (Reviewing document.) So if you look at
3 paragraph 8 of Nonaka, "When an acquired image signal is
4 corrected or modified so as to raise luminance of the
5 signal or brightness of the image represented by the
6 signal, in accordance with the luminance of each region,
7 a correction amount of the image signal for use as a
8 photographed image is smaller than that of an image
9 signal for use as a monitor image."

10 It's a way of putting a bound on the
11 correction level.

12 Q. How does Nonaka achieve that smaller
13 correction amount?

14 A. (Reviewing document.) So this is not in
15 something I've opined upon. I was spending time, you
16 know, I read it before, saw there were various
17 approaches taken to this optimization processing. So
18 perhaps you want to point to me in my report where I've
19 discussed this issue of using auxiliary or ancillary
20 image.

21 Q. Paragraph 63 is one example of Exhibit 1003
22 where you reference the image for monitoring, "to
23 improve the visibility of the subject during the display
24 of the image for monitoring while the user is shooting
25 the image."

1 A. So (Reviewing document.)

2 So in paragraph 27 of Nonaka, as pointed to in
3 paragraph 63 of my report -- first of all, in paragraph
4 63, as I state, "Nonaka describes processing image data
5 at a high speed so that the image signal from an image
6 pickup device is substantially displayed in real time
7 and processing image data to improve the visibility of
8 the subject during the display of the image for
9 monitoring while the user is shooting the image."

10 And it is paragraph 27, page 2, "When an image
11 for monitoring is displayed" -- then it describes, I
12 won't read it all, how it's fit in there. It goes down
13 and says, "In consequence, a user can shoot the image
14 while seeing this displayed." Okay? So this monitor
15 images is for a human to observe while the processing is
16 occurring. So a human can make a judgment of it.

17 Q. Is it your opinion that the image for
18 monitoring is the same as the image that is being
19 photographed?

20 A. In the sections I'm referencing, these are
21 from the first embodiment, keep in mind that when you're
22 attempting to capture a photograph with an image, you've
23 got to monitor. What's displayed on the monitor is
24 rarely, if ever, the exact same as the image that is --
25 would be captured because it goes through a series of

1 processing steps prior to display.

2 So, generally, what's shown in the monitor is
3 a representation of what you might be capturing, okay,
4 on any camera. That's a way of guiding the photographer
5 as they're capturing a picture. What's on that monitor
6 won't be exactly the same as what will be captured
7 generally ever in most cameras.

8 Q. So is what's on the monitor separated by what
9 you actually capture by a period of time between when
10 the image for monitoring is captured versus a later
11 point of time at which the image for photographing is
12 captured?

13 A. Well, there's human latency involved. So you
14 know, when you see on the monitor that the picture is
15 the way you want it, without correction, and that
16 representation, then your response will follow that.
17 But, you know, the intention is that it be substantially
18 the same, substantially the same. Not a picture of
19 something else, for example.

20 Q. Nonaka actually suggests continuous
21 elimination of a scene so that the image for monitoring
22 can be static for a period of time. Does it not?

23 A. Well, even in a -- even if a camera is on a
24 tripod, then the camera is pretty static. But there's
25 still vibrations. Furthermore, out there in the world

1 there are events occurring.

2 Even if you have a person sitting for a
3 portrait, we're humans. We move. We're mobile. So
4 there may be an intention, but then there's the reality,
5 too. But the intention, of course, is that the -- what
6 you capture will be -- what you're monitoring and what
7 you capture will be substantially similar.

8 Q. What do you mean by "substantially similar"?

9 A. I mean, this is commonsensical. You don't
10 even need a POSITA to understand that if somebody is
11 trying to take a picture, what you see in the display
12 screen, you're centering, you're maybe performing --
13 there's operations that might be correcting, and what
14 you capture -- your intention in using the monitor is
15 what you capture will have the good characteristics of
16 what you're seeing in the monitor, monitored image.

17 Q. Would you take a look at the last three
18 sentences of paragraph 56 in Nonaka. And let me know if
19 those sentences change any of your answers to the last
20 two or three questions.

21 A. (Reviewing document.) So it doesn't change my
22 opinion. I mean, it's true that Nonaka deals with, you
23 know, the possibility of introducing a flash apparatus
24 as part of the photographic composition. That's really
25 neither here nor there with regards to the method of

1 correction. That is what I'm pointing out in Nonaka.

2 Q. Isn't it true that Nonaka reduces the amount
3 of correction in the photographed image by analyzing the
4 image for monitoring to streamline the process for
5 individually photographed images?

6 A. It teaches that can be done. But
7 nevertheless, it teaches a method of correction.

8 Q. Doesn't that method of correction depend on
9 processing the image for monitoring?

10 A. I don't think the method of correction depends
11 upon that. I mean --

12 Q. You're saying the method of correction can be
13 divorced from the way that Nonaka implements it as
14 dependent on an image for monitoring?

15 A. The method of correction is not the same as
16 the correction amount. Okay. So you know looking at,
17 for example, claim 1 of Nonaka, so it talks about a
18 correction amount of the luminance would be smaller than
19 that of an image for monitoring.

20 That's not the same as the method of
21 correction. So, in other words, the method of
22 correction doesn't depend upon that, but the amount may
23 be -- it may.

24 Q. So in paragraph 42 when it says that when the
25 face is in a dark or blackened part of a scene, the face

1 detecting section cannot detect the face. And so the
2 optimization processing section 5B goes ahead and
3 brightens the dark part.

4 Is that talking about the image for monitoring
5 or the image to be photographed?

6 A. Well, the image for monitoring is always
7 derived from an image that could have been photographed.
8 So, you know, it may have been processed. It may be
9 that the moment has passed for it to be captured.

10 These are all, because of photons going
11 through the same lens and striking the same sensor and
12 being recorded by that same sensor. It's not two
13 cameras. So, substantially, the monitored image and the
14 photographed image are always the same in some sense,
15 meaning, well, once you photograph it, it's not going to
16 get monitored maybe. They come from the same, you know,
17 sensor. That's what I mean.

18 Q. Nonaka makes crystal clear the photographed
19 image is always later in time than the image for
20 monitoring; is it not?

21 A. Well, as I explained earlier, there is a time
22 delay. So when you photograph and capture the image, as
23 is currently incident, and that image never gets
24 monitored. In that sense, so sure.

25 Q. So paragraph 42, when it says that the face

1 can't be detected, then the optimization processing
2 section 5b and the exposure control section 12a perform
3 processing and control so as to brighten the dark part,
4 that's referring to the image for monitoring; correct?

5 A. So in paragraph 42, it says, "The face
6 detection section extracts the characteristic point from
7 information during focusing and the image for monitoring
8 described above" -- so that's information -- "based on
9 the image data" -- meaning the image for monitoring --
10 "output from the image processing section 5 to detect
11 the face."

12 So just to back up a little bit, in terms of
13 what is meant by an image, you asked me that a while
14 ago. Okay? Beginning of our proceeding. If you look
15 at, you know, books and documents, textbooks and so on
16 with regards to images and videos, you'll discover that
17 an image -- a video is an image. It's a moving image.
18 Okay?

19 And an image, like a video frame is also
20 video. Okay? So in trying to distinguish what is
21 displayed on the monitor and what is the captures of the
22 photograph, these are deriving from the same image
23 signal, which is function of space and of time. So my
24 point is that if we're doing face detection on this
25 monitored image, which is a video in any camera of use,

1 so you see as you're centering and so on, and the face
2 is detected on it, and then in a fraction of a second
3 later or a second later when you capture the photograph,
4 it's capturing the same face in the same image signal.

5 Q. Where does Nonaka talk about a video?

6 A. Well, they monitored -- he may not use the
7 term "video" that I recollect, but you know, in any
8 camera, a monitor that shows what you're going to take
9 is useless unless it's video. It would not be
10 incorporated or designed.

11 Q. In paragraph 56, Nonaka specifically says,
12 "When flash emission is used, the image for monitoring
13 becomes intermittent images." What sense does that make
14 if it's always a video?

15 A. He doesn't carefully explain this. He doesn't
16 suggest in any way that there is -- the monitor stops
17 capturing, even though it says becomes intermittent
18 images. But when you have a scene and then a flash,
19 that, you know, suddenly illuminates it, there's this
20 dramatic change in the scene, and then it reverts to
21 what it was before, I think that's what he means by
22 "intermittent images."

23 In other words, even though you have this
24 continuous stream of images, which is a video -- that's
25 the definition really of video if it's of the same

1 scene -- you know, the images -- I notice he says
 2 images -- become brightened during the period of the
 3 flash for an intermittent period. I think that's what
 4 he's saying. That's what makes the most clarity to me.
 5 Okay?

6 That's why he goes on to say, "Therefore,
 7 continuously emittable illumination," we don't have this
 8 sudden flash that then disappears and exists only for a
 9 few frames of the monitored image or a video. That's
 10 what this means.

11 Q. In the abstract, he says, "A correction amount
 12 of an image signal for use as a photographed image is
 13 smaller than a correction amount of an image signal for
 14 use as an image for monitoring."

15 If that's not two different image signals,
 16 what sense does that sentence make?

17 A. Well, again, they come from the same sensor.
 18 They pass -- the photons pass through the same lens.
 19 It's the same scene. The same electrical signal is
 20 generated. It goes through some processing normally to
 21 be displayed as a monitor signal. It's a compression,
 22 that sort of thing.

23 When you capture it, you're not capturing
 24 what's displayed on the monitor. You're capturing what
 25 does come off that, you know, sensor. It's -- it's

1 substantially the same -- I mean, it's the same scene.
2 It's substantially the same picture, even though the
3 monitor picture has been processed, and it's slightly
4 displaced in time. They come from the same image
5 signal.

6 It's true the monitor signal is a processed
7 version of that image signal, but it's the same image
8 signal.

9 Q. Is it not an image signal that's static as of
10 the moment in time that image for monitoring was
11 captured?

12 A. Is it not what?

13 Q. The image for monitoring?

14 A. Okay, I didn't quite understand your question.
15 Is not the image for monitoring what?

16 Q. Is it your opinion that the image for
17 monitoring is continuously changing as in a video
18 signal?

19 A. I mean, regardless of whether there's a flash
20 or not, it's a continuous stream of images being
21 captured from the lens of the sensor. I can't tell you
22 exactly what is happening in front of the camera.

23 Q. I'm talking specifically about the image for
24 monitoring. Is it being continuously updated from the
25 sensor, or is it statically processed and then stayed

1 the same until there is a largely different disagreement
2 between it and the photographed image?

3 A. Maybe you could, since I'm not really
4 understanding, maybe point to what you're referring to
5 in the spec and whether it's part of that embodiment or
6 a different embodiment.

7 Q. Paragraph 78, "A reason why the conditions of
8 the image emphasis processing are changed during the
9 photographing and the monitor display is that a
10 characteristic of the actually photographed image is
11 largely different from the image for monitoring."

12 The image for monitoring were being
13 continuously updated as in a video signal?

14 A. Hold on, I'm catching up. I'm not listening
15 very well. I want to see -- I didn't get there yet. So
16 paragraph 78. And what -- where is it?

17 Q. First sentence.

18 A. Okay. (Reviewing document.) I read that. I
19 see no contradiction. It's the same image signal. Some
20 of it is taken and displayed for monitoring. That same
21 image signal, which is a function of space and time, is
22 processed according to the invention to, for example,
23 improve the visibility of the face.

24 Q. How could the photographed image ever largely
25 differ from the image for monitoring if the image for

1 monitoring is being continuously updated as in a video
2 signal?

3 A. Well, it explains that. "The photographed
4 image is largely different from the image for
5 monitoring" -- because it's been processed -- "in which
6 the contrast of the only face part as mainly emphasized
7 or the face part is brightened to simply improve the
8 visibility of the face."

9 So I guess that's the same image signal, but
10 it's been processed to do this enhancement of the face.

11 Q. It's that processing that makes them
12 different, and because the processing is different,
13 that's a reason to change the conditions of the image
14 processing?

15 MR. GRAUBART: Object to form.

16 THE WITNESS: Your question again is?

17 MR. ROBINSON: Q. You suggested that the
18 difference between the image for monitoring and the
19 photographed image may be due to the image processing.

20 If that were the case, then it would seem this
21 paragraph is saying that the difference due to
22 processing is the reason to change the processing.

23 Is that what you're telling me that means?

24 A. Well, no. There's a bigger picture in the
25 surrounding paragraphs. There's processing that occurs

1 for the monitor. You know, just to read from, for
2 example, paragraph 77. "In a remarkably dark scene,
3 shown Figure 10a, the optimization processing section 5b
4 increases the correction amount of luminance/contrast or
5 the like so that the face of the subject can clearly be
6 recognized in the monitor display." Okay?

7 So this is a processing of the displayed --
8 the image signal as is being displayed. Okay. One
9 image signal is processed for display in the monitor in
10 darkened conditions. And that same image signal,
11 looking at the same previous paragraph, the optimization
12 says the correction amount to be smaller than that
13 during the monitor display.

14 And the rationale for that are given, you
15 know, in the next paragraph beyond the part that you
16 directed my attention to, paragraph 78. For example,
17 "That is during the monitor display," paragraph 78, "the
18 sunlight may be reflected depending on a direction in
19 which the camera is held, and the visibility thus
20 deteriorates."

21 So naturally, if you want to take a good
22 picture, you want to be able to have the monitor be
23 visible.

24 So, "To improve this visibility, intense
25 correction is necessary." This -- I'm adding this, this

1 is the monitor. The image signal that's being directed
2 to the monitor. "However, during the photographing,
3 such improvement is not necessary. The background needs
4 to be rather balanced, and natural gradation shading the
5 face needs to be represented."

6 The point is -- as it goes on -- it's a
7 different amount of correction for the image to be
8 photographed. It's the same image signal. So their
9 appearances will be different on the monitor and the
10 photograph. It's the same image signal.

11 Q. Would your opinion change at all if I tell you
12 this patent is categorized international patent
13 classification system still picture camera?

14 A. Most -- doesn't change at all. Still picture
15 cameras have, you know, in that time period, still
16 picture cameras would have a continuous video display to
17 help you and assist you in taking the picture.

18 Q. If my camera captured an image right now, and
19 five seconds from now I captured another image, both are
20 still images, they're captured from the same sensor five
21 seconds apart, do you consider those to be the same
22 image signal?

23 A. They came from the same image signal. They're
24 part of the same image signal. Just because I chose to
25 capture that image signal at two different points in

1 time does not change that.

2 Q. But they're two images once they're captured;
3 correct?

4 A. They are two still images that derive from the
5 same space-time continuous image signal.

6 Q. If you reduce the number of pixels in one of
7 those images, would it be fair to say it reduces the
8 quality of the image in which the number of pixels is
9 reduced?

10 A. Are we going to make comparisons? Are you
11 just talking about what if I have an image and I reduce
12 the pixels? Is your question directed toward comparison
13 between those two images? I'm really lost in this
14 question. Could you clarify?

15 Q. The number of pixels is reduced in the first
16 of those two images. Does it reduce the quality of that
17 image?

18 A. It could. People have a common
19 misunderstanding that resolution and quality are the
20 same thing. They're not. I can have a 50-megapixel
21 camera and take a horrible quality picture with it. And
22 I can have a 5-megapixel camera and take a very high
23 quality picture. It may or may not.

24 Q. Nonaka's paragraph 42, just to close the loop,
25 is it discussing processing of the image to be monitored

1 or the photographed image?

2 A. (Reviewing document.) I'm reading the
3 paragraph now. My apologies. Well, this signal in
4 paragraph 42 is being discussed. It refers to the image
5 for monitoring. Okay? "The image data," parentheses,
6 "the image for monitoring, output from the image
7 processing section 5." Okay?

8 The image for monitoring comes from the same
9 image signal as the image that will be photographed, so
10 they come from the same image signal. It is describing,
11 you know, that that image signal is sent for monitoring
12 as well as for photographing. It's describing
13 processing on the version of it that was sent for
14 monitoring.

15 Q. Paragraph 58, when it says that the
16 optimization processing section 5b does not perform the
17 optimization processing in a backlight landscape without
18 any person, is it talking about the image for monitoring
19 or the photographed image?

20 A. Again, there are different -- they're the same
21 image signal sent to different places.

22 Q. At which place is this happening?

23 A. If you carry on paragraph 42 describing and
24 detecting the face on the image for monitoring, which is
25 the same image signal that is just sent for monitoring,

1 that image signal sent for monitoring undergoes
2 different kinds of processes to make it suitable for
3 monitoring. Face detection can be conducted on that
4 monitoring signal, which is the same image signal.

5 So if you're detecting a face in the image for
6 monitoring, or not, then you're also detecting a face,
7 or not, in the image to be photographed. It's the same
8 image signal sent on two different paths.

9 Q. Object as nonresponsive.

10 At which path is paragraph 58's processing
11 happening?

12 A. So that section of the specification is not
13 specific, but you know, it could be on the path for the,
14 you know, the path for monitoring. Or it could be
15 before it's sent off on the path for monitoring. It
16 doesn't really say there. Doesn't really matter. I
17 didn't render an opinion on it in here.

18 Q. Let's take it step-by-step.

19 We've established paragraph 42 and 58 are both
20 talking about the first embodiment of Nonaka; correct?

21 A. This, I agree with.

22 Q. Paragraph 42 says if a face is not found in
23 the dark area, then the optimization processing section
24 5b performs the optimization processing section on the
25 dark area; correct?

1 A. It says that, yeah.

2 Q. And paragraph 58 says if a face is not found
3 in the dark area, that optimization processing is not
4 performed on the dark area; correct?

5 A. I don't see anything about optimizing or not
6 optimizing in the dark area. I don't see the dark area
7 is being equated in any way between those two
8 paragraphs.

9 Q. Paragraph 58 says, "In a scene of only
10 backlight landscape without any person, the optimization
11 processing section 5b does not perform the optimization
12 processing." Correct?

13 A. Of course. That's what it says, yeah.

14 Q. In fact, at your paragraph 56 in Exhibit 1003,
15 you say that citing paragraph 58 of Nonaka.

16 A. I'm sorry, what?

17 Q. Paragraph 56 of Exhibit 1003, you say, "If no
18 face is detected in the image, the optimization
19 processing section 5b does not perform any corrections."

20 A. Paragraph 56?

21 Q. Yes.

22 A. Yeah, I'm just quoting basically.

23 Q. To be clear, it's not quoting; correct?

24 A. It's not quoting, but I'm citing to it
25 immediately.

1 Q. That's what your opinion of what paragraph 58
2 says?

3 A. Paraphrasing.

4 Q. So in Nonaka, paragraph 48 and -- sorry --
5 paragraph 42 and paragraph 58 can't both be true if
6 they're on the same path; can they?

7 A. Paragraph 58 is talking about a situation
8 where there isn't any person, meaning no face, because
9 there isn't a person. Paragraph 42 is talking about
10 there is a face potentially, but it's dark, so it can't
11 detect the face. It's a different scenario than
12 whether, you know, the other one there's just no person;
13 here, it's saying it's dark. Okay?

14 And certainly, you know, it goes on to say
15 that, "The optimization processing section and the
16 exposure control section perform processing control so
17 as to brighten the dark part as described later in
18 detail."

19 So it's perfectly acceptable to have a
20 variation where you detect that something is so dark
21 that you can't decide whether there's a face, then you
22 brighten it, then you try face detection again. I don't
23 see any contradiction at all.

24 Q. Do you agree both paragraphs 42 and 58 are
25 addressing the possibility in which the face detection

1 unit can't initially determine whether there is a face
2 in the dark part of the image?

3 A. They can't determine, but for different
4 reasons. The conditions of the image are different. So
5 just because they can't detect the face doesn't mean
6 that the camera can't, you know, determine that, "Well,
7 it's really dark there. Maybe that's why I didn't
8 detect a face."

9 So it doesn't mean the processing has to be
10 the same or that those two scenarios are the same, and
11 that's why there's different paragraphs.

12 Q. So given the scenario 42, when the dark
13 section is so dark it can't detect a face, if you apply
14 paragraph 58 to that same scenario, wouldn't 42 and 58
15 reach different conclusions: one of which would
16 brighten the dark area and one of which would not
17 brighten the dark area?

18 A. (Reviewing document.) I don't think that
19 paragraph 58 and 42 are generally -- you know, you can't
20 really coningle them, because paragraph 58 doesn't talk
21 in any way about there being a dark part. Okay? It's
22 not even a same scenario.

23 I mean, not such a dark part you couldn't find
24 the face. Let's be careful. It does say "produced that
25 the dark part is emphasized." Okay?

1 So I don't think that those two paragraphs are
2 meant to be commingled or combined or one superimposed
3 on the other one artificially in any such way. I think
4 they're describing different scenarios where the
5 processing happens differently for good reasons.

6 Q. Might those different scenarios be that
7 paragraph 42 is applied to the image for monitoring
8 whereas paragraph 58 is applied to the photographed
9 image?

10 A. I don't think it has to be. Might be. But
11 remember, they're the same image signal.

12 Q. In fact, at paragraph 52 does Nonaka pivot to
13 describing the second processing that is used during
14 flash photographing?

15 A. Well, paragraph 52 starts out by talking about
16 the situation where flash occurs, of course.

17 Q. And that's the photographed image; correct?

18 A. Yes, but it doesn't change my opinion. I
19 mean, they're the same image signal, and sure, it talks
20 a lot about processing. But...

21 Q. We've established there are two paths for
22 processing; correct?

23 A. Okay. Keep in mind that, you know, the
24 inventor is teaching here. Okay? He's talking about,
25 you know, a monitor image. He's talking about an image

1 that is photographed, is derived from the same image
2 signal. He doesn't talk about two paths.

3 It could be that some processing occurs before
4 there's any, you know -- before the signal is sent to
5 either, along either of paths. It has just been
6 acquired. And I don't think that the inventor teaches
7 away from that.

8 I mean, if you look in paragraph 56, in
9 talking about part of this processing, second
10 processing, "It is to be noted that this processing may
11 be applied to not only the photographing, but also the
12 display of the image for monitoring." So he's
13 commingling these. It's not like there's some sharp
14 separation. So I can't agree.

15 Q. Doesn't that sentence "it is to be noted" in
16 paragraph 56 suggest that would be a variation on what's
17 described before it?

18 A. This is a specification. It's full of
19 variations, like specifications often are. That's why
20 they're multiple embodiments. You're teaching
21 principles here. It's talking about various
22 possibilities. You could have -- it could be that
23 paragraph 58 is just on the photographed part, or it
24 could be before either photographing are sent off to
25 monitoring or, you know, so...

1 Pointedly, the inventor doesn't say.

2 Q. I'll object to that answer as nonresponsive.

3 In paragraph 58, the sentence starting, "It is
4 to be noted," doesn't the phrasing of that suggest that
5 it is a variation of what is described above it?

6 A. In paragraph 58 where?

7 Q. The sentence starting, "It is to be noted."
8 Sorry, paragraph 56.

9 A. That's why I just can't find it. Okay.

10 So your question is what? I mean, I think
11 what he's saying is this process, he's simply saying
12 this processing may be applied to either the part of the
13 image signal that is captured as a photograph or the
14 part of the -- or the same image signal that is
15 displayed for monitoring.

16 Q. To be clear, paragraph 56 is referring to the
17 process, the second processing as described above.

18 A. Doesn't change my opinion. Says right here,
19 "May be applied to photographing and also the displayed
20 image for monitoring." That's my opinion. That's what
21 it says.

22 Q. This processing refers to the second
23 processing as described above.

24 A. Well, all it says is, "As described above, in
25 the second processing, the visibilities of both of the

1 outdoor landscape and the person in the room are
2 improved." That's all it says about the second
3 processing.

4 Q. That only happens when optimization processing
5 section 5b performs its optimization process; correct?

6 A. It says a number of things, firstly, in
7 paragraph 52, the main thing about second processing is,
8 you know, during flash -- the flash photography is
9 happening. Then the second sentence is, "The second
10 process is processing mainly for the image data during
11 the photographing."

12 My mind immediately says, well, that's for the
13 image data that from the image signal will be captured
14 from the photograph, but also for the monitor. Maybe
15 more of the processing is done in the creation of the
16 photograph. Doesn't say how much. Maybe 51/49 percent.
17 I don't know. Doesn't say. But it certainly does not
18 exclude in any way processing of the image signal as
19 it's sent for monitoring.

20 Q. The sentence that you specifically pointed to
21 a moment ago, "The visibilities of both of the outdoor
22 landscape and the person in the room improve."

23 A. Where is that again?

24 Q. Paragraph 56, it's the optimization performed
25 by the optimization processing section 5b that gives

1 rise to that result; correct?

2 A. (Reviewing document.) You know, I don't think
3 he says at any point in 52, 53, all the way up to 58,
4 anything about the optimization processing section 5b
5 being, you know, limited to processing image for -- that
6 comes from the image signal that is then used for
7 photographing versus for monitoring.

8 It says the second processing is mainly for
9 the image data during photographing. I can't come to
10 your conclusion.

11 Q. Object to that answer as nonresponsive.
12 Please listen carefully, Dr. Bovik.

13 The optimization processing section 5b is the
14 only thing described in Nonaka for achieving that result
15 in paragraph 56; correct? Specifically, the first
16 sentence of paragraph 56.

17 A. Well, my answer doesn't change.

18 The optimization processing section 5b is used
19 in the first processing and the second processing. It
20 has access to the image signal. The image signal is
21 sent for monitoring. That same image signal is sent for
22 photographing. Okay.

23 I don't see how it's being limited in the way
24 you're asking for paragraph 56. If you look at
25 paragraph 51, optimization is being used in first

1 processing.

2 Q. Object as nonresponsive.

3 The optimization processing section 5b is the
4 only thing that is described in Nonaka for achieving the
5 improvement of the visibilities both of the outdoor
6 landscape and the person in the room as recited in the
7 first sentence of paragraph 56; correct?

8 A. Sure. In paragraph 53, you know, 5b is
9 implicated in correction of landscape as well as outdoor
10 parts.

11 Q. Referring back to paragraph 42 and paragraph
12 58 --

13 A. So, Counselor, I mean --

14 Q. I haven't asked a question yet, Dr. Bovik.

15 A. Okay. Sure. Go ahead.

16 Q. Paragraphs 42 and 58, paragraph 42 says, "If a
17 face can't be detected in the dark part, the dark part
18 is lightened."

19 Paragraph 58 says, "If a face can't be
20 detected in the dark part, the dark part is not
21 lightened."

22 Both of those two things can't be true in the
23 same image; can they?

24 MR. GRAUBART: Object to form.

25 THE WITNESS: Who says it's the same image?

1 Was it paragraph 58 and 42 again?

2 MR. ROBINSON: Q. Yes.

3 A. Okay. I don't think this spec is teaching
4 that this is in the same exact situation or the same
5 image. Might not be in the same day, the same town.

6 Q. Can those two things be true on the same
7 image?

8 A. You're asking me to speculate. I haven't
9 talked about anything about this in my report. And
10 you've gone so far afield from my report at this point,
11 I really have to point that out. I need to --

12 Q. Your report cites paragraphs 42 and 58; does
13 it not?

14 A. It does.

15 Q. Surely you don't mean to suggest your
16 understanding of these two paragraphs and their
17 interrelationship is irrelevant to these proceedings?

18 A. I think I'm explaining, you know, how the
19 correction unit operates in the reference. We're
20 talking about scenarios of, you know -- anyway, I just
21 thought I would point that out.

22 So the answer to your question is, you know, I
23 don't think that the inventor here is trying to create a
24 situation where there isn't a person and there is a
25 person. I think that's illogical.

1 Q. Please listen carefully to my question.

2 If paragraph 42 is processing and paragraph 58
3 is processing were both applied to the same image with a
4 person in the dark part, but in which the dark part was
5 too dark for the person to be detected without
6 lightening the dark part, could both paragraph 42 and
7 paragraph 58 be applied to that same image?

8 A. Again, those are different scenarios.
9 Paragraph 42 has a person with a face. Paragraph 58, as
10 it says, a scene of only backlight landscape without any
11 person, hence no face.

12 Now, furthermore, paragraph 58 -- has a dark
13 part, but it doesn't say so dark it might be hiding a
14 face. Whereas, paragraph 42 is talking about
15 specifically -- it even says the image is blackened.
16 It's really emphasizing how dark it is. You know, you
17 just -- the face that is present can't be detected.

18 I don't think you can compare or combine these
19 two scenarios or try to map one or the other or vice
20 versa or anything else like that.

21 Q. Is it your opinion that Nonaka automatically
22 detects the presence of a face in an image?

23 A. You know, there's billions of digital cameras
24 that have face detection apparatus in them. You have a
25 little square. The screen is detecting a face on the

1 monitored image, which is then captured. You know, and
2 they attempt to detect. All this is about trying to
3 detect a face. And if you do detect the face, then
4 perform a correction.

5 Q. So Nonaka might not detect faces, despite its
6 best intentions?

7 A. That's true of every face detection algorithm
8 ever devised.

9 MR. GRAUBART: Do you mind if we take a quick
10 break after this question?

11 MR. ROBINSON: Sure.

12 Q. If Nonaka works as intended, it automatically
13 detects the presence of a face. Is it true then it also
14 automatically detects the absence of a face?

15 A. You know, I, keep in mind that in Nonaka,
16 you've got a face detection. It's basically describing
17 a function. Okay? You know, if you look at -- if you
18 look at Figure 8, there's face detection circuitry --
19 not circuitry, a face detection block. Okay?

20 But there isn't a structure revealed here.
21 There isn't an algorithm. I don't know how it's
22 detecting a face, just like I don't know how it's being
23 detected in the '132 objects. You look at the '132,
24 '118, it's just a block. It's just a function. No
25 structure. No structure here in Nonaka.

1 So I don't -- it doesn't say how the face is
2 necessarily detected. But it doesn't say anything about
3 specifically seeking non-detection. In fact, in
4 paragraph 42, when the face detection algorithm, however
5 it doesn't work, doesn't detect a face, it makes clear
6 that, well, golly, if there's a part of the image that's
7 so dark that it could be that a face was there but
8 obscured, it does additional processing to brighten it
9 up and potentially detect a face, if indeed it's in the
10 dark part.

11 Q. Are you saying that happens in paragraph 48's
12 processing as well?

13 A. Do you mean 58?

14 Q. 58, yes.

15 A. I would say that those algorithm steps are
16 unfavorable. But I mean, every algorithm is full of
17 subroutines. You don't enter a subroutine unless
18 there's an "if" condition, say. The "if" here could be,
19 well, is there a part that's blackened or so dark there
20 could be a face there? You know.

21 Well, paragraph 58 doesn't deal with that
22 situation. Instead, it's dealing with a situation where
23 there isn't a person. It doesn't make a point of a
24 blackened part of the image.

25 MR. GRAUBART: Could we go ahead and break for

1 a second?

2 MR. ROBINSON: I have one follow-up, and I'll
3 shut up and take a break.

4 Q. How in the world would paragraph 58 determine
5 that there's not a face if it doesn't run the face
6 detection algorithm?

7 A. It doesn't say it doesn't run the face
8 detection algorithm. It may not run the part of the
9 face detection algorithm that includes deciding there's
10 a blackened region, but it may run the face detection
11 algorithm.

12 You know, I mean, somehow it's determined that
13 not to do optimization processing. Algorithm isn't
14 prescient. You would have to run face detection. It's
15 implied even if it doesn't say it.

16 MR. ROBINSON: How much time do you want?

17 MR. GRAUBART: Just a few minutes.

18 MR. ROBINSON: All right.

19 (Recess taken: 3:33 p.m. - 3:42 p.m.)

20 MR. ROBINSON: Q. If the processing of
21 Nonaka's paragraph 58 were applied to the blackened
22 image of Nonaka's paragraph 42, can we agree that Nonaka
23 would never detect a face?

24 A. Well, this is only an embodiment. But I think
25 the way I would read it is the method of 58 would never

1 be applied to the image in 42. If the image in 42 were
2 received, then the methods of image 42 would instead be
3 applied, so...

4 It would be another embodiment --

5 Q. Where does Nonaka describe that?

6 A. Describe what, Counselor?

7 Q. What you just described in your answer.

8 A. Well, in 42, it says, "If this happens, then
9 this is what is done," without reading it all and taking
10 up time. Then 58, it says, "Well, if this is what
11 happens, this is what is done." It doesn't say in 42,
12 "Well, if this is what happens, then let's jump to the
13 method in 58 and do what it says there."

14 Q. Doesn't 42 suggest that it can't know that
15 there's nobody in the background until it runs the
16 processing of 42?

17 A. Can you refer to background in 42? I mean,
18 point to me where the word "background" appears, because
19 I couldn't find it.

20 Q. Doesn't 42 suggest that Nonaka's system can't
21 determine whether there is a face in the darkened
22 portion of the image unless it performs a processing of
23 paragraph 42?

24 A. Well, yes, but -- but it doesn't mean that
25 it's darkened in the same way, you know, a dark part in

1 paragraph 58. In fact, it's teaching away from that.
2 Again, they're not comparable.

3 Q. How is it teaching away from that? Does
4 paragraph 58 say that the landscape in 58 is lighter
5 than that in 42?

6 A. No. It says in a case where the main -- in
7 42, it says, "In addition, in a case where the main
8 subject is positioned in a dark part of the screen of
9 the backlight scene or the like, the image is blackened
10 and a fine difference between the brightness and the
11 darkness cannot be seen. In this state, the face
12 detecting section cannot detect the face."

13 There's no scenario like that described in 58.

14 Q. But 58 can't possibly conclude that that
15 scenario is not present unless it goes through the
16 process of 42; correct?

17 A. I disagree.

18 Q. How so?

19 A. It may determine, "Oh, it's dark over here,
20 but not so dark that I couldn't detect a face," as I
21 already explained.

22 Q. What if 58 receives an image that is so dark
23 it can't detect a face?

24 MR. GRAUBART: Object to form.

25 THE WITNESS: You're acting as though 58 and

1 42 are different embodiments. So 58 receiving that, I
2 don't know. That doesn't have any meaning. Instead, 42
3 receives that in the sense you're doing it. It's
4 actually all just one algorithm.

5 Instead, the image is received, and the
6 processing in 42 is described. It's not like 42
7 receives something and 58 receives something. It's one
8 embodiment. It does different things in different
9 situations.

10 Q. We've already established that paragraph 42 is
11 acting on the image for monitoring; correct?

12 MR. GRAUBART: Object to form.

13 THE WITNESS: So keep in mind that the image
14 from the monitor and the image that's photographed, it's
15 all the same image signal. Okay?

16 Sure, we directed that on two paths, same
17 image signal. When one is dark, the other is dark.
18 It's the same image signal. It's just that the image
19 signal is dark then, is what I mean to say.

20 Q. Isn't the more likely explanation that
21 paragraph 42 is acting on the path for the image for
22 monitoring which tells it whether there's a face, and
23 paragraph 58 is acting on the photographed image after
24 it also knows whether there's a face?

25 MR. GRAUBART: Object to form.

1 THE WITNESS: I don't see anything to lead me
2 to believe that. I don't see your logic leading in that
3 direction either.

4 MR. ROBINSON: Q. I'm sorry. You do see
5 logic in that direction, or you don't?

6 A. I do not.

7 Q. Okay. Hypothetically, if the blackened image
8 of paragraph 42 were run through the steps of paragraph
9 58, Nonaka wouldn't be able to detect the face; would
10 it?

11 A. I mean, we started out with "hypothetically,"
12 which means I'm stepping outside the embodiment. In any
13 such hypothetical thing, it's a different embodiment. I
14 don't know what's going to happen. Okay. I don't know,
15 for example, what the threshold for darkness is. Okay?

16 What we're going to -- if it's really dark,
17 are you going to sidestep 42? Then you've got a
18 different algorithm. I don't know what's going to
19 happen. It's just a hypothetical. I don't know how to
20 answer that.

21 Q. 42 says you do apply section 5b. 58 says you
22 don't apply section 5b.

23 Can those both be true at the same time?

24 A. Well, it's not as simple as what you said,
25 okay. I mean, optimization processing is not done

1 because there's no face, okay.

2 Q. Is there a button on top of the camera you
3 push when there's no face, or does it automatically
4 determine whether there's a face?

5 A. Well, we've already established that this
6 invention includes face detection. That's why
7 optimization processing 5b does not perform optimization
8 because without a person there, no face detected.

9 Q. Have you had an opportunity to review the
10 institution decision issued by the Board in the 1251
11 proceeding?

12 A. I did read those.

13 Q. Did you disagree with any of the conclusions
14 reached by the Board?

15 A. My understanding is that the decision of the
16 Board is that, you know, these IPRs be instituted.
17 That's the main decision. They don't render anything
18 with finality. So if you want to point me to something,
19 I'll tell you whether I agree or disagree with it.

20 Q. As you sit here today, did you -- are there
21 any instances of the Board's reasoning with which you
22 disagree?

23 A. I haven't looked at the petitions in awhile,
24 so I don't remember all the details. But I will say
25 that, I mean, I think that the petition should have been

1 instituted. That's all.

2 If you want to direct me to something
3 specific, I'm happy --

4 (Exhibit No. 1009 was marked for
5 identification.)

6 MR. ROBINSON: Q. I'm going to hand you
7 what's been marked as Exhibit 1009. That's the Konoplev
8 reference. Column 2, lines 4 through 7, "Imperfections
9 are automatically corrected by selecting a most suitable
10 skin color using a histogram of distributions" --

11 A. I'm sorry. Where are you at in Konoplev?

12 Q. Column 2, lines 4 through 7. "Imperfections
13 are automatically corrected by selecting" --

14 A. Hold it. I got to get there.

15 Q. Let me know when you're ready.

16 A. Okay. I've reached column 2, lines 4 through
17 7.

18 Q. You see where it says, "Imperfections are
19 automatically corrected by selecting a most suitable
20 skin color using a histogram of distributions of color
21 values on a face"?

22 A. M-hm. I do.

23 Q. And then at Konoplev column 6, lines 1 through
24 4.

25 A. Konoplev column?

1 Q. 6.

2 A. 6, lines 1 through 4.

3 Q. Do you see where it says, "Facial spots, such
4 as pimples, are processed by analyzing a second
5 derivative of the edge pixel value. The level of pixel
6 coloring over is set based on the second derivative of
7 the edge pixel value"?

8 A. Yes.

9 Q. Is coloring over the same as smoothing?

10 A. He doesn't use that language. Could be
11 smoothing, you know, but doesn't have to be, depending
12 on the approach applied. The idea here is to hide the
13 pimple.

14 Q. Would a POSITA consider coloring over to be
15 smoothing?

16 A. I don't think a POSITA would say they are
17 necessarily equivalent. A POSITA would consider that
18 you could use smoothing as part of coloring over.

19 Q. But coloring over could also be done without
20 smoothing?

21 A. You see, Counselor, the term "smoothing," it
22 doesn't have any fixed specific definition. So, I mean,
23 I think what it's teaching is removing these blemishes,
24 and that could involve a smoothing filter.

25 Like in paragraph 54 of my P2 report, "If the

1 face detection module detects a face, the facial skin is
2 enhanced by applying a smoothing filter to the detected
3 facial areas of the image to reduce wrinkle, spots, and
4 blemishes."

5 I mean, you can use a smoothing filter. I
6 don't think there is any definition or limitation here.

7 Q. Would a POSITA have understood the meaning of
8 a Gaussian fuzzy computation in the context of a
9 blurring method?

10 A. Probably not. A Gaussian fuzzy computation
11 also could be Gaussian filtering. It's a type of
12 smoothing filter. I think the language is odd and might
13 have been -- that, I believe, is in --

14 Q. Zhang.

15 A. Zhang.

16 MR. ROBINSON: In fact, I'll hand you a copy
17 of Exhibit 1008, which is the Zhang reference.

18 THE WITNESS: Sure.

19 (Exhibit No. 1008 was marked for
20 identification.)

21 MR. ROBINSON: Q. Does Gaussian filter
22 involve coloring over?

23 A. Gaussian filter could be used as part of
24 trying to color over a blemish. I don't think it
25 describes using only that.

1 Q. Does Gaussian -- sorry?

2 A. If you look in paragraph 43.

3 Q. Of?

4 A. Zhang, I'm sorry. I think we're we should
5 step back and realize Zhang is talking about something
6 other than blemishes and such.

7 You want to start your question over again,
8 and I'll try to adapt?

9 Q. Does a Gaussian filter use a histogram of
10 colors to color over?

11 A. Where, Counselor? You want to point to me
12 something in one of these? Could you use a Gaussian
13 filter as part of the coloring over as used in the '410
14 Konoplev? It could be part of that, sure.

15 Q. Does a Gaussian filter necessarily include
16 coloring over?

17 A. Gaussian filters are used for an amazing
18 diversity of things unrelated to any of this art.

19 Q. So a Gaussian filter does not necessarily
20 involve coloring over?

21 A. Gaussian filter is a very, you know --
22 generally speaking, a Gaussian filter is a very diverse
23 tool.

24 Q. Would a POSITA applying a Gaussian filter to a
25 digital image to blur a part of a digital image

1 understand that doing so would necessarily involve
2 coloring over?

3 A. Gaussian filters applied to digital images,
4 mathematically, they're a low-pass filter. They'll
5 reduce the high frequency content of the image. It can
6 have a smoothing effect. That might be intentional. It
7 might be a part of a larger process.

8 But, you know, ordinarily a person of ordinary
9 skill in the art wouldn't think of the term "coloring
10 over" because "coloring over" is a term that's
11 introduced primarily I think in this patent. It might
12 occur somewhere else out there. It certainly is a usual
13 term of the art.

14 So POSITA if you say "coloring over," they
15 aren't going to think of Gaussian filter. First,
16 they'll ask, "What do you mean by coloring over?"
17 That's what would really happen with a POSITA.

18 Now, if they read this and they read it, you
19 know, they get that you're hiding the pimple. There's
20 no specific association between pimples and Gaussian
21 filters.

22 Q. Would a POSITA applying a Gaussian filter to a
23 digital image to blur a part of that digital image
24 understand that doing so necessarily uses a histogram of
25 distributions of color values on a face to select a

1 suitable skin color?

2 A. You're reading from where? I would like a
3 context to better answer this question.

4 Q. We're talking about Zhang and Konoplev, and
5 they're respective teachings. How much more context do
6 you need? I referred you specifically to parts of the
7 Konoplev that discuss exactly what I just asked about.

8 A. Well, you pointed to me to where coloring over
9 is.

10 Q. Column 2, lines 4 through 7, of Konoplev
11 discuss one example of using histogram distributions of
12 color values on a face.

13 A. Yes, uh-huh. You can certainly use the
14 histograms as Konoplev revealed. You can certainly use
15 second derivatives. Sorry. I think I misplaced your
16 question.

17 Q. Would a POSITA applying a Gaussian filter to a
18 digital image to blur a part of that digital image
19 understand that doing so necessarily uses a histogram of
20 distributions of color values on a face to select a
21 suitable skin color?

22 A. So, I mean, you ordinarily wouldn't use a
23 Gaussian smoothing filter to select skin colors. Again,
24 I think you're combining things. Where is the Gaussian
25 filter? Where are you reading from that?

1 You're conflating a couple of things. I need
2 to understand that conflation. And is this something I
3 talked about in my report?

4 Q. Your declaration says to -- combined Konoplev
5 with Zhang.

6 A. Yes.

7 Q. That combination doesn't result in a
8 Gaussian -- in Zhang's Gaussian filter for blurring
9 using Konoplev's histogram of distributions for color
10 values on a face?

11 A. As I pointed out, paragraph 60, a person of
12 ordinary skill in the art would have understood the skin
13 smoothing applied in Konoplev and the background
14 blurring applied in Zhang are different amounts of the
15 same type of correction.

16 Q. What type of correction is that?

17 A. It's an operation to do smoothing. Konoplev
18 and Zhang could be combined to both blur the background
19 as well as, you know, smooth the skin.

20 Q. So "blurring" and "smoothing" are synonymous?

21 A. You can use some tools like a Gaussian filter.
22 A Gaussian filter can be used to smooth and to blur.

23 Q. What's the distinction between "smoothing" and
24 "blurring"?

25 A. Well, it depends upon the context. You could

1 use a Gaussian filter to smooth and blur here. There
2 are other operators that might smooth but not blur. A
3 good example is a median filter which smooths noise --
4 actually could smooth pimples pretty well, too, but does
5 it without blurring.

6 Q. Does your declaration meanings a mention
7 filter?

8 A. No, but you asked me.

9 Q. Are you suggesting now that the combined
10 Konoplev and Zhang would use a Gaussian filter to both
11 blur the background and smooth the skin?

12 A. I don't see why you couldn't use a Gaussian
13 filter. You could blur a background in Zhang with a
14 Gaussian filter, and you can smooth skin with a Gaussian
15 filter.

16 Q. Where does your declaration say that you use a
17 Gaussian filter to do both of those operations?

18 A. I think you asked me. So that's why I said.

19 Q. Does your declaration say you would use a
20 Gaussian filter to perform both of those operations?

21 A. I mean, I didn't write that. You asked me,
22 and I've stated it.

23 Q. So the answer is no, your declaration does not
24 say that?

25 A. Well, when I said I didn't write that, that's

1 what I meant to say.

2 Q. Okay. Does the coloring over of blemishes in
3 Konoplev reduce local contrast?

4 MR. GRAUBART: Object to form.

5 THE WITNESS: You know, I haven't really
6 contemplated that. Maybe it could. Certainly corrects
7 the image.

8 MR. ROBINSON: Q. Don't you identify blemish
9 by identifying the local contrast?

10 MR. GRAUBART: Object to form.

11 THE WITNESS: Well, I mean, what Konoplev
12 teaches is using a second derivative, which is not
13 synonymous with contrast.

14 MR. ROBINSON: Q. Are blemishes in a digital
15 image identified by finding corresponding local
16 contrast?

17 MR. GRAUBART: Object to form.

18 THE WITNESS: I mean, if you can show me this
19 kind of language in Konoplev, I'm happy to opine upon
20 it.

21 MR. ROBINSON: Q. How would a POSITA reading
22 Konoplev go about trying to identify a blemish on a
23 face?

24 A. (Reviewing document.) So, I mean, the
25 simplest answer and most direct is he describes a number

1 of different kinds of blemishes, and a different method
2 might be used for each kind of blemish: spots,
3 wrinkles, pimples, you know, so on.

4 Q. Would all those blemishes in a digital image
5 be marked by a local contrast?

6 A. Could you point to me where this kind of
7 language appears in Konoplev?

8 Q. Would a POSITA understand those types of
9 blemishes to be marked by local contrast?

10 MR. GRAUBART: Object to form.

11 THE WITNESS: Every part of every image is
12 marked by local contrast. I mean, if I take -- I don't
13 know what you mean by "marked."

14 MR. ROBINSON: Q. Delineated.

15 A. Every part of every image has a local
16 contrast. I don't know what you mean by "marked" or
17 anything. Maybe you can point to me what you're talking
18 about in Konoplev.

19 Q. I'm just asking whether a POSITA, with all of
20 his years of experience and education, would understand
21 to be the boundaries in the way of finding blemishes in
22 a digital image?

23 MR. GRAUBART: Object to form.

24 THE WITNESS: Could you use local contrast as
25 a way of finding blemishes? Generally speaking, I think

1 you could. But I don't think, you know, the '410 patent
2 is limited in any such way.

3 MR. ROBINSON: Q. Eliminating or hiding a
4 blemish would necessarily result in reducing that local
5 contrast; would it not?

6 MR. GRAUBART: Object to form.

7 THE WITNESS: It could. That wasn't my first
8 -- my last answered question was not meant to imply
9 that. I said you might use some characteristic, some
10 characteristic of local contrast. It might be local
11 contrast of a color component.

12 And in the processing the pixel coloring over,
13 it might in the end reduce the contrast. But the goal
14 is not contrast reduction. The goal is blemish
15 reduction and removal.

16 MR. ROBINSON: Q. Reducing the appearance of
17 the blemish in the image is the goal; correct?

18 A. I think reducing it as much as possible.

19 Q. That's --

20 A. Meaning removing it. Like you try to detect a
21 face, we call it face detection.

22 Q. And that's accomplished by reducing the local
23 contrast that's indicative of such a blemish; correct?

24 A. I don't see that expressed anywhere in
25 Konoplev.

1 Q. Would a POSITA understand that to be a true
2 statement or not?

3 A. I don't think a POSITA would come to that
4 conclusion. For example, the blemish might just be --
5 might just be redness, okay. By removing the redness,
6 you may do that without modifying the contrast at all.
7 So it doesn't follow.

8 Q. How about at the boundary of the redness?

9 A. The contrast, you know, the brightness may be
10 the same. Call that equal luminescent. So across the
11 red part, doesn't mean it's darker or lighter. It might
12 be the same brightness.

13 Q. There might be no perceivable contrast between
14 a red part and an un-reddened part of a person's face?

15 A. Again, you know, I don't have a definition,
16 your definition of "contrast." I gave you earlier ones.
17 If they were applied to an equal luminescent red spot,
18 that is correct. The contrast wouldn't change across
19 the boundary.

20 Q. Between the red spot and the non-red boundary?

21 A. If applied to, if you apply it to -- you
22 compute the contrast on the luminance of that image in
23 that region and that's equal luminescent, then that is
24 correct, you would not have a change in contrast, by
25 definition.

1 Q. Is luminescence the definition of contrast
2 you've been using for our discussion today?

3 A. Contrast is using defined in terms of
4 luminance.

5 Q. That was a very specific hypothetical you just
6 offered, Dr. Bovik. Is that a realistic one?

7 A. I didn't offer the hypothetical. You did.

8 Q. Equal luminescent red spot versus equal
9 luminescent non-red spot just outside the boundary of
10 the red spot, does that happen a lot?

11 A. It doesn't happen a lot anywhere, whether
12 blemishes or otherwise.

13 Q. So there would be some local contrast there in
14 most circumstances, if not all?

15 A. And there would be local contrast everywhere
16 else in the image as well.

17 Q. And by removing that red spot or covering over
18 that red spot, you would reduce the local contrast
19 between the red spot and the bordering non-red portion?

20 A. The point is the goal is not necessarily
21 reduction of contrast. It could be there's reduction of
22 contrast as a byproduct of the blemish removal
23 operation. It's not the stated goal.

24 And Konoplev has not stated that the goal as
25 being removing or reducing contrast. It's changing.

1 I'll say it's changing.

2 Q. Object as nonresponsive to the entire answer.

3 Whether it's a stated goal or not, coloring
4 over the red spot to match the non-red boundary wouldn't
5 necessarily reduce the local contrast at that boundary;
6 correct?

7 A. It very likely could change the contrast, but
8 almost any spatial image-processing operation I apply,
9 whether it's low-pass, high-pass, detail, preserving,
10 they can all modify contrast.

11 Q. Zhang's blurring of its background is another
12 example of modifying contrast; correct?

13 A. You want to point to me where he states that?

14 Q. The entire --

15 A. First of all, you're premise I disagree with.
16 You said it's another example of modifying contrast.
17 You said modifying? Go ahead. I'm sorry.

18 Q. So you don't disagree with modifying contrast?

19 A. I think in most spatial image-processing
20 operations in some way modify contrast. There's nothing
21 special about blemish-reducing in that regard.

22 Q. Zhang's entire application is about blurring
23 its background; correct? That's the point. Can we
24 agree on that?

25 A. No.

1 Q. Okay. One of the things Zhang describes in
2 all of its embodiments is blurring its background;
3 correct?

4 A. Zhang does describe blurring background.

5 Q. Would that reduce the contrast of Zhang's
6 background?

7 A. I would say it could definitely reduce
8 contrast. It could also reduce brightness in places.
9 It's not just reducing contrast. It could be byproduct.
10 In other places, it may not reduce contrast.

11 I already said earlier smooth regions, it may
12 not reduce contrast, either mathematically maybe or at
13 least noticeably.

14 Q. Would Zhang's blurring of its background ever
15 increase the contrast of its background?

16 A. So the measurement of contrast is a nonlinear
17 operation. So the blurring we've been talking about,
18 Gaussian blurring and so on, it's a linear operation.
19 The outcomes of a linear operation you can't really
20 predict using, you know -- there are effects on a
21 nonlinear operation, like contrast. So I can't really
22 say, mathematically speaking.

23 Q. Keeping in mind what you've previously
24 testified to about a POSITA's understanding of blurring,
25 would Zhang's blurring of its background be expected by

1 a POSITA to increase the contrast within that
2 background?

3 A. Probably generally not.

4 Q. Okay.

5 A. Again, I don't think that's the goal of what
6 Zhang is presenting. He's blurring. So to be clear,
7 I'm not equating blurring and contrast reduction, to be
8 especially clear.

9 Q. But contrast reduction, generally, is a
10 characteristic of blurring?

11 A. There's a lot of things that are a
12 characteristic of blurring.

13 Q. Is it inaccurate to say that contrast
14 reduction is a characteristic of blurring?

15 A. No, because there are signals for which -- I
16 already mentioned constant signals. There are other, if
17 you had a sinusoidal image, then its contrast would not
18 be changed by, say, a Gaussian blur.

19 So I mean, it's yes and no. It's not really
20 the goal. You know, you're trying to -- my reservation
21 is you're trying to import a measurement for which, you
22 know -- a characteristic for which Gaussian filtering is
23 not generally designed.

24 Q. Would a POSITA ever apply a Gaussian filter to
25 a constant image signal?

1 A. Yes.

2 MR. GRAUBART: Object to form. Go ahead.

3 THE WITNESS: Yes, because image signals
4 contain constant parts. Not always, but plenty often.

5 MR. ROBINSON: Q. Nonaka -- you can look at
6 Figures 2A through Figure 2C of Nonaka, for example,
7 specifically describes increasing the contrast of
8 backlight portion 30b; correct?

9 A. You're getting ahead of me again.

10 So we're in Nonaka and looking at Figure 2?

11 Q. 2A through 2C.

12 A. And specification you're referring to it
13 where?

14 Q. All right. How about paragraph 50 of Nonaka?

15 A. Going there. Paragraph 50.

16 (Reviewing document.) Yep.

17 Q. The entire point of the operation that Nonaka
18 performs on the part of the image 30b is to increase the
19 contrast to improve the visibility of the details,
20 including a person. Is that correct?

21 A. Well, no. It says, you know, you've got a
22 gain 2 as a correction value larger than a gain 1 to
23 raise luminance curve. So there's a brightening
24 happening. So brightening and contrast emphasis are not
25 the same thing.

1 Q. "Moreover, the optimization processing section
2 5b performs large contrast emphasis processing as
3 compared with the landscape 30a to raise the contrast
4 delta F0 to delta F2."

5 A. Well, there's, you know, modifying an image to
6 improve visibility certainly can involve, you know,
7 tightening the contrast within limits just like old
8 television had a contrast knob.

9 Q. In fact this sentence in paragraph 50 of
10 Nonaka specifically says that it involves emphasizing
11 the contrast.

12 A. It does. It also says raising the luminance
13 curve. Moreover, it emphasizes the contrast. So
14 there's a lot of different aspects that can involve, you
15 know, correction of an image.

16 Q. By performing those corrections, the
17 visibility in the room sufficiently improves; therefore,
18 an image providing visibility close to that obtained by
19 human eyes can finally be achieved. Meaning all of that
20 is to improve visibility of that portion of the image,
21 30b.

22 A. I have no problem with agreeing that
23 correcting an image in various ways improves visibility.
24 I will point out that he didn't really state what he
25 means by "visibility."

1 Q. Would a POSITA have had an idea what he meant
2 by "visibility" here?

3 A. Probably, yes. But there's technical aspects
4 of this visibility that may not occur.

5 I think a POSITA would just think it's easier
6 to see. So the Court isn't confused, that will work.

7 Q. That's the opposite of blurring?

8 A. I don't agree.

9 Q. Does blurring make it easier to see these
10 details?

11 A. Sometimes.

12 Q. Does --

13 A. For example, if you have an image that's
14 corrupted while in noise, you might want to blur it to
15 get rid of the noise, and then you can see the rest of
16 the image better.

17 Q. Does Zhang's blurring improve visibility of
18 Zhang's background?

19 A. No, but it improves the visibility of the
20 face. Human eyes are drawn to sharper regions.

21 Q. So Nonaka's gain 1 that applies to region 30a
22 is predefined; correct?

23 A. If you look at paragraph 48, okay, in
24 describing gain 1 there, it is stated that it's a
25 predetermined correction model. That's part of the

1 first embodiment. Practicing a patent wouldn't have to
2 be --

3 Q. Gain 1 is predetermined. Is there a reason to
4 give it its own lookup table?

5 A. Just to save time, you want to point me where
6 its given its own lookup table?

7 Q. 1017 at --

8 A. 1017?

9 Q. Exhibit 1017 at paragraph 91.

10 A. In a different embodiment. These embodiments
11 are already, you know, separated. So it's the third
12 embodiment.

13 Q. What's in the third embodiment?

14 A. Paragraph 91.

15 Q. No, paragraph 91 in your declaration,
16 Exhibit 1017.

17 A. Sorry. Paragraph 91.

18 Going back to -- what was the original
19 paragraph, so I can --

20 Q. Original paragraph of what?

21 A. We're talking about fixing the gain. 48?

22 Q. Yes. Gain 1 is the predetermined correction
23 amount.

24 A. You have to store these values somewhere. If
25 you have a predetermined value, processor or a computer

1 or whatever device you're using, could be a lot of
2 things, you've got to be able to access it, so you store
3 it somewhere. A lookup table is a good place.

4 Q. Why give us a separate table for a single
5 value?

6 A. Well, it says, as I state in my report, "A
7 POSITA would have recognized that the predictable
8 modification of the combination of Zhang in view
9 Konoplev and Nonaka, as suggested by the teachings of
10 Gonzalez, would have included precalculating Nonaka's
11 gain 1 and gain 2 values for the background and the
12 person, respectively, storing the precalculated gain
13 values in one or more lookup tables according to whether
14 the gain values are for personal background and
15 determining the gain values to apply to the facial,"
16 blah, blah, blah.

17 Okay. So I mean, already there's more than
18 one gain, but there's two gain values that suggest more
19 than one storage location, which you can represent as a
20 table. You can have a one-entry table. There's no
21 difficulties here.

22 Q. If gain 1 only had one predetermined amount as
23 suggested in paragraph 48 of Nonaka, would it make sense
24 to put it in a separate single entry table?

25 A. Well, we don't know it only has one. It might

1 be predetermined. Doesn't mean it has only one. It may
2 be that you have a table of values, and you know,
3 sometimes you use this predetermined value. Sometimes
4 you use that predetermined value. There's a setting on
5 the camera, you know. There's a lot of reasons.

6 Q. Nonaka doesn't say any of that for gain 1;
7 does it?

8 A. Pardon me?

9 Q. Nonaka doesn't say any of that for gain 1;
10 does it?

11 A. It doesn't -- (Reviewing document.) No, I
12 don't agree.

13 Q. Why?

14 A. Well, I mean, as I state, you have a couple of
15 gain values, and you can store those gain values in a
16 lookup table.

17 Q. Where do you state that?

18 A. Paragraph 91 of my report.

19 Q. Paragraph 91 doesn't cite to anything in any
20 of these prior art references; does it?

21 A. No. But it's hardly a leap for a POSITA to
22 understand if you have a couple of gain values you're
23 going to use, you have to store them somewhere. And
24 storing them together in a lookup table makes a lot of
25 sense.

1 Q. Nonaka never describes two different values
2 for gain 1; does it? Which was the question I asked a
3 moment ago before you reviewed the reference.

4 MR. GRAUBART: Object to form.

5 THE WITNESS: I didn't understand that to be
6 that question. But doesn't matter. A new question is
7 fine.

8 I mean, Nonaka is giving an embodiment here.
9 And in this embodiment, he describes gain 1 as
10 predetermined correction amount. Again, this is just a
11 teaching. I don't think it would have to be fixed to a
12 value, and a person of ordinary skill in the art would
13 understand there was no reason why a gain 1 would have
14 to be fixed to a value. He doesn't carry that into the
15 claims, for example.

16 You're asking me a question. I didn't even
17 have my report.

18 MR. ROBINSON: Q. Well, this goes directly to
19 whether there are more than one gain values in a table.
20 I would hope it's something you considered.

21 Nonaka doesn't ever say that a gain 1 is
22 selected from a plurality of predetermined amounts; does
23 it?

24 A. I didn't consider that. Here on the spot, I
25 would say, you know, I think whether or not there's only

1 one or not, I think the combination hangs together just
2 fine. You know, section 10 of my report had
3 combination, which is where I was just reading from.

4 And you know, Nonaka as a reference is fine.
5 And I think that, you know, a POSITA would certainly
6 understand there could be a range of gain 1 factors.

7 Q. You still haven't answered my question,
8 Dr. Bovik.

9 Nonaka doesn't ever say gain 1 is selected
10 from a plurality of predetermined amounts; does it?

11 A. Nonaka doesn't have that language. I think a
12 person of ordinary skill in the art would understand
13 there could be.

14 Q. Words were very important earlier today,
15 Dr. Bovik. Nonaka doesn't include those words; does it?

16 MR. GRAUBART: Object to form.

17 THE WITNESS: It does not. But Nonaka is
18 teaching, okay. And when you're teaching a concept,
19 sometimes you say, "Well, fix this, and then you'll
20 understand the rest."

21 I think that there's no reason why gain 1
22 needs to be fixed to a single value. And the rest of,
23 you know, the rest of the embodiment wouldn't require
24 it. And I think a person of ordinary skill in the art
25 would understand that gain 1 could be -- vary a little

1 bit.

2 MR. ROBINSON: Q. Dr. Bovik, do you know or
3 are you personally acquainted with either of the
4 inventors on the Nonaka references, Osamu Nonaka or
5 Atsushi Maruyama?

6 A. I am not. Never met them. Never heard of
7 them before this case.

8 Q. In your previous answer when you said, "When
9 you're teaching a concept, sometimes you say, 'Well, fix
10 this and you'll understand rest,'" you're speculating
11 about how they might teach someone?

12 A. I'm a teacher. I mean, I know how good
13 teaching is.

14 Q. Are any of those inventors teachers?

15 A. They are if they're writing a specification.
16 They're teaching how to practice claims.

17 Q. If gain 1 had only one predetermined value,
18 would it make any sense to put it in its own separate
19 lookup table from the values of gain 2?

20 A. I mean, I didn't opine that. I just said that
21 gain 1 or gain 2 could be stored in one or more lookup
22 tables. It could be the same one. It could be two
23 different ones. It doesn't really matter. Doesn't
24 change my opinion about anything.

25 Q. In claim 5 of the '132 patent, Exhibit 1001.

1 A. Claim 5 of '132, yes.

2 Q. Last clause of that claim says, "Resulting in
3 a first portion of a digital image that corresponds to
4 the first portion of the digital image data being
5 brighter than if the second amount of the parameter were
6 applied to both the first portion and the second portion
7 of the digital image data."

8 A. Okay.

9 Q. Did you determine whether claim 5 was met by
10 any particular image processing technique?

11 MR. GRAUBART: Object to form.

12 THE WITNESS: I don't know what you mean. I
13 mean, I certainly have the opinion that the prior art I
14 presented covers this.

15 Nonaka is certainly, for example, since we
16 were talking about Nonaka, modifies the brightness so
17 that a second amount of the parameter -- I mean, so that
18 a first portion corresponding to the first portion of
19 the image would be brighter than the second amount than
20 if the second amount of parameter applied to both the
21 first and second portion of the digital image, because a
22 much larger gain.

23 MR. ROBINSON: Q. Don't you need to know how
24 bright those two portions begin before you can determine
25 whether the relationship of claim 5 is true?

1 A. No, because it only says that -- I mean, if I
2 had a face it has a certain brightness, I can apply, for
3 example, the gain of Nonaka that's a larger gain, okay,
4 and I will get a brightness.

5 Or I could apply the smaller gain of Nonaka,
6 and I will get another brightness. Suppose I apply it
7 to the whole image, as it says in the last part of the
8 clause. Well, the face will be a lower brightness there
9 absolutely for sure than if I had applied the first
10 mentioned gain. So no.

11 Q. So, in fact, if you start with the input image
12 of Nonaka, you've got 30a, which has a brightness that's
13 the outside part, and you've got the outdoor part, the
14 part with the backlighting. Then you've got 30b, which
15 is the indoor part, it's darker.

16 A. 30a and b in Figures 2. So sorry, I was
17 planning things. You're question?

18 Q. 30a has a brightness. 30b has a brightness.
19 The input image, 30b, is less than 30a. If you apply
20 gain 1 to 30a and gain 2 to 30b, 30b will only end
21 brighter if the difference between gain 2 and gain 1 is
22 larger than the difference between the brightness of
23 those two sections in the input image; correct?

24 A. Well, I mean, when you apply a gain to both,
25 they both are made brighter. They both get bigger.

1 Okay? And you know, we're not talking about a size of a
2 difference here. Let's see.

3 We're talking about two different scenarios,
4 one in which the first amount is applied to 30a -- which
5 let's call that the face, okay -- versus whether the
6 second gain is applied to both 30a and 30b. And if the
7 first gain is larger, then 30a will be brighter than if
8 the second gain were applied to both.

9 Q. Make sure we're reading the same language. So
10 claim 5, apply the determined correction to the first
11 portion. So we're talking about Nonaka. We're talking
12 about gain 2 to 30b; correct?

13 A. Well, I don't know which part of claim 5
14 you're talking about. The last part of claim 5 says --

15 Q. I literally just quoted you some language from
16 claim 5.

17 A. Okay. Read it again.

18 Q. "Wherein applying the determined correction to
19 the first portion of the digital image," if you're
20 talking about a determined correction -- remember, this
21 is defense from claim 1 -- if you're talking about the
22 determined correction as you've read this against
23 Nonaka, we would be talking about gain 2 as its applied
24 to 30b; correct?

25 A. Okay. I think I may have been misreading this

1 at the late hour. Let me read it again.

2 (Reviewing document.)

3 I mean, the way I read it, the first portion
4 of the parameter's gain, you know, is gain 1. The
5 second portion is gain 2.

6 Q. Really? Do you want to refer back to your
7 declaration?

8 A. Oh, "portion of a digital image," I'm sorry.
9 First amount and second amount.

10 This claim is so big and baggy, it's hard to
11 keep straight in the mind.

12 (Reviewing document.) So, I mean, if the
13 first amount is gain 1, first amount of the parameter,
14 gain 1, to first portion where the first amount, gain 1,
15 is different from the second amount, gain 2, applied to
16 a second portion, different part of the image, resulting
17 in the first portion of the image that corresponds to
18 the first portion of the image being brighter than gain
19 1 being applied to the first portion than if the second
20 amount were applied to both, gain 2, both to the first
21 portion and the second portion.

22 Q. So it's your testimony here you interpret the
23 first portion of the determined correction in Nonaka to
24 correspond to gain 1 in Nonaka, and you interpret --

25 A. I said "amount." If you want to read it back,

1 "first amount."

2 Q. Okay. Read the claim language here so we're
3 on the same page. "Applying the determined correction
4 of the first portion of the digital image data" -- from
5 claim 1 -- "comprises applying the first amount of a
6 parameter to the first portion to enhance the visual
7 characteristic."

8 So in Nonaka, is the first portion of the
9 digital image data 30a or 30b as you compare this claim
10 to Nonaka?

11 A. I got -- I think I may have gotten gain 1 and
12 gain 2 confused. That's all. I didn't refer here.

13 Let's point out the first amount of the
14 parameter, it's gain 2. I wasn't looking at neither
15 Nonaka or my report. I was just looking at '132.

16 So the first amount of the parameter, gain 2.
17 Second amount, gain 1, but same answer otherwise.

18 Q. So applying the first amount of the parameter
19 to the first portion, so that's applying gain 2 to
20 portion 30b in Nonaka?

21 A. I mean, we could apply it to 30a is what I'm
22 thinking. Gain 2 applied to 30a.

23 Q. That's not how you applied it in your
24 declaration, Dr. Bovik.

25 A. Okay. It doesn't really matter.

1 Q. No, it really does.

2 A. Okay. We apply gain 2 to 30b.

3 Q. Okay.

4 A. Gain 2 is larger than gain 1.

5 Q. All right. So gain 2 is larger than gain 1.

6 Gain 2 is applied to 30b.

7 A. Okay. Sure.

8 Q. Okay. And resulting in a first portion of the
9 digital image, 30b, being brighter than if the second
10 amount, gain 1, had been applied to both the first
11 portion and the second portion?

12 A. Paragraph 57 of my report just above figure --
13 reproduction of Figure 4A.

14 Counselor, since you paused, I'm going to take
15 a five-minute break to use the rest room. Okay.

16 MR. ROBINSON: That's fine.

17 (Recess taken: 5:00 p.m. - 5:10 p.m.)

18 MR. ROBINSON: Q. One hopefully short
19 question, and I'll pass the witness.

20 In the application of gain 1 and gain 2 to
21 section 30b of the image in Nonaka, if the application
22 of both of those gains saturated that portion of the
23 image, would they have the same brightness?

24 A. Sure. But that wouldn't be the intention of
25 the invention. Things like that -- bad things like that

1 can happen if an algorithm isn't designed properly.

2 MR. ROBINSON: I'll pass the witness for
3 redirect.

4 EXAMINATION

5 BY MR. GRAUBART:

6 Q. Dr. Bovik, hopefully just one or two questions
7 here. A little earlier, Counsel was asking you
8 questions about your opinion in Exhibit 1017
9 declaration, in the 1251 proceeding, at paragraph 91.

10 A. Paragraph 91.

11 Q. In particular, paragraph 91 relates to the use
12 of lookup tables for particular values. That's what I
13 want to ask you about. Are you with me?

14 A. I'm there.

15 Q. Okay. I believe Counsel asked you something
16 to the effect of why would one use a separate lookup
17 table for landscape 30a if the only value to be stored
18 there is a gain. Do you recall some questioning on that
19 line?

20 A. I remember that line, yeah.

21 Q. With that in mind, can I ask you to please
22 turn to Exhibit 1005, the Nonaka patent.

23 A. M-hm.

24 Q. And in particular, turn your attention to
25 paragraph 48.

1 A. Yes.

2 Q. Paragraph 48, in addition to --

3 A. Where's the, "In addition to"?

4 Q. I'm saying -- paragraph 48 does reference a
5 gain 1?

6 A. Yes.

7 Q. Is that correct?

8 A. M-hm.

9 Q. Okay. Are there other processing -- is there
10 any other processing referred to in paragraph 48 besides
11 the use of gain?

12 A. Yeah. There's the contrast emphasis
13 processing.

14 Q. Would that contrast emphasis processing
15 likewise generate values that can be stored in the
16 lookup table?

17 A. There's no reason not. Sure.

18 Q. Given that then, does that does that confirm
19 or modify your opinion as to why there would be a
20 separate lookup table for landscape 30a?

21 A. Yeah. I mean, if you're calculating values
22 for gain 1 and gain 2 in a lookup table and you're
23 generating other values based on some processing, you
24 may store those in, you know, a table of values
25 associated with gain 1 and gain 2, for example. Or just

1 gain 1.

2 Q. So the lookup label for landscape 30a could
3 have data for more than just gain 1; is that correct?

4 A. Yes, certainly.

5 MR. GRAUBART: No further questions.

6 FURTHER EXAMINATION

7 BY MR. ROBINSON:

8 Q. Paragraph 91 of Exhibit 1017 doesn't say
9 anything about those other values; does it?

10 A. No. It doesn't include it. It makes sense
11 you can do that.

12 MR. ROBINSON: Thank you.

13 MR. GRAUBART: Thank you. No further
14 questions.

15 THE REPORTER: Did you need a certified
16 transcript?

17 MR. GRAUBART: Yes, please.

18 (Whereupon, the deposition proceedings were
19 adjourned at 5:15 p.m.)

20 ---oOo---

21

22

23

24

25

CERTIFICATE OF WITNESS

I, the undersigned, declare under penalty of perjury that I have read the foregoing transcript, and I have made any corrections, additions or deletions that I was desirous of making; that the foregoing is a true and correct transcript of my testimony contained therein.

EXECUTED this _____ day of _____,
20____ at, _____, _____.

ALAN BOVIK, PhD

REPORTER'S CERTIFICATE

I, KIMBERLEE SCHROEDER, TX CSR No. 10925 and CA CSR No. 11414, duly authorized to administer oaths pursuant to Section 28 (a) of the Federal Rules of Civil Procedure and 602.002 of the Texas Government Code, hereby certify that the witness in the foregoing deposition was by me duly sworn to testify the truth, the whole truth and nothing but the truth in the within-entitled cause; that said deposition was taken at the time and place therein stated; that the testimony of the said witness was reported by me and thereafter transcribed by me and that the witness was given an opportunity to read and correct said deposition and to subscribe the same.

I further certify that I am not of counsel or attorney for either or any of the parties to said cause of action, nor in any way interested in the outcome of the cause named in said cause of action.

I declare under penalty of perjury under the laws of the State of Texas that the foregoing is true and correct.

 day of April, 2019

KIMBERLEE SCHROEDER, CSR, RPR, CCRR
TX No. 10925 - CA No. 11414

A	24,25;157:2,9,21;159:2,7; 160:4;162:9,9,20;163:14; 164:2;165:2;175:5;177:4,7; 178:3;180:22;181:18; 183:8;185:21,22;186:17,24; 188:14;191:21;196:11,24; 197:16;199:1,3,11,12,14,20, 21,23;203:8,13;205:9	accurate (1) 23:10 achieve (2) 127:24;136:12 achieved (1) 189:19 achieving (2) 160:14;161:4 acne (1) 124:16 acquainted (1) 196:3 acquired (2) 136:3;157:6 acquires (1) 119:1 across (2) 183:10,18 act (2) 88:7,13 acting (4) 168:25;169:11,21,23 activities (1) 15:19 actually (16) 12:14;17:11;31:4;56:24; 73:15;75:23;80:1;82:21; 91:17;101:15;123:15; 138:9,20;146:10;169:4; 179:4 adapt (2) 88:21;175:8 adaptive (1) 90:17 added (1) 42:20 adding (2) 37:12;148:25 addition (3) 168:7;204:2,3	additional (2) 28:13;165:8 additions (1) 206:8 addressing (1) 154:25 adjourned (1) 205:19 adjust (6) 22:16;23:8,18;53:17; 54:2,2 adjusting (10) 46:25;52:2,6,16,25; 53:12;61:15,22;62:3; 103:24 adjustment (11) 22:12,15;23:7,11,12,17, 20,21;24:1;46:10,13 adjustments (1) 46:12 administer (1) 4:7 admits (1) 129:4 advance (1) 25:18 affect (2) 78:8;130:12 affecting (3) 106:9,10;130:13 afield (1) 162:10 after (13) 5:4;26:1,11,16;27:2,13; 30:9;45:22;54:19;97:4; 107:15;164:10;169:23 AFTERNOON (1) 132:11 again (59) 9:21;11:18;16:12;17:8;
able (15) 7:8;11:5;15:19;20:4,11; 30:9,11;47:14;67:14;94:16, 22;133:20;148:22;170:9; 192:2 about (212) 7:20,21,23;9:22;11:19, 21;12:17;13:14,17,23; 14:13,18;17:13;19:4;20:3, 12;22:20,21;23:19;24:21; 26:23;28:20,22;32:12,14, 16;33:2;34:4,11;35:8;36:5; 39:15;41:1,3,5,20;43:13,14, 18;44:18;45:3,4,4,8,15; 46:7;47:2,11,12;48:14; 49:9;51:23;53:2,5;54:8,23; 55:13,17,21,22,25;56:1,13, 17,18;57:5,16,18,24;58:9, 10,12,23;59:2,4,9,11;60:12, 17,22;62:7,10,15,18,23; 63:5,21,21;64:8,14;66:1,9; 67:1,5,7,9,18;68:4,9,13; 69:22;70:2,2,15,15;71:5,20; 72:25;73:13;74:22;76:18; 77:5,22;78:4;86:16;87:20, 24;89:16,17;91:12,13,15, 17;92:1,2,4,8,23;93:2,9,25; 95:6;96:25;103:20,22; 104:20;106:25;107:9,15,25; 108:22;109:13,19,21; 111:15;112:1;113:9; 119:19;120:9;123:5; 128:24;129:12;134:1,19,22, 24,25;135:2;140:17;141:4; 143:5;145:23;150:11; 151:18;152:20;153:5; 154:7,9;155:21;156:15,20,	above (9) 45:23;104:6;122:15; 142:8;158:5,17,23,24; 202:12 absence (3) 130:14,19;164:14 absolute (1) 119:8 Absolutely (3) 61:24;93:7;198:9 abstract (4) 135:11,16,18;144:11 abstractly (1) 32:16 accept (1) 47:18 acceptable (1) 154:19 access (2) 160:20;192:2 accomplish (1) 121:17 accomplished (1) 182:22 accordance (1) 136:6 according (9) 98:12;99:10;100:10; 101:21;103:22;113:1; 121:8;146:22;192:13 accordingly (1) 117:12		

19:3;20:23;21:13;22:17; 23:19;24:2,13,19;25:5; 26:13;27:11,22;28:17; 34:13;36:5;39:13;42:3,13; 50:7;51:19;52:8;54:17; 59:18;62:5;65:4;67:21; 72:14;74:20;77:21;81:13; 83:18;85:16;89:9;95:22; 108:22;113:22;116:5; 121:17;135:12;144:17; 147:16;151:20;154:22; 159:23;162:1;163:8;168:2; 175:7;177:23;183:15; 187:5;188:9;194:10; 199:17;200:1	algorithm (70) 10:25;21:2;24:24;34:20; 38:14;39:16,19,20;40:5; 81:12;82:12,14;85:13;87:5, 11,14,14,18,19,23;88:2,5,8, 12,13,15,17,19,21;89:2,5, 12,13,20,21;90:12,17,19,21, 22,23;91:4;96:24;98:11; 103:1;112:15,18,22;113:2, 6;115:14;116:6;120:23,24; 121:17,23;127:14;164:7,21; 165:4,15,16;166:6,8,9,11, 13;169:4;170:18;203:1	171:5;186:11;187:16; 191:11;192:17	37:25;77:19;126:12,17; 127:11;132:2
against (3) 7:8;9:23;199:22	algorithms (4) 38:19;75:20,22;88:20	also (39) 9:19;10:7;13:12;21:9; 37:15;39:6;41:6;45:23; 46:2;56:20;58:20;64:14; 67:15;74:10;75:5;77:13; 86:5;100:17;105:13;108:8, 25;112:18;115:3;116:18; 128:25;130:3;133:14; 135:2;142:19;152:6; 157:11;158:19;159:14; 164:13;169:24;173:19; 174:11;186:8;189:12	analyze (8) 77:14;78:2;121:21; 122:21;126:11,13,15;127:9
ago (11) 15:2;23:4;29:14;36:18; 71:14;79:18;94:5;119:4; 142:14;159:21;194:3	algorithm's (1) 90:15	always (14) 10:25;24:6;116:1;129:12; 133:7,12;134:4,12,19; 141:6,14,19;143:14;188:4	analyzing (5) 119:17;121:10;127:19; 140:3;173:4
agree (22) 13:25;14:3;22:24;23:15; 29:11;32:1,6;70:8;88:4,8; 91:19;110:24;128:8,10; 152:21;154:24;157:14; 166:22;171:19;185:24; 190:8;193:12	allow (2) 66:22;107:1	amazing (1) 175:17	anchor (1) 27:23
agreeing (2) 49:20;189:22	allowable (5) 100:14;101:1,20;102:9, 19	amenable (1) 74:7	ancillary (3) 135:24;136:1,19
ahead (9) 68:11;87:4;132:5;141:2; 161:15;165:25;185:17; 188:2,9	allowed (10) 48:9;49:1;54:16;55:11, 15;60:2;66:11,15;100:9,12	amongst (1) 52:24	and/or (2) 19:14;65:9
aimed (1) 20:10	allows (3) 55:18,18;66:20	amount (47) 36:8,9;66:23;67:15;73:4, 6;74:10,15;98:19;125:21, 23;126:1,2;136:7,13;140:2, 16,18,22;144:11,13;148:4, 12;149:7;191:23;192:22; 194:10;197:5,17,19,20; 199:4;200:9,9,13,13,14,15, 20,25;201:1,5,13,16,17,18; 202:10	another (25) 19:3;23:24;26:24;30:15, 20,22;40:9;53:15;74:25; 82:19;95:16;96:17;97:16; 99:5;103:17;104:22;106:8; 110:19;120:17;134:12; 149:19;167:4;185:11,16; 198:6
air (2) 91:10,11	almost (2) 72:23;185:8	amounts (6) 98:15;111:15,22;178:14; 194:22;195:10	answer (77) 8:1,2,4,5,13,18;11:5,11, 12;12:6,20;13:17,18;14:7, 18;16:24;18:19;20:11; 21:13;22:17,21;23:4;25:22; 27:11;28:16;29:23;31:11; 32:2,5;33:20;34:1;37:18; 42:13;45:6;47:18;49:16,20, 20;52:11;53:4;54:10,19,24; 55:6,13,16;57:20,21;58:1, 13;60:21;71:14;72:16; 75:20;79:18;84:3;85:5; 89:1,17;91:8;94:16;97:5; 123:18;124:9;134:2;158:2; 160:11,17;162:22;167:7; 170:20;177:3;179:23; 180:25;185:2;196:8;201:17
ALAN (3) 4:10;5:3;206:16	alone (1) 76:7	amplify (1) 34:20	answered (5)
	along (7) 27:16;62:14;84:13;105:2; 122:13;134:11;157:5	analysis (6)	
	already (28) 9:3,4,22,23;10:5,9;11:12; 14:22;56:13,20;71:13; 80:16;83:19,20;84:3,5; 97:16;104:19;112:20; 123:14,17;168:21;169:10;		

59:22;71:13;75:18;182:8; 195:7	appearances (1) 149:9	86:2;98:20;103:9;109:21; 111:14,15,21;112:4,12; 174:2;175:24;176:22; 177:17;199:18;201:3,5,18, 19	art (49) 7:17,21,24;14:17;15:5; 16:4,5,15;17:22,25;19:7,9, 17:20:1,23;23:21;24:3; 32:9,16,20;33:3,5;34:16; 65:6;70:18;71:3;72:24; 75:15;85:18;89:10;91:5,14, 17;118:4,17;121:25;123:6; 127:17,25;129:21;175:18; 176:9,13;178:12;193:20; 194:12;195:12,24;197:13
answering (6) 6:19;14:9;62:21;64:4; 69:19;96:25	appeared (1) 4:9	approach (3) 40:5;125:7;173:12	artifact (1) 82:15
answers (12) 9:23;17:17;27:22;54:18, 22;62:1,9;69:17;72:13; 91:2;104:7;139:19	appears (8) 42:4,6;96:2,15,16,16; 167:18;181:7	approached (2) 15:17;71:19	artifacts (5) 81:8,11;82:13,14;83:9
anybody (1) 119:3	Apple (4) 30:20;117:20;118:9,16	approaches (6) 39:6;77:20;78:1;131:20, 23;136:17	artificially (1) 156:3
anything (54) 8:3;12:17,19,21;13:17, 23;17:2;19:4;22:19;24:24; 27:21,24;30:21;32:3;34:8, 22;39:15;48:20;51:23;62:7, 23;67:2,5,20;68:12;69:20; 71:8;85:17;86:13;87:24; 88:2,22;89:16;90:1;92:23; 102:10,20;109:13;119:3; 120:24;123:25;131:10; 134:19;153:5;160:4;162:9; 163:20;165:2;170:1; 171:17;181:17;193:19; 196:24;205:9	application (14) 18:8,12;21:10;30:18; 97:12;113:14;119:7; 128:23;129:9,22;130:22; 185:22;202:20,21	approaching (2) 15:15;69:10	aside (2) 64:19;98:9
applications (2) 18:2;28:7	applied (59) 27:20;35:16;36:3;45:25; 87:1,6;89:11;99:18;101:14; 103:13,14;104:8,12,21; 105:4,22;106:2;109:25; 110:1,13,17,21;111:6,12; 112:15,18;113:1;122:4,11; 156:7,8;157:11;158:12,19; 163:3,7;166:21;167:1,3; 173:12;176:3;178:13,14; 183:17,21;197:6,20;198:9; 199:4,6,8,23;200:15,19,20; 201:22,23;202:6,10	appropriate (4) 6:24;79:11;96:25;124:22	asked (31) 13:18;14:13;19:24;20:14; 22:19,21;28:18;29:14,24; 30:17,24;34:11;39:15; 54:18,21;56:4;69:19;71:14; 80:17;86:16;89:17;95:6; 134:4;142:13;161:14; 177:7;179:8,18,21;194:2; 203:15
Anyway (2) 56:25;162:20	applies (2) 35:13;190:21	appropriately (1) 79:10	asking (28) 6:25;13:22;16:12,14; 18:18;29:11,19;32:12,14, 16,24;33:1;42:8;47:2; 57:22;59:17;60:6,17;62:18; 70:2;75:14;87:15;104:25; 160:24;162:8;181:19; 194:16;203:7
anywhere (7) 18:20;40:25;51:16;90:6; 119:13;182:24;184:11	apply (30) 12:21;36:8;73:5,6;75:2; 76:8,12;79:10;82:13;98:15; 104:5;112:21;117:5; 125:10;130:9;155:13; 170:21,22;183:21;185:8; 187:24;192:15;198:2,5,6, 19,24;199:10;201:21;202:2	approximate (2) 5:19;123:4	aspect (4) 35:8;114:13;115:11; 119:24
apart (1) 149:21	applying (18)	Approximately (3) 5:12;15:10;96:11	aspects (5)
apologies (2) 80:1;151:3		area (17) 18:15;127:23;128:7,7,25; 129:2;130:1,7,10;152:23, 25;153:3,4,6,6;155:16,17	
apparatus (2) 139:23;163:24		areas (8) 31:3;100:21;122:5; 126:12,16;127:10,23;174:3	
appear (2) 83:3;128:8		aren't (4) 14:8;31:19;32:13;176:15	
appearance (2) 17:15;182:16		arise (1) 84:15	
		arisen (3) 85:12,13,14	
		around (5) 15:16;41:4;92:9,13; 131:17	
		array (2) 12:24,24	

92:25;132:17;134:16; 189:14;190:3 assigned (4) 97:22;98:16;99:11; 100:18 assigning (1) 85:16 assist (2) 34:2;149:17 associated (4) 26:6;34:17;35:10;204:25 associating (1) 62:25 association (1) 176:20 assume (1) 66:10 assuming (1) 45:21 astronomy (2) 18:12,14 Atsushi (1) 196:5 attempt (4) 19:22;75:21;76:2;164:2 attempting (1) 137:22 attention (2) 148:16;203:24 attenuate (1) 34:20 attenuation (1) 47:20 attributes (1) 64:1 Austin (1) 4:4 author (1) 80:24 authorized (1)	4:6 authors (1) 42:18 automated (3) 114:15;115:11;119:25 automatically (7) 163:21;164:12,14;171:3; 172:9,13,19 auxiliary (1) 136:19 available (3) 62:19;63:7;64:24 Avenue (1) 4:4 average (3) 72:4,7;74:17 avoided (1) 72:23 aware (9) 52:21;53:12,23;54:1; 61:17,22;62:2;83:15;91:5 away (3) 157:7;168:1,3 awhile (1) 171:23	186:2,4,6,14,15,25;187:2; 190:18;192:11,14 backlight (6) 135:3;151:17;153:10; 163:10;168:9;188:8 backlighting (1) 198:14 backtrack (1) 62:9 bad (1) 202:25 baggy (1) 200:10 balance (5) 43:20,22;56:23;59:11; 61:11 balanced (1) 149:4 bandwidths (1) 12:25 base (1) 20:5 based (22) 6:25;39:17,21;42:11; 44:12,23;46:25;51:11; 71:21;74:8;75:14;76:22; 102:13;103:13;121:11; 123:21;126:12,17;127:11; 142:8;173:6;204:23 baseline (5) 28:24;29:6,7;33:4,11 basic (1) 54:13 basically (5) 36:17,22;131:2;153:22; 164:16 basis (3) 53:18,18;102:25 basketball (2) 129:12,12	bear (1) 119:18 bearing (2) 8:6;29:1 because (57) 8:13;13:5;14:7,15;15:18; 18:1;22:8,18;25:12;26:4; 27:23;28:9;30:18;31:10,11; 37:8;39:14;48:4;49:8;55:7; 57:12;59:9,23;61:10;63:17; 73:25;74:13;77:21;82:25; 86:1;87:7;90:21;103:22; 112:5,13;113:4;115:1; 117:8;118:4;125:8,19; 137:25;141:10;147:5,12; 149:24;154:8;155:5,20; 167:18;171:1,8;176:10; 187:15;188:3;197:21;198:1 become (2) 113:11;144:2 becomes (4) 13:9;126:1;143:13,17 been (60) 4:11;5:10;8:9,22;9:3,4, 25;10:9;14:22,23;15:4; 17:25;19:21;20:6;21:3; 28:18;29:11;31:17,23;33:1; 39:15;41:11;43:25;46:16, 18;47:14;52:21;53:5,12,23; 54:1;57:16;59:3;61:16,21; 62:2,20;83:15;85:11;90:11; 91:5;92:4;93:12;102:3; 104:19;110:6;132:21; 141:7,8;145:3;147:5,10; 157:5;171:25;172:7; 174:13;184:2;186:17; 199:25;202:10 before (28) 4:4;5:10;6:19;13:14; 19:5;20:6;25:6,24;26:6,19,
	B		
	bachelor (1) 65:6 back (18) 9:10;19:10;44:10;76:21; 82:23;84:2;86:15;92:12,17; 118:10,21;119:16;142:12; 161:11;175:5;191:18; 200:6,25 background (23) 99:4;106:11;129:14; 149:3;167:15,17,18;178:13, 18;179:11,13;185:11,23;		

20,24;32:9;33:10;34:1; 46:9;63:18;118:12;136:16; 143:21;152:15;157:3,4,17, 24;194:3;196:7;197:24 begin (4) 7:11;34:24;42:8;197:24 beginning (3) 20:5;108:14;142:14 begins (3) 45:16;112:8;115:2 being (60) 5:4,8;23:3;24:11,12; 27:20;34:6;36:24;45:2,18; 48:18;49:8;51:1,16;57:15; 64:16;69:18;77:3,9,21; 87:1;97:10;103:13,14; 104:22;105:4;108:8;109:1, 16;110:17,21;111:12; 115:24;119:10;120:21,22; 126:22;127:22;129:10; 133:9;137:18;141:12; 145:20,24;146:12;147:1; 148:8;149:1;151:4;153:7; 155:21;160:5,23,25;164:22; 184:25;197:4;200:18,19; 202:9 beings (1) 125:20 beliefs (1) 7:20 believe (13) 7:22;8:19;11:16;15:15; 16:3;33:1;58:15;63:6;70:4; 131:18;170:2;174:13; 203:15 believed (2) 21:16;28:23 below (1) 45:17 beneficial (1)	39:21 besides (1) 204:10 best (4) 5:23;33:14;103:3;164:6 better (7) 21:11;25:22;45:6;108:22; 119:12;177:3;190:16 Between (29) 5:18;15:1;18:22;21:16; 39:1;54:14;64:23;79:22; 80:2;83:3;100:21;108:10; 109:4;124:22;125:2,13; 138:9;146:2;147:18; 150:13;153:7;168:10; 176:20;178:23;183:13,20; 184:19;198:21,22 beyond (3) 76:18;131:10;148:15 big (2) 124:4;200:10 bigger (6) 106:25;107:1,1;111:5; 147:24;198:25 billions (1) 163:23 biomedical (1) 30:21 biomedicine (1) 18:11 bit (13) 22:25;23:22;48:4;49:21; 54:9;55:7;56:13;59:23; 70:1;85:3;117:7;142:12; 196:1 bite (1) 57:18 black (2) 130:11,13 blackened (8)	140:25;163:15;165:19, 24;166:10,21;168:9;170:7 blah (6) 106:19,19,19;192:16,16, 16 blanket (1) 96:5 blemish (11) 124:25;174:24;180:8,22; 181:2;182:4,14,17,23; 183:4;184:22 blemishes (28) 114:17;115:13;120:3,8, 18,20;121:14,20;124:3,4,6, 12,21;125:1,5,6,11;173:23; 174:4;175:6;180:2,14; 181:1,4,9,21,25;184:12 blemish-reducing (1) 185:21 blending (3) 43:13,15,16 blindly (1) 24:9 block (3) 81:25;164:19,24 blocking (7) 81:8,11;82:13,14,15;83:9, 13 blocks (4) 81:18,20;83:1,2 blocky (1) 82:16 blue (6) 12:22;13:1,2,8,8;37:10 blur (23) 83:19,21;84:4,6,11,13,14; 85:11,12;86:2,12;106:11; 175:25;176:23;177:18; 178:18,22;179:1,2,11,13; 187:18;190:14	blurred (1) 86:7 blurring (47) 78:7,8,10,12,15,16,17; 80:17,20,21,22;81:3,14,16, 19;82:6;83:16,24;84:9,23; 85:7,22;86:11,12;174:9; 178:8,14,20,24;179:5; 185:11,22;186:2,4,14,17,18, 24,25;187:6,7,10,12,14; 190:7,9,17 Board (5) 31:25;33:20;171:10,14, 16 Board's (1) 171:21 book (1) 24:8 books (1) 142:15 bordering (1) 184:19 both (33) 27:11;61:9,25;99:18; 100:22;101:14;134:17; 149:19;152:19;154:5,24; 158:25;159:21;161:5,22; 163:3,6;170:23;178:18; 179:10,17,20;197:6,20; 198:24,25,25;199:6,8; 200:20,20;202:10,22 bottom (3) 36:21;46:8;114:25 bound (1) 136:10 boundaries (3) 34:8;83:2;181:21 boundary (6) 183:8,19,20;184:9;185:4, 5
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

BOVIK (28) 4:10;5:3;7:14;8:21; 22:20;25:23;28:21;40:3; 44:2,9,21;57:22;58:14; 70:5;71:2;92:6,20;93:17; 132:13;160:12;161:14; 184:6;195:8,15;196:2; 201:24;203:6;206:16	12;63:22;66:24;67:20;72:2; 5;104:21;105:20;110:13; 112:2;136:5;168:10;183:9; 12;186:8;197:16;198:2,4,6, 8,12,18,18,22;202:23	calculate (1) 126:23 calculated (1) 5:23 calculating (2) 130:6;204:21 California (1) 4:6 call (11) 13:3,4,11;27:13;32:3; 33:20;59:12;119:1;182:21; 183:10;199:5 called (14) 4:11;12:15;13:10;41:10; 52:23;72:8;75:22,23;77:12, 13;78:14;81:6;82:12,20 calling (1) 132:3 calls (2) 61:11,12 came (2) 118:12;149:23 camera (21) 12:23;38:2,7;85:13; 118:13,14,16;138:4,23,24; 142:25;143:8;145:22; 148:19;149:13,18;150:21, 22;155:6;171:2;193:5 cameras (7) 117:20;118:10;138:7; 141:13;149:15,16;163:23 can (110) 5:18;7:12,12;12:6;17:12; 25:22;29:5,8,10;33:14; 34:13;39:8,16,25;42:7;43:3, 15;44:5;45:6;47:24;51:2,9; 52:20;53:15,16,16,19,20; 54:7;61:1;67:2;75:11;78:8, 8,10;79:16;80:11,21;81:1,4; 82:3,13;84:14,15;85:4;	88:4;91:4;96:3,14;97:10, 17;98:14,16;100:15;101:2; 104:25;105:8;115:25; 116:1,6,18;118:16;121:1, 18;129:16;130:8;131:19; 135:10;137:13,16;138:22; 140:6,12;148:5;150:20,22; 152:3;154:6;161:23;162:6; 163:18;166:22;167:17; 170:23;174:5;176:5; 177:13,14;178:21,22; 179:14;180:18;181:17; 185:10,23;188:5;189:6,14, 19;190:15;191:19;192:19, 20;193:15;197:24;198:2; 203:1,21;204:15;205:11 cannot (3) 141:1;168:11,12 can't (33) 17:11;24:20;58:13;88:2; 97:14;118:14;123:24; 125:17;130:8;142:1; 145:21;154:5,10,21;155:1, 3,5,6,13,19;157:14;158:9; 160:9;161:17,19,22;163:17; 167:14,20;168:14,23; 186:19,21 capture (12) 19:22;68:20;137:22; 138:9;139:6,7,14,15; 141:22;143:3;144:23; 149:25 captured (18) 8:9;135:8,15,18;137:25; 138:6,10,12;141:9;145:11, 21;149:18,19,20;150:2; 158:13;159:13;164:1 captures (2) 66:21;142:21 capturing (6)
Bovik's (2) 32:2,25	39:25;103:21;119:17		
box (1) 114:25	21:18;34:21;46:20;47:22; 64:2;78:1;85:15		
break (20) 23:16;44:1,2,3,4,5;63:2; 82:18;92:5,7,8,12,20;93:8; 132:5,14;164:10;165:25; 166:3;202:15	broadest (4) 41:23;51:19;56:16;69:5 broadly (11) 20:22,24;41:8;67:13; 77:1,2;83:12;106:16; 125:10;127:12,15		
breakdown (1) 5:19	broken (1) 15:12		
briefly (2) 50:18;118:3	brought (2) 6:22;85:18		
bright (2) 17:9;197:24	brown (1) 120:17		
brighten (8) 17:9;133:23;142:3; 154:17,22;155:16,17;165:8	building (11) 98:17;99:20;101:17; 103:10,14,17;111:20;112:5, 13,13,16		
brightened (2) 144:2;147:7	buildings (9) 99:19;101:7,14;104:10; 112:24;113:5,12,19,22		
brightening (5) 35:19,23;36:12;188:23, 24	burn (1) 23:3		
brightens (1) 141:3	button (1) 171:2		
brighter (7) 197:5,19;198:21,25; 199:7;200:18;202:9	byproduct (2) 184:22;186:9		
brightness (40) 36:18,23,25;37:16;42:15, 23;45:5;46:5;48:24;51:1; 53:1,55:10;60:1,22;62:3,	C		

138:3,5;143:4,17;144:23, 24 car (1) 98:18 care (1) 113:6 careful (4) 23:1,3;57:12;155:24 carefully (3) 143:15;160:12;163:1 carry (3) 72:18;151:23;194:14 carrying (1) 106:20 cascade (1) 73:21 case (26) 7:20;8:5;14:10,24;15:3,4; 16:18;17:8;18:21;22:18; 34:4,15;44:2;51:20;81:18; 91:3;92:24;93:4;108:17; 130:15;134:12,12;147:20; 168:6,7;196:7 cases (4) 5:15,16,16;6:1 cast (2) 7:8;9:23 casting (1) 14:8 catching (1) 146:14 categorized (1) 149:12 cause (1) 94:1 causing (1) 100:20 caveat (1) 24:2 caveats (4)	23:19;24:13,21;25:5 Cb (1) 41:12 centering (2) 139:12;143:1 certain (7) 11:23;21:4;66:22;67:15; 103:25;117:13;198:2 Certainly (23) 21:9;29:5;51:2;52:19; 70:10,24;118:13;121:24; 129:4;130:12,15,15;154:14; 159:17;176:12;177:13,14; 180:6;189:6;195:5;197:13, 15;205:4 CERTIFICATE (1) 206:1 Certified (2) 4:5;205:15 cetera (10) 15:6;48:10;49:6,7;55:12; 60:4,5;114:18;116:17; 120:4 chain (1) 27:16 change (32) 13:17;45:25;53:19,20; 86:20,22;87:21;89:17; 90:18;97:20;103:1;105:16; 111:18;116:1,2,6;121:19; 139:19,21;143:20;147:13, 22;149:11,14;150:1; 156:18;158:18;160:17; 183:18,24;185:7;196:24 changed (2) 146:8;187:18 changes (3) 87:1,6;103:12 changing (21) 46:3;47:20;55:20,22;	56:2,4;58:24,25;62:8,12,15, 17,18;79:7;81:9;102:25; 104:1;105:20;145:17; 184:25;185:1 characteristic (16) 62:16,19,24;64:20,23; 68:23;128:2;142:6;146:10; 182:9,10;187:10,12,14,22; 201:7 characteristics (5) 19:23;61:12;107:6; 124:11;139:15 characterization (1) 110:15 characterizing (1) 108:15 chart (1) 130:21 choice (2) 121:7;124:20 choices (1) 125:9 choose (2) 53:16;117:12 choosing (2) 18:19;37:16 chose (2) 123:8;149:24 chromatic (7) 38:18;41:10,12;56:16; 59:10,10;61:1 chromaticities (13) 48:9,25;54:12,15;55:11, 15;57:3;58:20;60:2,10; 61:8,23;67:20 chromaticity (44) 40:17,25;41:16,19;43:19, 22;46:3;47:6,21;49:10; 51:5;56:5,11,12,14,18,23; 57:6,9,15,16,18;58:11,15,	24:59:3,7,9,11,13,15,16; 60:22,25;61:10;63:21; 76:21,24;77:15;126:11,16; 127:9,19;130:6 circuit (1) 120:24 circuitry (2) 164:18,19 circumstances (1) 184:14 cite (2) 133:6;193:19 cites (1) 162:12 citing (2) 153:15,24 Civil (1) 4:8 claim (46) 9:7,12,14,15,17;10:15; 11:8;36:4,5,6,15;65:25; 66:1,2;67:3;71:4,4;73:1,3,3, 23;74:21;111:16,16,23; 126:4,8;127:18;128:14,17; 130:21;140:17;196:25; 197:1,2,9,25;199:10,13,14, 16,21;200:10;201:2,5,9 claims (20) 12:18;33:6;36:17;44:18; 45:7;47:11;50:9;66:25; 67:22;68:13,16;70:18,20; 72:23;130:23;131:3,9,21; 194:15;196:16 clarification (2) 63:3;88:25 clarify (6) 6:7;38:12;49:21;57:23, 25;150:14 clarity (2) 49:5;144:4
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

class (6) 52:22;53:5;111:7,7; 117:9;123:13	15:15 colloquially (1) 83:10	57:24;58:14,18;62:23;63:5; 64:5,6,8,10,12,16;66:18; 67:6,8;68:8;69:8,8,8;73:18, 19;74:2,7,18;78:3;114:7,23; 115:16;126:8;127:8;172:8, 12,16,23,25;177:10	91:20 commonsensical (1) 139:9
classic (1) 52:24	color (55) 12:24;36:14;37:22;41:4, 5,7,9,22,22;43:20,21;46:6, 13;51:5;53:1;54:2,3;56:6, 11,12,19,23;57:5,19;58:11; 59:2,11,15;60:23,24;61:2,3, 11;63:21;77:9;106:10; 126:23;128:3,6,7,10; 130:14,19;172:10,20,20; 174:24;175:10;176:25; 177:1,12,20,21;178:9; 182:11	columns (1) 54:23 combination (8) 37:6,11,22;46:6;178:7; 192:8;195:1,3 combine (1) 163:18 combined (4) 156:2;178:4,18;179:9 combining (1) 177:24 come (14) 15:9;26:11,16;30:16; 92:12,17;117:24;141:16; 144:17,25;145:4;151:10; 160:9;183:3 comes (6) 25:6;30:9;46:9;107:15; 151:8;160:6 coming (4) 33:10;44:4;87:8,12 comingle (1) 155:20 comma (3) 101:16;108:14,19 commencing (1) 4:2 commingled (1) 156:2 commingling (1) 157:13 common (3) 18:22;95:18;150:18 commonly (1)	company (1) 119:1 comparable (1) 168:2 compare (2) 163:18;201:9 compared (1) 189:3 comparison (2) 70:17;150:12 comparisons (1) 150:10 completely (3) 31:18;65:14;72:23 completeness (1) 43:24 component (4) 11:17;38:17;51:10; 182:11 components (4) 37:7,12;38:18;41:12 comport (2) 74:13,15 composition (1) 139:24 compress (2) 26:18;82:12 compressed (1) 82:11 compression (3) 26:19;81:6;144:21 comprises (4) 66:3;67:4;73:6;201:5 computation (2) 174:8,10 compute (2) 72:5;183:22
classification (1) 149:13			
clause (3) 69:7;197:2;198:8			
clear (15) 34:2;48:18;53:2;54:22, 25;59:4;62:15;80:19;111:1; 141:18;153:23;158:16; 165:5;187:6,8			
clearly (5) 66:8;99:16;101:19; 102:25;148:5			
clever (1) 88:24			
close (4) 24:9;92:6;150:24;189:18			
closer (1) 17:19			
cloud (2) 21:21;30:23			
clouds (1) 79:9			
Code (1) 4:9			
coextensive (3) 22:1,3,5			
colleague (1) 18:6			
collected (3) 37:15,20;38:2			
collection (1) 127:20			
collectively (1)			

computed (1) 38:15	conflating (1) 178:1	114:15;120:1,15	144:7;145:17,24;146:13;
computer (6) 10:25;21:1;65:7,9;132:2; 191:25	conflation (1) 178:2	contemplated (2) 129:10;180:6	147:1
conceive (1) 90:19	confused (2) 190:6;201:12	contemplates (1) 111:24	contradiction (2) 146:19;154:23
concept (2) 195:18;196:9	confusion (1) 108:18	content (6) 7:9;44:13;81:10;131:16, 18;176:5	contradictory (1) 96:7
concepts (3) 12:4;56:18;132:2	Congress (1) 4:3	context (113) 8:17;11:3,4,5,8,18,20,22, 25;12:10;14:8;16:10,13,14, 20;18:7;20:17,21;21:12; 23:5;24:6;25:13,15;26:5; 28:2,5,7,13,25;29:16,17,18, 21;30:1,4;31:20;32:15,17, 23;33:24;34:25;35:5,24; 36:20,24;37:5,24;38:24; 39:3,24;40:17;41:16,25; 43:1,3,4,7;44:25;45:16; 47:15,25,25;50:4;51:9,17, 25;56:21;57:14;58:7;59:9; 60:8,15;61:9;65:11,16; 68:6;70:15;71:11;72:17; 77:2,22,25;79:16;81:23; 82:4,9,15,17;84:23;85:1,7, 17,19,22;86:3,5,8;87:2,20; 90:4,11,14;93:21;94:24; 95:4;100:8;108:3;117:4; 123:9;174:8;177:3,5; 178:25	contrast (130) 36:13;45:4;46:7,12;51:5; 52:12,17,23,25;53:13,19; 63:22;67:18,19;68:3;71:16, 20,23,23,23,25;72:8,9,22; 73:8,11,12,13,14,18,20,24; 74:1,5,6,10,11,12,14,23,24; 75:1,3;78:5,7,8,9,11,19,24; 79:2,14,15,21,23;80:3,4,6,8, 11,12,15,18;96:18,20; 100:1;104:16;110:11; 147:6;180:3,9,13,16;181:5, 9,12,16,24;182:5,10,11,13, 14,23;183:6,9,13,16,18,22, 24;184:1,3,13,15,18,21,22, 25;185:5,7,10,12,16,18,20; 186:5,8,9,10,12,15,16,21; 187:1,7,9,13,17;188:7,19, 24;189:2,3,7,8,11,13; 204:12,14
concern (1) 11:4	connection (1) 24:16		control (10) 98:19,23,24;99:14; 133:22,23;142:2,3;154:16, 16
concerning (1) 6:12	consequence (1) 137:13		controlled (6) 73:20;105:13;108:8,11; 109:1,5
conclude (1) 168:14	consider (9) 16:21;19:17;70:19;74:18; 93:3;149:21;173:14,17; 194:24		controlling (5) 74:2,4,25;102:8,18
concluded (1) 92:21	consistent (1) 62:20		controls (1) 100:1
concludes (1) 69:9	constant (9) 78:19,19,21;79:25;83:20; 84:5;187:16,25;188:4		conversations (1) 15:7
conclusion (2) 160:10;183:4	constraints (1) 51:21		converse (1)
conclusions (3) 15:9;155:15;171:13	construction (3) 8:16,20;33:7	contexts (3) 17:18;45:18;91:24	
condition (1) 165:18	consummate (1) 8:18	context-specific (1) 17:5	
conditions (5) 51:22;146:7;147:13; 148:10;155:4	contacted (1) 15:1	continue (1) 93:3	
conducted (1) 152:3	contain (2) 12:3;188:4	continuous (5) 138:20;143:24;145:20; 149:16;150:5	
confess (2) 20:8;22:5	contained (2) 69:23;206:10	continuously (5)	
confined (1) 34:7	containing (3)		
confines (1) 31:10			
confirm (1) 204:18			

29:19	47:2,12;48:17;49:25;50:13;	5:24;10:22;11:7,18;17:3,	66:23
converted (10)	51:3,4;65:24;66:2,3,3;67:4,	3,6,6,8,17;18:17;21:8;	couple (5)
114:4,20;115:8,21;120:8,	4;69:2;86:16,19;87:5,11,18,	22:15;23:7,17;24:1,20;	41:4;64:5;178:1;193:14,
20;121:14;126:17;127:10;	19;88:2;97:23;98:1,6,6,10,	25:14;26:25;27:4,6,12,13;	22
130:7	10,13,14,15,20,20,24,24;	30:13;35:2;36:1,2,12,12,13,	course (5)
converts (1)	99:1,2,6,8,14,15,17,23;	14;39:2;45:24;46:2,4,5,5,6,	6:22;70:21;139:5;153:13;
66:24	100:2,4,6,11,20,23;101:9,	7,24;47:19,21;48:12,14;	156:16
copies (4)	12,19,23,24;102:1,7,14;	49:3,16,17;52:12,14,15;	Court (5)
6:22,23;7:12;9:8	103:2,4,7,9,12,16,21,25;	54:11;58:5,22;60:10;61:7;	34:3,4;57:13;129:14;
copy (6)	104:3,4,8,11,13,19,20,23,	66:7;74:4,8;76:5;77:10,20;	190:6
6:20,22;9:20;10:1;114:9;	25;105:1,7,11,15,19,22;	80:24;81:20;85:10,10,12,	cover (1)
174:16	106:2,6,8,8,12,13,24;108:7,	13,14;88:19;90:13,14,16,	118:1
corners (4)	11,25;109:1,5,11,13,17,19;	19;94:5;100:25;101:19;	covering (5)
7:5;8:14;14:19;16:18	110:1,12,16,21;111:11,16,	103:4,15;105:19,23;106:3,	123:21;124:22;125:3,14;
correct (45)	22,25;112:4,12;113:1,4,15;	9;107:5;118:24,25;119:17;	184:17
6:14;19:7;38:11;48:19;	135:24;136:7,11,13;138:15;	122:18;124:13,13,18;	covers (1)
70:3;79:13;93:19,20;99:4,	140:1,3,7,8,10,12,15,16,18,	130:17,19;134:19;141:7;	197:14
4;105:5,9;111:25;142:4;	21,22;144:11,13;148:4,12,	146:3,24;150:14,18;152:13,	Cr (1)
150:3;152:20,25;153:4,12,	25;149:7;161:9;162:19;	14;157:3,22,22,24;163:6;	41:13
23;156:17,22;159:5;160:1,	164:4;178:15,16;188:22;	165:7,18,20,25;173:10,18,	create (7)
15;161:7;168:16;169:11;	189:15;190:25;191:22;	19,24;174:11,23;175:12,14;	8:16,20;38:16,19;39:20;
182:17,23;183:18,24;185:6,	194:10;199:10,18,20,22;	178:18,25;179:4,13;180:6;	68:24;162:23
12,23;186:3;188:8,20;	200:23;201:3	181:6,24;182:1,7;184:21;	creation (1)
190:22;198:23;199:12,24;	corrections (10)	185:7;186:7,8,9;192:1;	159:15
204:7;205:3;206:10	46:11,24;105:4;109:24;	195:6,13,25;196:21,22,22;	creatures (1)
corrected (8)	133:5,12;134:8;153:19;	198:5;201:21;205:2	18:10
21:3;87:9;109:16;113:11;	189:16;206:8	couldn't (5)	criteria (2)
136:4;172:9,13,19	corrects (2)	112:21;155:23;167:19;	98:12;103:24
Correcting (18)	98:11;180:6	168:20;179:12	crystal (1)
18:6,13,14;19:2;45:3;	correspond (2)	counsel (14)	141:18
86:25;99:21;101:6,7,18;	104:4;200:24	7:11;9:9;15:1,7,13,17;	cumulative (1)
103:22;106:18;114:16;	corresponding (2)	20:8;23:1;43:25;92:4,22;	10:24
115:12;120:2,12;139:13;	180:15;197:18	93:9;203:7,15	current (2)
189:23	corresponds (2)	Counselor (17)	66:12;68:2
correction (181)	197:3;200:17	6:19;18:18;19:9;28:17;	currently (1)
16:10,13,14,22,24;17:1,6,	corrupted (1)	31:9;51:25;57:11;70:7;	141:23
21,24;18:6,21;20:17,20;	190:14	84:12;91:1;92:9;123:11;	curve (2)
21:8,11,17,19,25;22:10,12,	cortex (1)	161:13;167:6;173:21;	188:23;189:13
16;23:7,11,12,17,25;24:2,3,	69:10	175:11;202:14	
7,10;44:12,16,25;46:11,22;	could (141)	counted (1)	

D	125:25 deal (1)	11:1,7,11;19:25;42:18; 53:3;56:14;57:15;58:7;	25;91:19,23,25;123:23; 124:13,14,18,19,19;126:25;
dark (53) 17:9;124:4;133:15,19,24; 134:13,21;140:25;141:3; 142:3;148:2;152:23,25; 153:3,4,6,6;154:10,13,17, 20;155:2,7,12,13,16,17,21, 23,25;161:17,17,20,20; 163:4,4,5,6,12,13,16;165:7, 10,19;167:25;168:8,19,20, 22;169:17,17,19;170:16	165:21 dealing (2) 123:7;165:22 deals (1) 139:22 deblocking (5) 81:11;82:7,9,13;83:6 decibels (2) 68:4;69:11 decide (2) 123:20;154:21 decided (1) 118:1 deciding (1) 166:9 decision (4) 32:6;171:10,15,17 declaration (14) 10:2;15:24;28:21;113:25; 132:25;178:4;179:6,16,19, 23;191:15;200:7;201:24; 203:9 declarations (4) 6:21;15:6,25;31:20 declare (1) 206:6 declared (1) 9:24 decrease (2) 78:7,11 decreases (1) 80:4 defense (1) 199:21 define (7) 7:3;16:3;40:25;73:14; 80:24;81:22,23 defined (15)	66:8;71:24;72:9;80:23; 86:5;184:3 defines (1) 43:19 defining (5) 36:23;39:23;50:10;52:5; 95:16 definite (1) 55:21 definitely (1) 186:7 definition (12) 19:13,20;42:17;56:24; 80:6;143:25;173:22;174:6; 183:15,16,25;184:1 definitions (3) 72:10;75:3;78:20 definitively (2) 94:22;95:2 defocusing (1) 85:12 degradation (1) 94:3 degree (3) 65:7;106:11;116:2 delay (1) 141:22 deletions (1) 206:8 Delineated (1) 181:14 delta (2) 189:4,4 demosaiicing (2) 13:11;45:22 depend (26) 33:5;34:13;83:24;89:21, 22,23;90:4,6,7,8,11,13,14,	140:8,22 dependency (1) 90:18 dependent (1) 140:14 depending (10) 35:14;47:7;88:16,20; 90:12,15;123:15;129:22; 148:18;173:11 depends (21) 11:3;36:6;73:3;84:10,11; 87:11,14;88:6,8,12,18;89:3, 6,12,13;90:20,23;117:18; 124:11;140:10;178:25 deploy (2) 77:21;78:2 deployed (1) 119:10 depo (1) 33:21 deposed (1) 5:10 deposition (6) 7:4;14:20;31:15;32:1; 70:4;205:18 depositions (2) 5:20,24 derivative (12) 121:10,12,22;122:21; 123:5,22;124:23;125:3,14; 173:5,6;180:12 derivatives (2) 121:18;177:15 derive (1) 150:4 derived (3) 38:15;141:7;157:1 deriving (1)

142:22	14:25;46:5;47:22;49:10;	devolves (1)	6,11;147:4,12,12;149:7,9,
describe (6)	171:24;188:19;190:10	109:8	25;151:20,21;152:2,8;
63:11;79:3;133:15;167:5,	detect (20)	didn't (27)	154:11;155:3,4,11,15;
6;186:4	133:20;141:1;142:10;	32:17;33:6;54:18;56:23;	156:4,6;163:8;169:1,8,8;
described (17)	154:11,20;155:5,8,13;	57:5;70:22;71:5,8;73:25;	170:13,18;178:14;181:1,1;
27:15;109:3;120:21,22;	164:2,3,3,5;165:5,9;166:23;	80:9;96:13;108:2;118:19;	189:14;191:10;194:1;
129:18;142:8;154:17;	168:12,20,23;170:9;182:20	119:2;145:14;146:15;	196:23;199:3;200:15,16
157:17;158:5,17,23,24;	detected (18)	152:17;155:7;179:21,25;	differently (3)
160:14;161:4;167:7;	96:21;122:5;133:4,11;	184:7;189:24;194:5,16,24;	99:10;112:25;156:5
168:13;169:6	134:4,7;135:3;142:1;143:2;	196:20;201:12	differs (1)
describes (10)	153:18;161:17,20;163:5,17;	differ (5)	57:2
45:24;74:23;137:4,11;	164:23;165:2;171:8;174:2	39:9;72:16;98:2;105:13;	difficult (3)
174:25;180:25;186:1;	detecting (7)	146:25	34:10;57:20;91:9
188:7;194:1,9	141:1;151:24;152:5,6;	difference (14)	difficulties (1)
describing (9)	163:25;164:22;168:12	21:16;39:1;48:16;54:14;	192:21
134:15;135:23;151:10,	detection (19)	64:22;72:1;100:21;129:4;	digital (67)
12,23;156:4,13;164:16;	142:6,24;152:3;154:22,	147:18,21;168:10;198:21,	6:18;7:3,6,25;8:8,9,12;
190:24	25;163:24;164:7,16,18,19;	22;199:2	9:17;10:15,19,23;11:7,13;
description (4)	165:4;166:6,8,9,10,14;	differences (2)	12:4;13:9;16:10,13;17:2;
43:6;47:22;128:11;133:9	171:6;174:1;182:21	61:2,3	18:15,23;19:14;27:1,7;
design (5)	detects (4)	different (149)	28:20;35:13;37:25;38:7;
39:17;121:7;122:18;	163:22;164:13,14;174:1	11:24;17:18;18:2,2,13,	41:21,25;71:11,16;73:5,7,9;
124:20;125:9	deteriorates (1)	14:20;3,21;22:9;28:8;	76:9;82:4;84:23;85:1,7,23;
designed (4)	148:20	30:14,17,25;36:8,11;37:13;	86:9;91:6;94:1,3;114:15;
79:10;143:10;187:23;	determine (14)	42:19;43:10,10,10;52:1,6,	120:1;123:4;163:23;
203:1	117:21;121:4;122:11;	10,16;55:15;58:22;60:11;	175:25,25;176:3,23,23;
designer (1)	125:13;129:6;155:1,3,6;	61:8,15,22;62:2,8,11;68:19,	177:18,18;180:14;181:4,22;
113:6	166:4;167:21;168:19;	21;83:13;84:15;85:14;86:3,	197:3,4,7,21;199:19;200:8;
desirable (1)	171:4;197:9,24	11;91:24;97:22;98:15,15,	201:4,9;202:9
84:19	determined (9)	16;99:9,10,12;100:10,10,	digitized (2)
desirous (1)	36:9;106:19;166:12;	13,18,21;102:10,11,16,20,	8:9;13:4
206:9	199:10,18,20,22;200:23;	21,22;103:23;104:4,11,12,	dimensions (1)
despite (3)	201:3	13,20,23,25;105:1,3,4,7,8,	40:9
33:6;130:2;164:5	Determining (4)	11,12,15,17,21,22;106:2,3;	direct (7)
detail (6)	36:7;73:4,6;192:15	108:7;109:16,17,21,22,25;	31:19;32:4,25;91:16;
74:24;75:4;78:4;122:2;	device (5)	110:1,12,16,17,21,22;111:4,	97:2;172:2;180:25
154:18;185:9	64:15;67:9,13;137:6;	9,12,13,15,21,22,24;112:25;	directed (5)
detailed (1)	192:1	113:15;115:18;118:3;	20:20;148:16;149:1;
116:5	devised (1)	122:16;124:7,9;125:9,20;	150:12;169:16
details (7)	164:8	134:15,15,25;144:15;146:1,	directing (1)

34:3	displaced (1)	151:2;155:18;160:2;	15:8;24:11;44:20;49:25;
direction (3)	145:4	180:24;188:16;193:11;	50:18;140:6;159:15;167:9,
148:18;170:3,5	display (14)	200:2,12	11;170:25;173:19
directly (2)	64:15;67:9,13;136:23;	documentation (1)	don't (149)
33:21;194:18	137:8;138:1;139:11;146:9;	15:4	6:1,7,22;7:13;11:11;
disagree (7)	148:6,9,13,17;149:16;	documents (11)	13:21;14:25;20:9;22:5,7,14,
14:5;168:17;171:13,19,	157:12	12:3;14:19;15:11,13;	24:23;20:25;12,13,20;
22;185:15,18	displayed (12)	16:18;17:7,20;22:18;26:5;	27:23,24;28:17;31:14;33:1;
disagreeable (1)	137:6,11,14,23;142:21;	89:15;142:15	39:14;43:2;44:1,4;49:6;
130:16	144:21,24;146:20;148:7,8;	doesn't (101)	50:10;51:15,17;55:20;56:2;
disagreement (1)	158:15,19	8:6;12:20;17:25;24:23;	57:4,13,17;58:12;61:3,10;
146:1	displays (1)	26:22;32:3,19;36:1;40:23,	62:6,10,23,23,25;63:10,25,
disappears (1)	67:17	24;48:5,5;55:7,7;59:23,23;	25:64:15,18;65:2;66:4,25;
144:8	distinction (1)	63:22;65:2;66:1;74:14;	67:21,22;68:12;72:22;
disclose (1)	178:23	78:9;90:24;100:25;101:3;	77:22;80:25;86:25;87:7,25;
131:8	distinguish (2)	102:6;107:16;109:13;	88:8,15,22;90:6,25;91:2;
disclosed (1)	113:14;142:20	112:3,11;113:5,6;121:3,23;	95:14;96:1;97:13;102:17;
131:8	distribution (17)	122:1;128:24;129:3,8;	103:5;104:5;105:18;
disclosure (1)	76:24;77:3,4,9,12,13,15;	133:11,12,14;134:7,18;	107:22;109:18;112:7,22;
130:22	126:11,12,16,17;127:9,11,	139:21;140:8,22;143:15,15;	113:3,20;116:11;118:22;
discomfort (1)	20;128:6,7;130:6	149:14;152:16,16;155:5,9,	119:7,14,18;124:2,2,3,5,5,9,
69:17	distributions (6)	20;156:18;157:2,15;158:1,	17,24,25;125:24;128:20;
discover (1)	172:10,20;176:25;	4,18;159:16,17;160:17;	134:9;135:10,16;139:9;
142:16	177:11,20;178:9	163:13;165:1,2,5,5,21,23;	140:10;144:7;153:5,6;
discovered (1)	district (2)	166:5,7,7,15;167:11,14,20,	154:22;155:18;156:1,10;
124:6	5:16;6:1	24;169:2;173:10,11,22;	157:6;159:17;160:2,23;
discrete-cosine-transform (1)	diverse (2)	178:7;183:7,11;184:11;	162:3,15,23;163:18;164:21,
82:21	28:8;175:22	193:1,6,9,11,19;194:6,14,	22;165:1,17;169:2;170:1,2,
discuss (7)	diversity (1)	21;195:9,11,15;196:23,23;	5,14,14,18,19,22;171:17,24;
92:21,23,25;132:13,17;	175:18	201:25;205:8,10	173:16;174:6,24;179:12;
177:7,11	divided (1)	doing (24)	180:8;181:12,16;182:1,24;
discussed (2)	72:3	22:9;29:12;40:12;53:10;	183:3,15;185:18;187:5;
136:19;151:4	divorced (2)	80:12;102:10,11,20,20;	190:8;192:25;193:12;
discussing (2)	14:7;140:13	106:9,11;117:19;118:23;	194:11;197:12,23;199:13
90:12;150:25	document (27)	119:3;126:22;127:13;	down (8)
discussion (4)	9:15;10:12;19:12;40:23;	129:5,24;135:24;142:24;	15:12;23:16;40:14;58:7;
15:13;72:24;135:18;	45:12;50:20;71:1;93:24;	169:3;176:1,24;177:19	63:2;74:7;78:13;137:12
184:2	94:25;95:21;98:9;110:7;	domain (3)	Dr (26)
discussions (1)	121:15;133:25;136:2,14;	82:19,20,21	8:21;22:20;25:23;28:21;
93:9	137:1;139:21;146:18;	done (11)	32:2,25;40:3;44:2,9,21;

57:22;58:14;70:5;71:2; 92:6,20;93:17;132:13; 160:12;161:14;184:6; 195:8,15;196:2;201:24; 203:6 dramatic (1) 143:20 draw (1) 12:5 drawing (1) 8:15 drawn (3) 13:16;22:19;190:20 DRC (3) 35:13;46:10,10 drew (1) 69:16 due (3) 34:9;147:19,21 duly (3) 4:6,11;5:4 during (17) 15:19;92:20;93:8;99:14; 132:14;136:23;137:8; 142:7;144:2;146:8;148:13, 17;149:2;156:13;159:8,10; 160:9 dynamic (197) 41:25;42:10,25;43:5,7, 14;44:12,15,24;45:13; 46:11,22;47:2,4,12,15;48:2, 5,12,15,16,17,17,20,23; 49:3,17,25;50:4,10,12,22; 51:2,4,7;52:2,5,6,9,12,16, 25;53:12;54:2,11;55:3,8,17, 21,22;56:1,4,5,10;57:2,2,8, 9,19;58:4,11,11,19,20,25; 59:20,24;60:8,9,10,11;61:4, 5,7,8,16,22;62:3,10,12,15, 17,18,19,24;63:1,6,7,12,16;	64:7,9,14,20,21;65:10,16, 23;66:2,3,5,7,10,11,15,19; 67:4,7,9;68:4,5,15,20,21,23, 25;69:2,10,13;93:23;94:2,4, 5,8,12,18;95:4,6,9,17,24; 96:4,14,19,22,23;97:9,11, 16,19;99:18,20,24;100:3,6, 9,13,15;101:1,5,13,17,20; 102:2,8,9,12,14,23,24,25; 103:2,10,24;104:1,15; 105:16,23;106:4,15,16,18, 23;107:1,5,8,9,9,14,20,23, 25;108:3,4,10;109:5,10,12; 110:10,21;111:6,8,11,18; 112:4,12;113:1 E each (9) 6:9;18:1,23;30:23,24; 31:1,3;136:6;181:2 earlier (12) 11:17;54:10;63:6;69:17; 75:18;86:16;95:6;141:21; 183:16;186:11;195:14; 203:7 easier (2) 190:5,9 easy (1) 124:8 Eat (2) 92:11,13 edge (13) 74:23;75:4;78:4;121:10, 12,22;122:21;123:22; 124:23;125:4,15;173:5,7 edges (1) 83:11 editing (1) 82:4	education (5) 51:12;71:22;75:14;76:23; 181:20 educational (1) 65:8 effect (13) 68:1;78:23;79:2,20; 83:23;84:9;104:16,17; 116:2,3,7;176:6;203:16 effectively (2) 79:1,20 effects (3) 49:25;75:5;186:20 efficacious (1) 21:2 effort (1) 15:16 eg (3) 35:12;94:1;105:12 either (13) 27:16;33:19;79:1,20; 85:17;91:11;157:5,5,24; 158:12;170:3;186:12;196:3 elaborate (1) 49:21 electrical (1) 144:19 element (5) 38:21;114:2;128:14,17; 130:5 elements (3) 126:4,8;127:8 eliminate (1) 76:3 Eliminating (1) 182:3 elimination (1) 138:21 else (21) 24:10;27:19,19;30:9,10;	34:8;36:2,13;46:2;51:5,22; 56:1;98:5;101:18;103:4; 106:9;122:14;138:19; 163:20;176:12;184:16 elusive (1) 95:22 embodiment (28) 43:11;50:7,24;56:21; 121:9;133:9,10;134:6,6,16, 18,20;137:21;146:5,6; 152:20;166:24;167:4; 169:8;170:12,13;191:1,10, 12,13;194:8,9;195:23 embodiments (9) 43:11;45:17;47:23;65:21; 134:15;157:20;169:1; 186:2;191:10 emission (1) 143:12 emittable (1) 144:7 emphasis (7) 37:7;38:10;146:8;188:24; 189:2;204:12,14 emphasized (2) 147:6;155:25 emphasizes (1) 189:13 emphasizing (2) 163:16;189:10 empirical (2) 77:7,8 encompassing (1) 107:14 encountered (1) 24:18 encountering (1) 20:6 end (4) 12:20;35:12;182:13;
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

198:20	equate (2)	155:22;163:15;166:15;	51:6;52:22;53:9,15,18,21,
ends (5)	37:17;60:24	194:16	21;61:2;65:25;67:6;68:2,7,
48:1;55:2,19;59:19;63:16	equated (3)	event (4)	10;71:24;74:25;75:6;78:10,
engaged (1)	36:24;42:15;153:7	25:8,16,21,21	15,24;79:24,25;81:12,14,
14:24	equating (1)	events (2)	15,19,25;82:1,3;83:19;84:4;
engineer (1)	187:7	27:15;139:1	87:8;90:16;91:4;93:24;
30:20	equation (2)	eventually (1)	95:15;96:16,18;99:3,9;
engineering (1)	74:13,14	39:12	100:24;101:1;103:6,8;
18:10	equations (1)	ever (10)	104:15;105:3,19,21;106:5,
English (3)	73:15	38:8,20;137:24;138:7;	7,18,22;107:2,2,3,12,13;
91:20,24;92:1	equivalent (1)	146:24;164:8;186:14;	108:1,14,19;109:7,8,9,12,
enhance (4)	173:17	187:24;194:21;195:9	16;110:9,16,20;111:10;
47:21;96:18;110:10;	eradicate (1)	every (10)	112:2,8,22;113:9,10,13,19;
201:6	82:21	33:12;38:7;54:19;78:21;	123:11;124:3;130:16;
enhanced (2)	error (2)	164:7;165:16;181:11,11,15,	134:1;136:21;138:19;
122:4;174:2	72:6,7	15	140:17;146:22;148:2,16;
enhancement (6)	especially (2)	everything (9)	170:15;177:11;179:3;
46:13;52:13;114:15;	45:7;187:8	13:14;15:15;63:17;84:25;	183:4;185:12,16;188:6;
115:12;120:1;147:10	essentially (2)	97:4;101:18;108:19;	190:13;194:15;197:15;
enhancing (3)	33:11;63:8	116:12;122:14	198:3;204:25
46:5;104:16;120:11	established (4)	everywhere (2)	examples (27)
enough (6)	152:19;156:21;169:10;	102:24;184:15	11:6;12:3;13:13;17:18;
6:3,8;9:20;19:3;61:6;	171:5	evident (1)	18:23;26:9,14;30:12,13,15;
115:7	estimate (1)	76:2	31:5;34:14,21;46:12,22;
enter (1)	117:25	exact (3)	52:20;53:22;58:6;59:10;
165:17	et (10)	102:6;137:24;162:4	64:6;65:23;66:6;72:11;
entire (9)	15:6;48:10;49:6,7;55:12;	exactly (8)	81:1,4;84:25;118:24
53:19;73:24;86:24;94:3;	60:4,5;114:18;116:17;	11:19;77:3;100:25;101:8;	except (2)
130:4;185:2,14,22;188:17	120:4	134:10;138:6;145:22;177:7	54:23;61:11
entirely (1)	ethnicities (2)	exam (1)	excerpts (1)
76:3	124:7;128:12	32:4	114:8
entitled (1)	evasive (1)	EXAMINATION (4)	exclude (2)
71:4	34:5	5:6;32:25;203:4;205:6	107:19;159:18
entry (1)	even (30)	examined (2)	excludes (1)
192:24	37:9;38:20;39:21;46:19;	4:12;5:4	107:22
equal (6)	47:12;52:10,10;64:16;66:1;	example (120)	excuse (3)
59:15;183:10,17,23;	69:19;70:22;75:24;89:22;	17:7;26:4,7;30:17,17,25,	67:8;88:1;119:4
184:8,8	91:15;96:7;109:20;114:23;	25;34:19;35:6,15,19;36:14;	EXECUTED (1)
equally (1)	125:24;130:8;138:23,23;	38:3,9;39:8;40:4,11;42:16;	206:12
102:24	139:2,10;143:17,23;145:2;	43:12;49:24;50:6,23,24;	exemplar (1)

130:16	12:13;20:4;40:24;47:8;	142:6	170:9;171:1,3,4,6,8;172:21;
exemplary (2)	48:5;49:15;55:7;59:23;	extreme (7)	174:1,1;176:25;177:12,20;
113:10;121:8	63:23;73:25;91:1;98:13;	48:1;55:2,19;59:19;	178:10;180:23;182:21,21;
exemplify (1)	114:19;115:20;116:9,12;	63:16;78:24;130:15	183:14;190:20;198:2,8;
34:14	120:7,19;121:3,13,21;	eye (5)	199:5
Exhibit (34)	122:10;126:10,15;127:8;	37:22;38:5,7,8,20	Facebook (3)
8:22,24;10:1,3,6,10;	143:15	eyes (4)	117:23;118:20,23
15:22;19:11;44:10;53:4;	explained (5)	24:9;119:16;189:19;	face-detecting (1)
93:13,14;113:24;114:9,10,	63:14;98:21;134:20;	190:20	133:20
13;119:22;130:20;132:21,	141:21;168:21	eye's (1)	faces (23)
22,25;136:21;153:14,17;	explaining (5)	38:11	99:18,21;101:6,14;104:9;
172:4,7;174:17,19;191:9,	102:3;116:6;120:25;	F	105:13,23;106:3;112:9,23;
16;196:25;203:8,22;205:8	134:11;162:18		113:5,11,18,21;114:16;
exist (1)	explains (2)	F0 (1)	115:17;119:17;120:2,15,18;
88:20	99:16;147:3	189:4	128:8;129:13;164:5
exists (1)	explanation (4)	F2 (1)	facial (13)
144:8	30:5;47:15;74:18;169:20	189:4	121:9;122:3,5;126:12,16;
expect (1)	explanatory (6)	face (153)	127:10,23;130:7,10;173:3;
116:12	61:14;64:7,17,17;80:9;	17:16;35:10,17,19,23;	174:1,3;192:15
expected (3)	120:9	98:17;99:3,19;100:12;	fact (11)
26:10,16;186:25	explicit (3)	101:14;103:10,13,17,23,24;	33:6;116:12;128:13;
experience (14)	33:7;70:22;71:6	104:18;105:17,24;106:4,19,	130:2;153:14;156:12;
6:25;25:16;29:1;31:2;	explicitly (1)	22,25;107:1;108:10;109:4;	165:3;168:1;174:16;189:9;
42:11;51:12;65:9;71:22;	40:24	110:11,18;111:2,3,3,5,6,6,	198:11
75:15;76:23;83:5;118:9;	explore (1)	17,19;112:5,5,13,19;113:7,	factor (2)
123:12;181:20	29:6	20;117:21;127:23;128:1,7,	45:25;46:4
experiences (1)	exposure (4)	7,25;129:2,5,7,8;130:1;	factors (6)
19:6	123:13;133:22;142:2;	133:3,10,15,19,21;134:4,7,	47:6,20,20;48:13;58:5;
experiment (1)	154:16	13;140:25,25;141:1,25;	195:6
117:7	express (1)	142:5,11,24;143:1,4;	failed (1)
experimentation (4)	7:20	146:23;147:6,7,8,10;148:5;	49:14
117:16;118:7;123:23;	expressed (9)	149:5;151:24;152:3,5,6,22;	failing (1)
124:1	9:23;16:16;19:21;50:25;	153:2,18;154:8,10,11,21,22,	92:3
experimenting (1)	58:5;69:23;71:1;101:21;	25;155:1,5,8,13,24;161:17,	Fair (8)
118:2	182:24	19;163:9,11,14,17,22,24,25;	6:3,8;19:3;86:18;87:17;
expert (5)	expressly (2)	164:3,3,7,13,14,16,18,19,	110:15;125:5;150:7
14:23;21:5;131:6,7,25	31:21;33:14	22;165:1,4,5,7,9,20;166:5,5,	fairly (1)
expertise (1)	extent (3)	7,9,10,14,23;167:21;	45:14
132:1	88:5,12,16	168:11,12,20,23;169:22,24;	falls (2)
explain (26)	extracts (1)		46:14;71:3

familiar (1) 14:6	Figures (2) 188:6;198:16	finger (1) 24:9	191:21
famous (1) 82:1	fill (1) 101:2	fingerprint (1) 21:5	flash (10) 139:23;143:12,18;144:3, 8;145:19;156:14,16;159:8,8
far (3) 33:11;72:24;162:10	fills (1) 28:16	finish (1) 81:14	flexible (1) 44:6
fast (1) 79:7	filter (61) 12:24;78:15,18;79:11,12; 81:7;82:2;115:18,24,25; 116:1,7,9,18,19,19,20,21, 23,24,24;117:5,12,14; 118:6;120:16;122:4,11,16; 173:24;174:2,5,12,21,23; 175:9,13,15,19,21,22,24; 176:4,15,22;177:17,23,25; 178:8,21,22;179:1,3,7,10, 13,14,15,17,20;187:24	finished (2) 13:16;46:18	focus (1) 15:19
faster (1) 125:21	filtering (9) 78:23;79:1,20;116:14,15; 117:3;121:1;174:11;187:22	first (78) 5:4;6:3;28:19;36:9; 45:15;55:16;58:23;66:1,9; 72:14;73:5,7,8;75:11; 78:12;83:8;94:10;97:5; 98:10;108:5,6,13,16,18,20, 23,24;109:7;114:12;115:5; 119:24;134:17;137:3,21; 146:17;150:15;152:20; 160:15,19,25;161:7;176:15; 182:7;185:15;191:1;197:3, 4,6,18,18,21;198:9;199:4,7, 10,19;200:3,9,13,13,14,14, 17,18,19,20,23;201:1,4,5,6, 8,13,16,18,19;202:8,10	focusing (1) 142:7
feature (20) 77:9;96:18,21;98:21; 99:19,20;101:15,17;104:18, 22;105:9,12;109:20;110:11, 13,18,23;111:2,3,5	filters (5) 118:3,21;175:17;176:3, 21		follow (4) 27:7;30:12;138:16;183:7
features (20) 77:11;97:22;98:16,17; 99:12;100:18;104:9,9,10, 12;105:4;109:16,22,25; 110:2,17;111:8,12;112:25; 113:16	final (2) 116:16;117:3		followed (1) 110:9
Federal (1) 4:8	finality (1) 171:18		following (7) 13:5;34:18;54:24;114:23; 115:3;122:3;130:21
feed (1) 90:24	finally (1) 189:19		follow-on (1) 54:22
feel (1) 28:18	find (11) 23:2;43:12;123:14,17; 124:8,8;130:16;131:17; 155:23;158:9;167:19	Fish (1) 4:3	follows (1) 5:5
few (5) 34:14;63:13;119:14; 144:9;166:17	finding (5) 97:14;119:16;180:15; 181:21,25	fit (1) 137:12	follow-up (1) 166:2
field (12) 7:1;16:5;17:2;18:8; 19:14;28:2,12;29:16;30:6; 41:17;65:7,9	fine (9) 89:10;92:18;94:15; 119:12;168:10;194:7; 195:2,4;202:16	fits (1) 130:15	foregoing (2) 206:7,9
Figure (20) 43:11;45:20;49:24;50:3, 6,25;119:6;122:20;124:21; 125:18;127:4,5;135:1,2; 148:3;164:18;188:6,10; 202:12,13		five (4) 63:19;65:8;149:19,20	forget (3) 75:19;80:1;81:12
		five-minute (1) 202:15	forgotten (1) 43:18
		fix (2) 195:19;196:9	Form (91) 7:18;9:18;10:17,19,23; 11:2,9;12:1,12,13;13:20; 17:23;18:25;19:8;20:7,18; 22:2;23:13;24:4,17;25:3,11, 19;26:2,12,17;27:3,9;28:3, 14;29:3;30:7;31:7;33:25; 35:25;37:11;42:2;49:4; 51:14;52:3,18;57:10;61:18; 62:4;63:9;64:25;65:12,18; 66:16;67:10;68:17;69:14;
		fixed (4) 173:22;194:11,14;195:22	
		fixing (1)	

70:13;71:7,12,17;74:13; 75:9,17;76:25;77:17;80:5; 83:17,25;84:24;85:8,24; 86:23;87:22;89:8;90:5; 91:22;101:25;107:21; 118:11;131:14;147:15; 161:24;168:24;169:12,25; 180:4,10,17;181:10,23; 182:6;188:2;194:4;195:16; 197:11	freckles (3) 114:18;115:14;120:3 frequency (1) 176:5 from (76) 7:16;12:19;13:18;14:7; 16:8;23:5;30:15;38:16; 39:24;41:11;54:6;56:15; 57:2;69:16;81:20;84:15; 85:12,13,14;87:17;95:11; 99:13;103:6;106:21; 107:23;111:7,16;113:25; 114:8;115:6;120:18; 121:14;122:7;128:22; 137:5,21;140:13;141:7,16; 142:6,10,22;144:17;145:4, 21,24;146:11,25;147:4; 148:1;149:19,20,23;150:4; 151:6,8,10;157:1,7;159:13, 14;160:6;162:10;168:1,3; 169:14;177:2,25;194:22; 195:3,10;196:19;199:15,21; 200:15;201:4	138:25;163:12 fuzzy (2) 174:8,10 G gain (109) 33:23;34:12,17,19,24; 35:1,4,13,16,19,22,23;36:3, 8,9,13;45:24;46:4,10;47:7, 19;49:9;50:1,12;73:4,6; 188:22,22;190:21,24;191:3, 21,22;192:11,11,12,14,15, 18,18,22;193:6,9,15,15,22; 194:2,9,13,19,21;195:6,9, 21,25;196:17,19,21,21; 197:22;198:3,3,5,10,20,20, 21,21,24;199:6,7,8,12,23; 200:4,4,5,13,14,14,15,18, 20,24;201:11,12,14,16,17, 19,22;202:2,4,4,5,5,6,10,20, 20;203:18;204:5,11,22,22, 25,25;205:1,3 gains (1) 202:22 games (1) 129:12 gamut (1) 5:17 Gaussian (36) 174:8,10,11,21,23;175:1, 9,12,15,17,19,21,22,24; 176:3,15,20,22;177:17,23, 24;178:8,8,21,22;179:1,10, 12,14,14,17,20;186:18; 187:18,22,24 gave (13) 8:18;9:8;11:12;26:7; 54:17,19;58:17;78:20; 79:24;81:25;85:1;96:8;	183:16 general (6) 7:7;24:19;78:1;107:23; 109:8;122:17 Generally (15) 24:25;50:9;87:13,15; 88:23;107:10;127:1;138:2, 7;155:19;175:22;181:25; 187:3,9,23 generate (1) 204:15 generated (3) 27:2,8;144:20 generating (1) 204:23 geometry (3) 116:24;117:14;118:6 gets (1) 141:23 getting (5) 18:20;51:9;81:13;92:5; 188:9 give (34) 5:18;8:1;9:20;10:7; 17:17;25:22;30:12,13; 34:14;38:9;39:8;45:6; 50:21;51:9;52:20;53:15; 57:17;64:5;65:23;67:15; 78:10;81:4;82:3,17;90:1; 91:4,8;120:23;121:23; 122:25;123:24;131:10; 191:4;192:4 given (21) 28:5;29:17,18;31:6; 35:14;37:22;47:25;62:7; 67:13,14;69:18,21;75:3; 76:7,16;93:5;101:21; 148:14;155:12;191:6; 204:18 gives (9)
formal (1) 42:17 format (2) 8:10;11:13 formation (1) 29:2 forms (1) 107:23 formulate (1) 30:5 forth (2) 4:12;85:18 Fortieth (1) 5:14 forward (2) 31:23;70:1 found (3) 131:19;152:22;153:2 four (10) 6:2;7:5;8:14;14:18; 49:18;60:6;112:24;114:7, 22;115:2 fraction (2) 5:25;143:2 frame (1) 142:19 frames (1) 144:9 framework (1) 11:23	front (1) 145:22 full (3) 130:18;157:18;165:16 full-scale (1) 52:23 function (11) 78:11;83:24;84:9;85:23; 86:8;120:21,22;142:23; 146:21;164:17,24 functional (1) 113:2 functions (1) 78:13 Further (5) 104:7;109:24;205:5,6,13 Furthermore (2)		

50:23;59:10;105:3;109:7; 111:10;113:17,18;124:3; 159:25 giving (10) 23:22;37:7;46:12;58:6; 66:6;68:9;96:5;118:24; 122:17;194:8 global (2) 51:23;53:18 globally (1) 51:23 goal (11) 127:24;128:9;182:13,14, 17;184:20,23,24;185:3; 187:5,20 goals (3) 18:13;20:21,22 goes (10) 103:25;137:12,25;141:2; 144:6,20;149:6;154:14; 168:15;194:18 going (44) 6:20;9:19,21;10:6,22; 12:16;23:6;31:9,9,11,17; 32:5,8,22;33:19;39:10; 42:6;43:25;57:11;58:10; 65:1;69:25,25;70:1;72:21; 87:25;88:25;92:4;97:4; 132:20;141:10,15;143:8; 150:10;170:14,16,17,18; 172:6;176:15;188:15; 191:18;193:23;202:14 golly (1) 165:6 gone (2) 84:13;162:10 Gonzalez (1) 192:10 good (10) 72:12;92:15;123:16;	132:7;139:15;148:21; 156:5;179:3;192:3;196:12 Google (1) 30:23 gotten (1) 201:11 governed (1) 32:22 Government (1) 4:9 gradation (1) 149:4 granular (1) 122:1 GRAUBART (103) 7:18;9:18;10:17;11:2,9; 12:1;13:20;17:23;18:25; 19:8;20:7,18;22:2;23:13; 24:4,17;25:3,11,19;26:2,12, 17;27:3,9;28:3,14;29:3; 30:7;31:7,13,17;32:12,21; 33:13,25;35:25;42:2,12; 43:25;49:4;51:14;52:3,18; 57:10;61:18;62:4;63:9; 64:25;65:12,18;66:16; 67:10;68:17;69:14;70:13; 71:7,12,17;75:9,17;76:25; 77:17;80:5;83:17,25;84:24; 85:8,24;86:23;87:22;89:8; 90:5;91:22;92:4,16,18; 101:25;107:21;118:11; 131:14;132:7;147:15; 161:24;164:9;165:25; 166:17;168:24;169:12,25; 180:4,10,17;181:10,23; 182:6;188:2;194:4;195:16; 197:11;203:5;205:5,13,17 gray (1) 42:23 grayscale (1)	78:22 greater (2) 37:7;38:11 green (7) 12:22,25;13:1,8;37:7; 38:10,11 green-valued (1) 13:7 guess (13) 5:23;14:24;48:4,6;49:12, 13;55:6,9;59:22,25;60:8; 122:25;147:9 guidance (3) 50:22;122:19;125:9 guide (1) 124:20 guided (1) 127:22 guides (3) 127:13,16,21 guiding (2) 65:20;138:4 H half (1) 92:5 hand (10) 7:11;8:21;9:10,25;10:8; 93:12;114:9;132:20;172:6; 174:16 handle (1) 74:21 hangs (1) 195:1 happen (7) 43:17;170:14,19;176:17; 184:10,11;203:1 happened (1) 26:1	happening (5) 145:22;151:22;152:11; 159:9;188:24 happens (14) 24:9;45:22;68:8;83:22, 22;84:6,7;134:12;156:5; 159:4;165:11;167:8,11,12 happy (4) 70:15;97:2;172:3;180:19 hard (4) 51:22;89:25;124:8; 200:10 harder (1) 125:2 hardly (1) 193:21 having (2) 4:11;13:7 head (2) 30:14;109:4 heard (3) 41:19;42:25;196:6 heck (1) 60:20 held (1) 148:19 help (16) 11:20,25;12:10;15:2; 16:25;31:9;36:16;50:3; 68:4,11,14;69:12;90:2; 113:23;121:19;149:17 hence (1) 163:11 herein (1) 4:11 hereinafter (1) 4:12 Here's (1) 134:12 hide (1)
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

173:12	22;106:3;110:11,18;111:2,	illogical (1)	12,18,21;105:12,23;106:3;
hiding (3)	2;113:11;114:16;115:17;	162:25	107:6;109:19,25;110:1,11,
163:13;176:19;182:3	120:2,15;125:20;128:1,2;	ill-posed (1)	13;112:6,9,14,16,19;114:4,
high (4)	137:15,16;138:13;189:19;	91:8	20;115:8,21;116:3;117:9;
101:15;137:5;150:22;	190:20	illuminates (1)	120:8,15,20;121:14;123:12;
176:5	humans (2)	143:19	126:17;127:10,24;129:1,3,
higher (3)	128:12;139:3	illumination (1)	7,17,24;130:1,3,4,7,11;
35:16;99:19;101:16	hundred (1)	144:7	132:1,1;133:4,11;134:23;
highest (1)	30:16	illustrates (1)	135:5,6,7,8,13,14,15,18,19,
95:12	hypothetical (9)	49:24	20,21,21,22,24,25;136:1,3,
high-pass (1)	18:18;89:25;91:2;113:9,	image (495)	5,7,8,8,9,20,22,24,25;137:4,
185:9	10;170:13,19;184:5,7	6:18;7:3,6,25;8:8,8,12;	5,5,7,8,9,10,13,17,18,22,24;
hire (1)	Hypothetically (2)	9:17;10:15,19,20;11:7,13,	138:10,11,21;139:16;140:3,
118:4	170:7,11	15,24;12:8,11;13:4,9,12;	4,9,14,19;141:4,5,6,7,13,14,
histogram (9)	I	17:2,8,16;18:5,10,13,24,24;	19,19,22,23;142:4,7,9,9,10,
77:13;126:23;172:10,20;		19:2,2,14,14;20:16,20;21:2,	13,17,17,17,19,22,25;143:4,
175:9;176:24;177:11,19;	idea (11)	4,4,8,11,16,17,18,19,20,25,	12;144:9,12,12,13,14,15;
178:9	21:11;28:1,5,12;29:15,18,	25;22:12,12;23:21,23;24:3,	145:4,7,7,9,10,13,15,16,23;
histograms (2)	20;43:21;65:10;173:12;	7,10,11,16,22;26:19,20,22;	146:2,8,10,11,12,19,21,24,
50:25;177:14	190:1	27:2,8,18;28:20;33:24;35:9,	25,25;147:4,4,9,13,18,19,
Hold (2)	ideas (1)	9,13,15,17;36:11;37:25;	19;148:8,9,10;149:1,7,8,10,
146:14;172:14	76:14	38:4,17;39:11;40:5,7,10,11;	18,19,22,23,24,25;150:5,8,
hope (1)	identical (2)	41:21;42:1;44:13;46:5;	11,17,25;151:1,4,5,6,6,8,9,
194:20	58:21;60:9	47:22;49:10;53:19,20;62:8,	9,10,11,18,19,21,24,25;
hopefully (2)	identifiable (1)	16;64:9;65:9;66:9,10,12,18,	152:1,4,5,7,8;153:18;155:2,
202:18;203:6	57:8	19,21;67:18;68:2,9,19,19,	4;156:7,9,11,17,19,25,25;
horrible (2)	identification (8)	21,25;71:11,16,25;72:1;	157:1,12;158:13,14,20;
124:15;150:21	8:25;10:4,11;93:15;	73:5,7,9;75:2;76:3,9,12;	159:10,13,13,18;160:5,6,9,
hour (4)	114:11;132:23;172:5;	77:5,5;78:18,19,21,22,23,	20,20,21;161:23,25;162:5,
4:2;44:1;92:5;200:1	174:20	25;79:4,6,12,19,25;81:5,19,	7;163:3,7,15,22;164:1;
hours (3)	identified (1)	20;82:4,7,10,16,18;83:18,	165:6,24;166:22;167:1,1,2,
15:16;96:11,13	180:15	21,24;84:3,5,9,10,23;85:1,7,	22;168:9,22;169:5,11,13,
However (2)	identify (3)	23;86:9,16,19,20,22,24;	14,15,17,18,18,21,23;170:7;
149:2;165:4	121:19;180:8,22	87:1,8,12,12,19,21,24;88:3,	174:3;175:25,25;176:5,23,
huge (2)	identifying (1)	3,6,7,9,11,12,14,16,17,18,	23;177:18,18;180:7,15;
21:7,21	180:9	21;89:2,3,4,5,6,11,21;91:6;	181:4,11,15,22;182:17;
human (38)	ie (6)	95:8,10,12,12,17;96:18,21,	183:22;184:16;187:17,25;
37:8,22;38:5,7,8,11,20;	67:25;68:4;78:5;110:10;	24;97:20,22;98:11,16,17,	188:3,18;189:5,15,18,20,
39:3,12;69:9;99:3,18,19,21;	111:11;120:18	21;99:10,12,21;100:8,14,	23;190:13,16;197:3,4,7,10,
101:6,14;104:18;105:12,17,		15,18,21;101:2,6,7;104:9,9,	19,21;198:7,11,19,23;

199:19;200:8,16,17,18; 201:4,9;202:9,21,23 image-processing (6) 22:9;123:13;125:16,18; 185:8,19 images (43) 12:5;30:22;37:6;52:9,10; 55:23;62:13;68:20,25;79:5; 82:11;86:14;89:20;113:3; 114:15,16;115:12;117:9,10; 120:1,2,12;123:7,24; 127:23;129:10;137:15; 140:5;142:16;143:13,18,22, 24;144:1,2;145:20;149:20; 150:2,4,7,13,16;176:3 imagine (1) 130:8 imaging (2) 16:11,13 immediate (1) 103:6 immediately (6) 18:5;54:24;101:11;117:2; 153:25;159:12 impacting (1) 100:20 imperfection (1) 116:16 imperfections (7) 114:17;115:13;120:2,12; 172:8,12,18 implement (1) 123:15 implements (1) 140:13 implicated (1) 161:9 implication (1) 48:18 implied (1)	166:15 imply (2) 104:18;182:8 import (2) 65:2;187:21 importance (4) 97:23;98:19;99:13; 100:19 important (8) 14:15;29:6;47:11;56:3; 58:8;59:8;129:3;195:14 importing (1) 62:22 impossible (3) 17:14;75:22;125:12 improve (13) 17:15;18:24;74:24; 136:23;137:7;146:23; 147:7;148:24;159:22; 188:19;189:6,20;190:17 improved (1) 159:2 improvement (3) 20:24;149:3;161:5 improves (4) 75:2;189:17,23;190:19 inaccurate (1) 187:13 incident (1) 141:23 include (15) 10:21,22,23;11:17;49:3; 76:3,6;78:5;81:25;118:20; 129:8;130:17;175:15; 195:15;205:10 included (2) 49:18;192:10 includes (4) 28:22;129:7;166:9;171:6 including (2)	128:1;188:20 inconsistent (2) 97:10,13 inconsistently (1) 97:15 incorporated (1) 143:10 incorrect (1) 57:18 increase (3) 186:15;187:1;188:18 increases (4) 80:3;104:21;110:12; 148:4 increasing (2) 112:2;188:7 indeed (2) 83:1;165:9 independent (9) 14:9;15:8;16:22;20:17; 42:9;130:23;131:3,9,21 indicates (1) 79:14 indication (1) 37:21 indicative (1) 182:23 individual (2) 104:8;109:25 individually (1) 140:5 indoor (1) 198:15 inference (1) 87:17 influence (1) 99:1 inform (5) 12:11;34:4;68:14;69:12; 115:7	information (12) 10:23;11:13,15,16;21:4; 34:20;61:6;82:22,25;122:1; 142:7,8 informative (2) 57:13,21 informed (1) 33:4 informs (2) 117:1;127:16 initial (3) 116:15;117:3,8 initially (1) 155:1 in-loop (2) 81:7;82:1 input (23) 83:24;87:12,15,21,24; 88:3,3,6,7,9,11,12;89:6,12; 90:12,15,17,21;91:6;112:9; 198:11,19,23 insistent (1) 70:1 instance (10) 99:16;101:12;103:15,19; 111:4;112:8,17,23;113:5; 133:21 instances (3) 105:17;110:22;171:21 instead (9) 8:6;13:6;21:1;38:1; 62:17;165:22;167:2;169:2, 5 instituted (2) 171:16;172:1 institution (1) 171:10 instruct (1) 32:5 instructing (1)
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

121:15	13:6	inverse (1)	129:13
instructions (2)	interpolation (1)	80:2	job (1)
71:6;93:5	40:14	invisible (1)	119:12
instructive (1)	interpret (2)	113:20	jpeg (3)
107:13	200:22,24	involve (14)	82:12,17;83:14
intend (1)	interpretation (2)	12:4;18:23;47:19;51:4,	judgment (1)
131:4	81:21;103:6	13;52:12;82:6;83:16;	137:16
intended (10)	interpreted (1)	173:24;174:22;175:20;	jump (1)
10:24;38:6;39:16;48:21;	94:6	176:1;189:6,14	167:12
69:22;108:2,3;115:10;	interrelationship (1)	involved (1)	just (180)
124:6;164:12	162:17	138:13	5:19,22;6:21,24;7:10,15;
intending (1)	interrupt (1)	involves (6)	13:7,21;14:1,4,6;18:4,17;
48:19	31:15	47:22;61:1;82:5;86:19,	19:22;22:23;23:3,5;24:6,8;
intense (1)	intervene (1)	22;189:10	26:4;27:22;28:17;29:12;
148:24	31:25	involving (1)	30:13;31:3;33:8;34:2,21;
intensities (2)	into (6)	50:6	35:8,11,20;36:7,16;40:2,10,
50:11;111:19	15:12;62:22;92:3;122:1,	iPhone (4)	14,19;41:1,18;42:22;43:17,
intensity (59)	18;194:14	117:22;118:10,12,14	23;45:15;46:12,21;47:9;
41:25;42:10,15,21,25;	intrinsic (1)	IPR (4)	48:13;49:5;53:4;57:12;
43:3;50:6;71:10;93:22;	32:15	5:24;6:12;7:4;70:4	58:6;59:1,6,12;61:13;63:2,
94:2,4,7,8,11,12,18,19;95:3,	intrinsically (1)	IPRs (3)	3;64:16;65:3;67:3;68:9;
7,9,10,11,12,17,24;96:4,14,	79:8	5:14,16;171:16	69:15,25;71:19,20,21;
19;97:9,11;99:17,20,24;	introduced (1)	irrelevant (2)	72:10;74:21;75:13,24;
100:3,6,9,13,15;101:5,13,	176:11	32:10;162:17	76:11,21;77:2,8;78:13;79:6,
17;102:2,8,12,14;103:10;	introducing (1)	isolated (1)	23,24;80:19;81:21,25;82:7,
104:1,15;106:15,18;107:9,	139:23	124:16	17;84:2,8;85:1;86:22;87:5,
14,25;108:4;109:4;110:10;	intuitive (2)	isolation (1)	6,7;88:25;90:22;91:1,6,10;
111:11;112:4,12	37:15;79:6	122:13	92:1,21;95:1,23,25;96:24;
intention (8)	invention (11)	issue (2)	102:23;105:18;106:5,7,9;
65:22;113:4,21;138:17;	76:16,19;102:10,19;	70:22;136:19	107:2,12,24;108:17;109:15;
139:4,5,14;202:24	114:14;115:11;119:25;	issued (1)	111:1,12;112:17,23;114:19;
intentional (6)	120:11;146:22;171:6;	171:10	115:5,5;116:12;117:19;
85:11,23;86:2,8,13;176:6	202:25	ITC (2)	118:24;119:12;120:10,10,
intentions (1)	inventor (14)	5:16,25	25;121:6;123:3,18;125:18;
164:6	36:22;37:16;40:23;43:19;	iTeam (2)	126:2;127:5,15;128:11,22,
intermittent (4)	46:23;47:8;56:22;59:6,7;	117:20;118:9	24;129:14,20;133:25;
143:13,17,22;144:3	72:20;156:24;157:6;158:1;	J	142:12;148:1;149:24;
international (1)	162:23		150:11,24;151:25;153:22;
149:12	inventors (2)	jersey (1)	154:12;155:5;157:5,23;
interpolate (1)	196:4,14		158:9;162:20;163:17;

164:22,24,24;166:17;167:7; 169:4,18;170:19;177:7; 181:19;183:4,5;184:5,9; 186:9;189:7;190:5;191:5; 194:10;195:1,3;196:20; 199:15;201:15;202:12; 203:6;204:25;205:3	20:2,21,23;21:9;22:20; 23:20,23;24:7,11;25:5,12, 13,13,20;26:8,20,20;27:22; 28:4,6;29:17;30:19,23; 31:8;34:12,23;35:2,20; 36:12,16;37:14,25;39:17, 20;40:7,8;41:19,21;42:4; 43:9,12;45:2,15,21,24;46:3, 4,15,16;47:9;48:7,21;49:6, 11,13;50:7,18,24;51:15,16, 18,23;53:1,17;54:5;55:9; 56:3;57:4,4,14;58:10,12,25; 59:25;60:23;61:1,10;62:6,8, 11,24;63:25;64:1,15,18; 65:1,2,4,22,24,25;66:5,10, 22;67:17,17,21;68:12,18, 24;70:24;72:12,19,23;73:1, 2,2,17,23;74:5,5,8,20,23; 75:1;76:17;77:3,4,7,8,12, 15,22;79:1,10,25;80:10,18; 81:12;83:7,13,18;84:14,17, 20;85:11;87:7,24,25;88:13, 15,19;90:23,25;91:25;92:1; 93:3;96:1,17;100:7,8; 101:1;102:14;103:16,19; 104:6;106:10;107:2;109:9; 111:1,3;112:16;113:9; 114:23;115:1;116:5,11,14; 117:8,11,15,20;118:1,3,19, 22;119:7,11,15,18;120:22; 121:23;122:14,16,24;123:7, 17;124:2,2,4,5,5,9,15,17,25; 125:22,24;126:2,18,19,21, 23;127:3,14,15,24;128:9; 129:9,10,10,22,24;130:10; 131:6,25;133:8;134:9,10, 18;135:24;136:16;138:14, 17;139:18,23;140:16;141:8, 16;142:15;143:7,19;144:1, 25;148:1,15;149:15;	151:11;152:13,14;154:12, 14;155:6,19;156:23,25; 157:4,25;159:8,17;160:2,5; 161:8;162:18,20,22;163:16, 23;164:1,15,17,21,22; 165:20;166:12;167:14,25; 169:2;170:14,14,18,19; 171:16;172:15;173:11; 175:21;176:8,19;178:19; 180:5;181:3,13,16;182:1; 183:9,15;186:20;187:20,22; 188:21;189:5,6,15;191:11; 192:25;193:2,5;194:25; 195:2,4,5,23;196:2,12; 197:12,23;199:1,13;200:4; 204:24	laboratory (1) 30:21 land (2) 24:10;84:20 landscape (13) 135:1;151:17;153:10; 159:1,22;161:6,9;163:10; 168:4;189:3;203:17; 204:20;205:2 language (24) 14:10,11,12,12,15,16; 33:6;54:6;67:16;91:21,24; 92:2;111:16,23;128:14,17; 173:10;174:12;180:19; 181:7;195:11;199:9,15; 201:2 large (9) 28:6;51:20;61:19;99:24; 100:3;103:2;106:22,23; 189:2 largely (4) 146:1,11,24;147:4 larger (16) 99:22;100:12;101:6; 105:23,24;106:4,4;124:21; 176:7;188:22;197:22; 198:3,22;199:7;202:4,5 largest (1) 72:1 Larry (1) 14:23 last (17) 27:11;69:7;84:3;89:1,17; 92:5;106:14;107:7,11,19; 113:8;139:17,19;182:8; 197:2;198:7;199:14 late (1) 200:1 latency (1) 138:13
K			
keep (17) 8:1;19:20;22:24;32:1; 42:5;45:6;47:9;103:19; 112:17;113:8;118:18; 130:5;137:21;156:23; 164:15;169:13;200:11 Keeping (1) 186:23 KIMBERLEE (1) 4:4 kind (24) 7:5;9:20;11:12;12:6; 13:11;21:4;37:14;47:5; 50:12;59:12;66:6;69:2; 77:12;83:13;84:13,20; 105:19;123:18;124:25; 130:14;131:5;180:19; 181:2,6 kinds (6) 5:15;73:14;118:3;124:15; 152:2;181:1 knew (2) 41:20;77:18 knob (1) 189:8 know (333) 5:24;6:1,10;7:7,19;8:20; 11:4,11;12:3,3,16;13:21; 14:22,25;15:14;16:12,17; 17:11;18:4,9,17;19:1,20;	knowledge (8) 19:7;20:5;25:16;29:1,7; 42:11;44:23;129:16 knowledgeable (1) 60:23 known (3) 95:20;128:10;129:13 knows (3) 87:8;88:6;169:24 Konoplev (32) 114:8;115:6;119:21; 120:5;122:7;128:23; 130:24;131:16,19,19;172:7, 11,23,25;175:14;177:4,7, 10,14;178:4,13,17;179:10; 180:3,11,19,22;181:7,18; 182:25;184:24;192:9 Konoplev's (3) 129:18;130:22;178:9		
	L		
	label (1) 205:2		

later (8) 22:19;46:7;66:23;138:10; 141:19;143:3,3;154:17	level (7) 42:23;121:11;123:21; 125:2,14;136:11;173:5	114:25;203:19,20	15,18;185:5
Law (1) 4:3	library (1) 123:17	linear (9) 37:6,11;53:25;84:14; 116:19,19,20;186:18,19	locally (3) 53:20;74:16;102:13
lawerly (1) 22:6	light (1) 130:14	lines (23) 19:21;41:4;45:9;46:8; 47:3,16;49:23;54:10;58:14; 66:18;68:8;73:19;74:7,19; 78:3;105:2;134:11;172:8, 12,16,23;173:2;177:10	location (1) 192:19
lawyer (1) 131:9	lightened (2) 161:18,21	link (2) 79:22,23	logic (2) 170:2,5
lead (1) 170:1	lightening (1) 163:6	list (1) 60:6	long (17) 17:17;31:17;71:14;94:5; 110:6;119:4,5,7,14;122:20, 23;123:16,20;125:12,17; 127:4,5
leading (1) 170:2	lighter (2) 168:4;183:11	listed (7) 31:3;46:22;48:13,24; 49:19;60:7;120:13	longer (1) 124:21
leaning (1) 30:18	likely (5) 77:19;101:20;118:18; 169:20;185:7	listen (2) 160:12;163:1	longstanding (1) 38:16
leap (1) 193:21	likewise (1) 204:15	listening (1) 146:14	Look (24) 18:17;36:4,21;41:3; 43:11;46:8;64:5;65:25; 69:6;78:13;104:6;116:14; 117:8;136:2;139:17; 142:14;157:8;160:24; 164:17,18,23;175:2;188:5; 190:23
learn (1) 22:6	limit (6) 12:16,25;36:15;53:10; 66:5;79:17	lists (1) 109:15	looked (1) 171:23
least (16) 49:6;56:21;64:21;65:22; 70:19;73:13;74:15;76:6; 79:14;83:22;84:6;91:16; 94:14;130:6,23;186:13	limitation (3) 36:7;115:2;174:6	literally (2) 63:2;199:15	looking (7) 19:6;97:19;140:16; 148:11;188:10;201:14,15
leave (2) 14:24;26:8	limitations (2) 67:1,1	literature (1) 69:16	looks (2) 81:10;82:16
leeway (2) 23:23;69:18	limited (12) 7:5;47:17;64:8;67:7,9; 68:7,23,25;70:25;160:5,23; 182:2	little (23) 22:25;23:22;44:1;48:4; 54:9;55:7;59:23;70:1; 79:14;81:13;82:18;83:1,2, 2;85:3;117:7;118:7;123:23; 124:16;142:12;163:25; 195:25;203:7	lookup (16) 50:1,12;191:4,6;192:3, 13;193:16,24;196:19,21; 203:12,16;204:16,20,22; 205:2
left (1) 61:14	limiting (3) 51:3;86:21;112:23	local (36) 36:13;53:17,17;73:8,10, 12,20,24;74:1,10,11,22,24; 75:1;78:5,7,8,9,11;102:25; 180:3,9,15;181:5,9,12,15, 24;182:4,10,10,22;184:13,	loop (1) 150:24
legal (3) 23:1;131:5,6	limits (2) 63:8;189:7		loosely (2) 42:15;59:7
lens (3) 141:11;144:18;145:21	Line (34) 9:13;31:18;35:8;36:22; 40:20,21;43:14,18,20;48:1; 50:15,17;54:25;55:3,14; 56:25;57:24;58:18;59:19; 60:15;63:5;64:8,11,12;67:7, 8;69:8,20;70:6;74:8;78:13;		
less (4) 6:10;76:2;113:20;198:19			
Lesser (2) 37:9,9			
letting (1) 31:23			

loss (1) 82:25	92:9,11,12,13;132:6,8,14	50:13;52:24;53:10,16,24; 63:19;67:2;84:15;85:15; 86:2;90:13;95:25;96:11,13	27:16;35:16;39:19;40:12, 12:42;14:48;6:49;25;54:4; 55:9;56:10;59:25;66:22; 72:4;73:20;75:4,5;78:25; 79:7,9,18;82:23;83:1;84:16, 16,16,18;86:13;87:23; 93:25;96:19,24;97:22;99:3, 4,11,14,21,23;100:17; 101:6;104:12,17,17,21; 105:13,13;106:10,11,19,23, 25;110:1,11,13;111:2,3,8,8; 112:10,10;113:11;117:6,7, 8,12;118:7;125:6,7;129:15; 139:4;140:22,23;141:8,8; 143:6;147:19;148:18; 150:23,23;157:10;158:12, 19;166:8,10;168:19;183:6, 9;186:10,11;190:4;193:1; 199:25;201:11;204:24
lost (1) 150:13	M	map (1) 163:19	Maybe (28) 23:2;25:22;39:17;46:3; 63:19;68:24;72:22;83:21; 84:6,18;85:4,25;88:21; 92:9;106:9;113:4;123:17; 135:9;139:12;141:16; 146:3,4;155:7;159:14,16; 180:6;181:17;186:12
lot (24) 10:22;15:8;17:4;24:5,22; 33:5;35:2;45:3;53:25; 62:22;78:12;85:10,14; 90:16;91:23;117:22; 156:20;184:10,11;187:11; 189:14;192:1;193:5,24	machine (1) 39:2	mapping (2) 126:19;130:8	mean (171) 7:6;11:12;13:24;16:17, 18,19;17:3,4,6,6,8,13;18:1, 7,14;21:8,20;22:3,4,7,15; 23:6,20;24:20,21,23;25:20, 21;26:18;27:15,20;30:2; 33:19;35:2,5;36:2;38:23; 39:24;43:2;44:25;45:1,23; 46:3;47:7,10,17;51:7; 53:25;56:10;59:14;64:2; 66:21;69:3,4;72:18;73:1,17, 17,22,23;77:1;79:3,6,16; 80:9;81:5;84:11,12;85:10,
lots (1) 53:24	made (5) 46:24;89:1;113:19; 198:25;206:8	March (1) 4:2	
lower (1) 198:8	main (4) 159:7;168:6,7;171:17	marked (21) 8:22,24;9:3,4;10:1,3,9,10; 93:13,14;114:10;132:21,22; 172:4,7;174:19;181:5,9,12, 13,16	
lowest (1) 95:11	mainly (3) 147:6;159:10;160:8	Maruyama (1) 196:5	
low-pass (6) 78:15,23;79:1,19;176:4; 185:9	maintain (3) 73:8,23,24	match (1) 185:4	
lucky (1) 15:18	maintaining (6) 73:18;74:2,5,11,22;75:1	material (2) 14:9;91:17	
lull (1) 15:18	make (29) 5:23;21:1,3;34:2;35:19; 51:20;74:4;75:4,5;76:2; 80:19;87:7,10;113:18; 125:1,9,11;130:9,11; 137:16;143:13;144:16; 150:10;152:2;165:23; 190:9;192:23;196:18;199:9	mathematically (3) 176:4;186:12,22	
luminance (25) 36:23,24;37:1,2,4,13; 38:14,17;41:12;42:19; 48:25;51:1;55:10;60:1,22; 63:22;72:2;78:22;136:4,6; 140:18;183:22;184:4; 188:23;189:12	makes (6) 141:18;144:4;147:11; 165:5;193:24;205:10	matter (11) 6:21;7:10;8:7;29:12; 31:12;90:24;96:9;152:16; 194:6;196:23;201:25	
luminance/contrast (1) 148:4	making (5) 70:7;74:6,23;78:4;206:9	matters (1) 60:14	
luminances (1) 48:8	mammography (1) 18:15	maximize (8) 51:7;100:13,15;101:2; 104:2;111:18,20,21	
luminescence (1) 184:1	manipulated (1) 51:1	maximizing (11) 51:12,18;99:17;100:6; 101:13;102:7,23;103:9; 104:15;110:10;111:11	
luminescent (5) 183:10,17,23;184:8,9	manipulation (2) 46:13;54:2	maximum (5) 63:7;64:24;66:7;100:9; 102:24	
lunch (7)	manner (1) 86:25	may (99) 7:21;10:25;14:16;18:14;	
	many (18) 5:12;21:22;37:14;42:16;		

25;86:1;87:3,23;88:15,20; 89:13,24;90:9,13,14,16; 92:7;95:8,11;96:9,15; 100:5;101:11;104:3; 105:10;106:17;107:16; 109:18;110:7;112:22; 113:8;114:25;115:23; 116:11;117:18;119:2; 122:13,14,23;123:11; 124:14,19;128:20;130:17, 25;131:2,5,7,13,22;133:12; 134:24,25;135:23;139:8,9, 22;140:11;141:17;145:1, 19;155:5,9,23;156:19; 157:8;158:10;161:13; 162:15;165:13,16;166:12; 167:17,24;169:19;170:11, 25;171:25;173:22;174:5; 176:16;177:22;179:21; 180:11,18,24;181:12,13,16; 183:11;187:19;192:17; 193:1,14;194:8;196:12,20; 197:12,13,17;198:1,24; 200:3,12;201:21;204:21	65:11;68:1;81:1;84:9; 89:23;90:25;95:7;107:14; 125:24;143:21;144:10; 147:23;170:12;189:25	merely (3) 14:8;29:24;58:4	12,13,14;121:16;124:8,21; 125:8,9;126:24;127:2,17; 129:11;130:9,11;133:20; 138:3;139:13;156:6,10; 162:5;163:13;164:5; 174:12;176:6,7,11;179:2; 181:2;182:9,10,13;183:4,5, 11,13;190:14;192:25; 196:11
	meant (39) 14:17;17:20;22:4;28:1, 12;29:16;30:5;35:1;36:19; 39:12;48:3;49:15;50:4,22; 53:9;55:5;59:17,21;60:20; 63:15;68:5;70:20;79:24; 80:7,8;81:7,9;86:14;89:20; 91:9,9;108:13,18;120:9; 142:13;156:2;180:1;182:8; 190:1	met (2) 196:6;197:9	
		method (18) 73:3;114:14;115:11; 119:25;120:11;123:8; 139:25;140:7,8,10,12,15,20, 21;166:25;167:13;174:9; 181:1	
		methods (5) 20:20;28:9;78:1;132:3; 167:2	millions (1) 119:10
		M-hm (19) 7:2;9:15;16:2;23:9; 44:14;45:12;50:2;78:6; 82:3;86:17;114:6;119:23; 123:2;126:6,9;129:18; 172:22;203:23;204:8	mind (23) 8:2;19:20;22:22;41:1; 42:5;45:6;47:9;76:14; 103:19;112:17;113:8; 118:18;129:22;130:5; 137:21;156:23;159:12; 164:9,15;169:13;186:23; 200:11;203:21
	measure (5) 72:4;80:7,8;96:13;121:19		minimum (3) 64:23;66:8;122:25
	measured (1) 77:9		minute (1) 14:15
	measurement (3) 73:12;186:16;187:21	Michelson (1) 71:25	minutes (1) 166:17
	measurements (1) 74:9	microscope (1) 30:22	mischaracterized (1) 108:12
meaning (27) 14:10;33:3,5;45:17; 48:23;56:15;60:24;67:19; 70:11,23;71:5,10;80:3; 86:7;90:3,11;98:24;106:24; 109:11;128:8;141:15; 142:9;154:8;169:2;174:7; 182:20;189:19	measuring (2) 95:13,16	might (124) 13:11,25;16:19;17:15; 20:25;21:1,3,10,11;22:16, 25;23:7,12,18;24:21;26:8, 10,16,18,20;27:17;28:5; 29:12,18;30:2,12,14,18,19, 21,22;31:5,24;34:16,19; 35:18,22;38:14,18;39:18; 42:21,22,22;43:2;49:7;51:4, 21;52:8;54:15;56:11;60:7; 64:10;65:24;67:14;68:20, 22,24;69:1;72:4,10;73:18; 74:6;83:10;87:6;91:25; 94:6,9,13,19,21;95:14;96:6, 6;97:19;99:25;100:10,12, 14;103:23;112:24;113:3; 116:24;118:1,5,5;119:11,	mischaracterizes (1) 65:14
	median (4) 116:23,24;118:6;179:3		mislead (1) 80:10
	medicine (1) 18:11		misplaced (1) 177:15
	meet (2) 100:16;111:19		misreading (1) 199:25
	memorized (1) 135:10		misspoke (1) 64:10
meaningless (1) 91:2	mention (3) 44:2;106:16;179:6		misunderstanding (1) 150:19
meanings (1) 179:6	mentioned (8) 45:23;56:20;75:20;95:25; 108:13;135:16;187:16; 198:10		mobile (1)
means (27) 17:1;18:5;23:23;24:8; 35:19,22,23;37:3;38:13; 40:24;47:15;59:16;63:14;	mentions (4) 41:6;47:6;78:14;128:25		

139:3	139:16;141:13,16,24;	39:13;142:17	81:2,16;82:5;104:5;165:2;
mode (1)	142:25;143:6;144:9;	much (23)	173:17;175:15,19;176:1,24;
116:16	150:25;164:1	6:5;15:10;26:22;30:10;	177:19;182:4;184:20;185:5
model (3)	monitoring (60)	34:3;79:5;82:12;90:20;	necessary (2)
39:18,22;190:25	135:7,14,19,22;136:22,	95:5;98:23;100:8;117:16,	148:25;149:3
modification (2)	24;137:9,11,18;138:10,21;	18;118:2;123:3,7,9;124:1;	need (26)
102:13;192:8	139:6;140:4,9,14,19;141:4,	159:16;166:16;177:5;	9:1;11:18;15:2,3;30:1;
modified (5)	6,20;142:4,7,9;143:12;	182:18;197:22	31:12,25;44:1,2;51:25;
24:12;45:2;121:2;125:8;	144:14;145:10,13,15,17,24;	multiple (9)	66:13;77:2;79:16;81:22;
136:4	146:11,12,20,25;147:1,5,	12:14;15:7;45:18;47:23;	85:3;86:3,5;90:10;113:3;
modifies (1)	18;151:5,6,8,11,14,18,24,	96:2,15;109:21,22;157:20	123:3;139:10;162:11;
197:16	25;152:1,3,4,6,14,15;156:7;	multivalued (1)	177:6;178:1;197:23;205:15
modify (13)	157:12,25;158:15,20;	13:9	needed (1)
27:17;86:12;96:6;99:8;	159:19;160:7,21;169:11,22	myself (1)	49:21
115:25;116:1;126:11,16;	month (2)	15:19	Needham (27)
127:10;128:6;185:10,20;	119:11,13	N	16:15;93:19,21;94:18,24;
204:19	more (60)		95:4,25;96:2,5,6,12;97:7,
modifying (13)	5:25;6:10;21:2,4;28:2;	nailing (1)	21;98:3,22;101:3;102:4;
18:23;23:23;48:15;50:11;	29:21;32:16;33:21;35:20;	58:6	103:8;104:10,11;107:17,24;
101:20;102:12;126:25;	37:8;44:1;46:4;47:19;	narrow (1)	109:20;111:24;112:3,7,11
183:6;185:12,16,17,18;	54:13;66:13;67:16;70:1;	16:17	needs (6)
189:5	74:5,6,6,7,24;75:4,5;76:15;	native (1)	87:9;88:6,13;149:3,5;
module (1)	78:4;79:15;83:10;84:1;	8:9	195:22
174:1	85:3;97:18;103:21;104:8;	natural (11)	negative (1)
mole (2)	105:10,14;106:6,15;107:10;	127:25;128:15,18,24,25;	75:5
124:7,8	108:7,9,25;109:2,8,19,24;	129:7,16;130:13,13,17;	neither (2)
moles (1)	113:7,12,18;118:7;125:6,7;	149:4	139:25;201:14
124:5	159:15;169:20;177:5;	naturalistic (2)	never (8)
moment (11)	192:13,17,18;194:19;	128:8;130:10	60:13;71:19;141:23;
12:20;23:4;29:14;36:18;	196:21;205:3	Naturally (3)	166:23,25;194:1;196:6,6
64:19;76:22;79:18;141:9;	Moreover (2)	20:14;100:7;148:21	nevertheless (3)
145:10;159:21;194:3	189:1,13	nature (3)	39:19;70:24;140:7
monitor (30)	most (16)	60:20;86:12;90:18	new (1)
136:9;137:14,23,23;	95:18;118:17;127:24;	near (2)	194:6
138:2,5,8,14;139:14,16;	128:15,18,24,25;129:6;	36:21;119:14	next (4)
142:21;143:8,16;144:21,24;	138:7;144:4;149:14;172:9,	necessarily (28)	115:1;120:14;121:8;
145:3,6;146:9;148:1,6,9,13,	19;180:25;184:14;185:19	12:20;17:19;34:15,23;	148:15
17,22;149:1,2,9;156:25;	move (1)	42:17;54:19,23;60:25;61:3;	nobody (1)
159:14;169:14	139:3	77:23;78:9;80:14,22,25;	167:15
monitored (9)	moving (2)		noise (12)

17:11,12,13,13;46:14; 75:5,21,22,24;179:3; 190:14,15	45:14;47:5;85:5	numerical (1) 64:1	70:7
noisy (1) 17:10	nonspecifics (1) 84:21	O	observe (1) 137:15
Nonaka (73) 132:21;133:6,14,17,18; 134:14;135:6,11,13,23; 136:3,12;137:2,4;138:20; 139:18,22;140:1,2,13,17; 141:18;143:5,11;152:20; 153:15;154:4;156:12; 160:14;161:4;163:21; 164:5,12,15,25;166:22; 167:5;170:9;188:5,6,10,14, 17;189:10;192:9,23;193:6, 9;194:1,8,21;195:4,9,11,15, 17;196:4,4;197:15,16; 198:3,5,12;199:11,23; 200:23,24;201:8,10,15,20; 202:21;203:22	nonsubstantive (1) 92:25		obtained (1) 189:18
Nonaka's (7) 135:17;150:24;166:21, 22;167:20;190:21;192:10	noon (2) 92:6,17	oaths (1) 4:7	obvious (2) 102:7;124:4
non-detection (1) 165:3	nor (8) 32:13;64:18;78:24;85:17; 91:12,13;97:14;139:25	object (58) 7:13;35:15;66:16;67:10; 68:17;69:14;70:13;71:7,12, 17;74:23;75:9,17;76:25; 77:17;78:4;80:5;83:17,25; 84:24;85:8,24;86:23;87:22; 89:8;90:5;91:22;95:14; 97:4;101:25;104:23; 107:21;110:19,19;111:3,5; 118:11;131:14;147:15; 152:9;158:2;160:11;161:2, 24;168:24;169:12,25;180:4, 10,17;181:10,23;182:6; 185:2;188:2;194:4;195:16; 197:11	obviously (1) 45:25
none (1) 118:8	normal (2) 35:12;77:24	objecting (1) 70:5	occupies (1) 128:3
non-face (1) 35:12	normally (1) 144:20		occupy (1) 117:11
nonlinear (4) 84:15;116:23;186:16,21	Noted (5) 132:12;157:10,15;158:4, 7	Objection (45) 7:18;9:18;10:17;11:2,9; 12:1;13:20;17:23;18:25; 19:8;20:7,18;22:2;23:13; 24:4,17;25:3,11,19;26:2,12, 17;27:3,9;28:3,14;29:3; 30:7;31:7,24;33:25;35:25; 42:2,12;49:4;51:14;52:3, 18;57:10;61:18;62:4;63:9; 64:25;65:12,18	occur (4) 25:18;43:16;176:12; 190:4
non-perceptual (4) 39:6,9;40:4,5	notes (1) 15:14	objects (4) 104:10;109:22;111:7; 164:23	occurred (2) 25:10;27:16
non-red (4) 183:20;184:9,19;185:4	nothing (16) 21:13;24:10;27:20;42:14; 67:1;69:19;80:13;83:21,22; 84:6,7;87:6;89:9;90:19; 112:20;185:20	obsured (1) 165:8	occurrences (2) 105:8,11
nonresponsive (6) 97:5;152:9;158:2;160:11; 161:2;185:2	notice (6) 14:25;41:6;43:18;83:1; 117:10;144:1		occurring (3) 38:1;137:16;139:1
nonspecific (3)	noticeably (1) 186:13	observation (1)	occurs (8) 26:6;83:14,14;98:24; 101:4;147:25;156:16;157:3
	noting (3) 31:23;33:14;69:17		odd (1) 174:12
	notion (1) 85:15		of_ (1) 206:12
	number (15) 17:3;19:24;28:22;37:5; 59:5;70:9,11;71:24;106:12; 126:7;150:6,8,15;159:6; 180:25		off (3) 144:25;152:15;157:24
	numbers (1) 10:6		offer (4) 33:7;47:14;71:6;184:7
			offered (8) 32:13;33:13,15;60:17; 63:4;70:9;128:11;184:6
			Offices (1) 4:3
			often (7) 13:4;22:5;41:10;75:20;

77:4;157:19;188:4	old (1)	193:4;194:24;196:4;201:3;	147:6;153:9;157:11;159:4;
Oftentimes (1)	189:7	203:18;204:23	160:14;161:4;163:10;
117:5	on (194)	once (9)	166:24;174:25;192:22,25;
Oh (21)	4:1;6:5,11,25;7:22;8:6;	9:21;13:4;21:13;27:10;	193:1;194:25;196:17;
5:20;8:13;9:15;10:5;	9:1;10:6;11:3;12:4,24;	88:11;107:25;118:1;	198:1,20;203:17
15:12;29:4,10;35:6;42:13,	14:24;15:2,3;16:3;17:17;	141:15;150:2	onto (1)
23;53:7;58:3;71:18;73:10;	18:3;24:10,20;28:7;29:1;	one (108)	126:19
82:1;83:12;86:6;102:23;	31:13,14;32:6,13,17;33:1,6,	5:23;6:6;9:8,9,10;15:24;	oOo- (3)
110:5;168:19;200:8	16,21;34:13;35:9,18;36:13;	21:20,21,21,22;25:13;	5:2;132:10;205:20
Okay (142)	39:17,21;42:11;44:13,23;	26:23;27:11;30:17,19,21,	open-ended (1)
6:23;9:5;10:6,12;11:11;	46:25;51:11;53:17;65:24;	22,23,25;31:1;34:19;40:7;	126:3
16:9;17:5,13;18:2;21:5,6,	70:9,11,23;71:21;74:8;	46:4;47:1,19;49:8,11,13;	operate (2)
19;23:16,19,21,24;26:7;	75:14;76:22;78:23,24;79:2,	50:13;52:24;54:20;61:14;	89:20;99:9
34:25;36:22;37:3,10;38:4,	20;82:7;83:24;84:9,10,11;	71:13;72:14;76:21;81:4,21;	operates (2)
14;39:5,12,17,18;40:9,10;	85:23;86:8;87:11;88:6,7,12,	84:1;88:25;93:18;95:13;	64:2;162:19
42:15,24;43:21;45:19;	13,17,25;89:2,3,5,7,13,20,	99:4;103:6,16,20;104:7;	operating (4)
46:14;47:21,23;48:9;49:6;	21,21;90:12,15,20,23;99:3;	105:10,13;106:5,6,7;107:2,	88:17;89:2,5,7
50:19,20;53:8;55:12,18;	101:22;102:13,25;103:13,	3,12,12,13;108:7,8,25;	operation (29)
59:3,8;60:5,20;61:4;63:23;	17,17;104:17;105:8,11;	109:1,5,10,19,24;110:18;	13:6;43:13;53:17;98:6,
64:8,13,15;66:1,7;67:19;	106:21;108:6;109:19;	111:17,18,20;114:12,13;	10,11,21;99:2,17;100:4,6;
70:8;71:9;73:1,19;77:10;	110:5,11;114:12,22,25;	115:5,10;116:12,13;119:24;	101:13,19,24;102:7;103:9;
78:16;81:8,17;86:1,4,13;	115:15;116:3,3,4,13;	130:6;136:21;148:8;150:6;	104:20;105:20;106:8;
87:17;90:17,18,19,21,24;	117:18,20,21;118:19;	154:12;155:15,16;156:2,3;	110:12,22;178:17;184:23;
92:9;95:25;98:10;99:15,22;	119:11;121:11;122:3,15;	163:19;166:2;169:4,7,17;	185:8;186:17,18,19,21;
103:15;104:10,12;106:6,23;	123:15,19,21,23;124:6,11,	175:12;177:11;184:6;	188:17
108:17;109:20;110:6;	13,14,18,19;125:21;126:12,	186:1;192:13,18,19,22,25;	operational (5)
116:21;117:7;118:25;	17,25;127:11,23;128:1;	193:1;194:19;195:1;	96:20;105:14;108:9;
129:13;137:14;138:3;	129:22;130:20;132:1;	196:17,21,22;199:4;202:18;	109:2,11
140:16;142:14,18,20;144:5;	136:10;137:23;138:4,5,8,	203:6,16	operations (31)
145:14;146:18;148:6,8;	14,23;140:8,14;142:8,15,	one-entry (1)	97:24;103:21;104:4,8,11,
151:5,7;154:13;155:21,25;	21,24;143:1,2;144:6,24;	192:20	13;105:1,8,11,15,22;106:2,
156:23,24;158:9;160:22;	146:14;148:18;149:6,9;	ones (6)	6,8,13,13;108:8,25;109:1,
161:15;162:3;164:17,19;	151:13,23,24;152:3,8,13,15,	32:13,25;124:16,16;	14,17,19,21,24;110:1,17;
169:15;170:7,14,15,25;	17,24;153:4;154:6,14;	183:16;196:23	111:25;139:13;179:17,20;
171:1;172:16;180:2;183:5;	156:3;157:16,23;162:6;	only (39)	185:20
186:1;187:4;190:23;	163:25;169:11,16,21,23;	32:24;38:6;47:24;53:9,	operators (1)
192:17;195:18;197:8;	171:2;172:21;173:6,12;	21;58:23;59:2;66:22;67:14;	179:2
198:3;199:1,5,17,25;201:2,	176:25;177:12,20;178:10;	68:7,8;70:7;74:1;78:16;	opine (4)
25;202:2,3,7,8,15;203:15;	180:22;181:3;183:22;	90:23;107:16;113:17,21;	32:17;96:3;180:19;
204:9	185:24;186:18,20;188:18;	116:13;129:4;135:1;144:8;	196:20

opined (2) 33:1;136:15	original (2) 191:18,20	178:11;189:24;201:13	page (7) 114:2;115:1;116:14;
opinion (22) 7:23;29:13;32:13;33:15; 70:22;103:11;107:18; 131:10;137:17;139:22; 145:16;149:11;152:17; 154:1;156:18;158:18,20; 163:21;196:24;197:13; 203:8;204:19	Osamu (1) 196:4	outcomes (1) 186:19	122:15;130:20;137:10; 201:3
opinions (13) 7:20;15:3;28:22;29:2; 33:5;69:21,23;70:2,9,11,25; 119:20;131:25	other (68) 6:9,9;7:8;14:19;16:15,19; 22:16,18;23:8,18;24:11; 25:7,8,13,17;26:7,10,15; 27:15;28:19;35:17;46:11; 47:6,20;51:3;53:11,22; 61:12;64:6;72:11;76:4; 77:11;78:20;82:20,23; 95:19;97:11;103:5,18; 105:19;106:12,12,13; 107:19,22;109:13;112:24; 120:18;124:14,16,19; 125:22;132:17;133:13; 140:21;143:23;154:12; 156:3;163:19;169:17; 175:6;179:2;186:10; 187:16;204:9,10,23;205:9	outdoor (5) 159:1,21;161:5,9;198:13	pages (3) 119:21;120:14;126:5
opportunity (1) 171:9		output (16) 13:3;38:8;87:10,11,14; 88:18;89:3,6,12,21;90:15, 20,23;91:6;142:10;151:6	paragraph (174) 15:23,25;16:3;19:11; 45:16;53:4;93:25;96:16,17; 97:21;98:4,14;99:13;100:5, 17;103:8,20;104:6;105:3,7, 16,21;106:1,14;107:8; 108:16,23,24;109:3,15,23; 110:3,4,6,15,20;111:10; 112:3,8,11;113:13;114:13; 115:6,16;120:5;122:7; 128:18,23;130:20;132:25; 133:2,3,6,8,14,17;134:5,18, 24,25;135:4;136:3,21; 137:2,3,3,10;139:18; 140:24;141:25;142:5; 143:11;146:7,16;147:21; 148:2,11,15,16,17;150:24; 151:3,4,15,23;152:10,19, 22;153:2,9,14,15,17,20; 154:1,4,5,5,7,9;155:14,19, 20;156:7,8,12,15;157:8,16, 23;158:3,6,8,16;159:7,24; 160:15,16,24,25;161:7,8,11, 11,16,19;162:1;163:2,2,6,7, 9,9,12,14;165:4,11,21; 166:4,21,22;167:23;168:1, 4;169:10,21,23;170:8,8; 173:25;175:2;178:11; 188:14,15;189:9;190:23; 191:9,14,15,17,19,20; 192:23;193:18,19;202:12; 203:9,10,11,25;204:2,4,10; 205:8
opposed (2) 53:18;67:19		outputs (1) 90:22	
opposite (1) 190:7		outside (33) 8:4,5;12:17;14:18;16:24; 17:7;20:23;22:17;24:21; 26:5;27:11;31:10,18;33:16; 34:7,12;39:13,13;41:16; 51:19;52:8;57:17;61:9,25; 62:5;70:3;71:18;72:15; 85:19;93:4;170:12;184:9; 198:13	
optimization (31) 133:4,11,21;136:17; 141:2;142:1;148:3,11; 151:16,17;152:23,24;153:3, 10,11,18;154:15;159:4,5, 24,25;160:4,13,18,25; 161:3;166:13;170:25; 171:7,7;189:1	others (2) 125:6,7	over (30) 6:9;72:7;121:11;123:21; 124:23;125:3,14;168:19; 173:6,9,14,18,19;174:22, 24;175:7,10,13,16,20; 176:2,10,10,14,16;177:8; 180:2;182:12;184:17;185:4	
optimizing (2) 153:5,6	Otherwise (6) 51:9;88:17;89:13;91:1; 184:12;201:17	overall (1) 94:2	
option (1) 129:24	ought (1) 19:23	own (12) 15:9;19:7;29:23;30:24; 42:11;51:11;72:20;91:12; 122:18;191:4,6;196:18	
ordinarily (3) 56:14;176:8;177:22	out (49) 6:23;8:5;12:19;14:9,13; 28:17;30:14;31:10;34:6; 35:2;36:7;41:9;43:17,23; 47:10;55:16;56:21,24;58:4; 59:5;67:15;69:25;85:2; 87:6;91:2,10,10;96:1; 97:19;117:17;118:12; 119:6;122:21;124:22; 125:2,18;127:4,5;129:15; 138:25;140:1;156:15; 162:11,21;170:11;176:12;	P	
ordinary (20) 7:17,21,24;16:4;34:16; 65:5;118:4,17;121:5,24; 123:6;127:3,17,25;129:21; 176:8;178:12;194:12; 195:12,24		P2 (1) 173:25	
		packetization (1) 26:21	paragraphs (16)

98:22;114:22;115:2,4; 122:14;126:18;134:14,22; 147:25;153:8;154:24; 155:11;156:1;161:16; 162:12,16	147:6,7;148:15;149:24; 154:17;155:2,21,23,25; 157:9,23;158:12,14;161:17, 17,20,20;163:4,4,6,13; 165:6,10,19,24;166:8; 167:25;168:8;173:18; 174:23;175:13,14,25;176:7, 23;177:18;181:11,15; 183:11,14,14;188:18; 190:25;198:7,13,13,14,15; 199:13,14;200:16	60:13,13,16,16;61:9,11,13, 25;62:6,6;64:2;65:11,17,20; 68:6;69:13;70:9,12,18,19; 71:19;72:15,17;75:12; 85:17,19;91:13;97:12; 111:17;121:16;127:13; 129:23;131:19;149:12,12; 176:11;182:1;191:1; 196:25;203:22	perceptual (12) 37:4;38:16,21,22;39:5,9, 11,17,22,23;40:13,13 perfectly (1) 154:19 perform (12) 133:5,12,23;134:7;142:2; 151:16;153:11,19;154:16; 164:4;171:7;179:20 performed (8) 85:23;86:8;104:17;105:8, 11;110:11;153:4;159:24 performing (2) 139:12;189:16 performs (5) 152:24;159:5;167:22; 188:18;189:2 Perhaps (5) 27:10;35:1;74:16;104:23; 136:18 period (8) 15:20;67:25,25;138:9,22; 144:2,3;149:15 perjury (1) 206:7 person (41) 7:17,21,24;16:4;34:16; 65:5;87:7;121:5,24;123:6; 124:9;127:17,25;129:21; 135:1,2,3;139:2;151:18; 153:10;154:8,9,12;159:1, 22;161:6;162:24,25;163:4, 5,9,11;165:23;171:8;176:8; 178:11;188:20;192:12; 194:12;195:12,24 personal (1) 192:14 personally (2) 4:9;196:3 person's (2)
parameter (33) 96:20;98:7,20,25;99:1,7, 8,23;100:2,11,20,23; 101:10,23;102:1,15;103:2, 4,12,16;104:19,24;106:24; 113:2,15;197:5,17,20; 200:13;201:6,14,16,18	particular (15) 12:5;21:10,12;37:22; 64:23;86:21;106:19;108:1; 116:4;123:19;135:5; 197:10;203:11,12,24 particularly (1) 82:11 parts (8) 11:17;51:10;99:10; 120:15;127:23;161:10; 177:6;188:4 pass (4) 144:18,18;202:19;203:2 passed (1) 141:9 patch (4) 72:3,5,6,7 patent (100) 6:12,15,16,21;8:3,23,23; 9:21;11:8;13:15;16:15,23; 19:6,18;20:6,23;21:14; 22:17,21;23:5;28:19;29:8; 31:20;32:10,11,15,19,22, 23;33:4,10;34:13;35:5,24; 36:20;39:14;40:17;41:17; 42:6,9;43:5,8,9;44:10,17; 45:21;46:23;47:13;48:19; 49:14;50:5,21;52:8;55:20; 56:2;57:17,24;58:8,9,15;	patent-related (1) 5:16 patents (14) 13:25;14:3,6,7,11;15:5; 16:5,25;17:7;26:5;27:12; 39:13;71:19;89:10 path (6) 152:10,13,14,15;154:6; 169:21 paths (5) 152:8;156:21;157:2,5; 169:16 paused (1) 202:14 PC (1) 4:3 penalty (1) 206:6 people (9) 18:2;39:18;118:4;119:11; 124:6,14,15;129:11;150:18 perceivable (1) 183:13 perceived (1) 38:5 percent (1) 159:16 Percentages (1) 5:22 perception (6) 38:11,24,25;39:2,4;47:21	

19:22;183:14	37:14,20,21;38:1;67:2, 15;141:10;144:18	pixelated (1) 83:10	96:1;97:10,19;112:1; 129:25;135:10;136:18;
perspective (9) 7:17;13:18;16:8;20:5,12; 23:5;29:7;30:24;89:18	photosensor (2) 34:17,18	pixelation (1) 83:13	138:11;142:6,24;146:4; 149:6;160:3;162:10,11,21;
pervades (1) 18:11	phrase (2) 51:11;116:12	pixel-dependent (1) 47:19	165:23;167:18;171:18; 175:11;181:6,17;184:20;
petition (1) 171:25	phrasing (1) 158:4	pixels (12) 13:1;35:16,17;42:16; 49:10;66:22,23;72:6;150:6, 8,12,15	185:13,23;188:17;189:24; 191:5;201:13
petitioner (1) 93:9	physics (1) 18:12	place (2) 151:22;192:3	pointed (8) 8:2;51:16;58:4;59:5; 137:2;159:20;177:8;178:11
Petitioner's (1) 92:21	pick (3) 24:8;36:7;67:2	places (6) 43:10;96:2;100:10; 151:21;186:8,10	Pointedly (1) 158:1
petitions (4) 14:13;15:6;91:14;171:23	pickup (1) 137:6	planning (1) 198:17	pointing (4) 91:11;95:23;96:1;140:1
PhD (3) 4:10;5:3;206:16	picture (23) 20:25;39:20;79:8;80:12; 83:21;84:5;99:25;103:18; 117:22;138:5,14,18;139:11; 145:2,3;147:24;148:22; 149:13,14,16,17;150:21,23	please (13) 5:21;6:7;9:6,11;15:22; 50:14;81:4;95:2;113:24; 160:12;163:1;203:21; 205:17	points (1) 149:25
photo (3) 38:2;94:1,3	pictures (2) 113:21;119:1	plenty (1) 188:4	poor (2) 68:22;94:1
photograph (9) 137:22;141:15,22; 142:22;143:3;149:10; 158:13;159:14,16	piece (1) 71:25	plucking (1) 47:10	portion (39) 36:8,10;50:21;73:5,7,8; 167:22;184:19;188:8; 189:20;197:3,4,6,6,18,18, 21;199:11,19;200:3,5,8,14, 16,17,18,19,21,21,23;201:4, 6,8,19,20;202:8,11,11,22
photographed (27) 128:3;135:21;136:8; 137:19;140:3,5;141:5,7,14, 18;144:12;146:2,10,24; 147:3,19;149:8;151:1,9,19; 152:7;156:8,17;157:1,23; 169:14,23	pieces (2) 16:15;82:18	plurality (2) 194:22;195:10	portions (3) 36:11;128:10;197:24
photographer (1) 138:4	pimple (2) 173:13;176:19	plus (2) 42:19,19	portrait (1) 139:3
photographic (2) 84:17;139:24	pimples (13) 114:18;115:14;120:3,18; 121:9;124:12,14,15;125:11; 173:4;176:20;179:4;181:3	pm (2) 202:17;205:19	portraits (3) 114:16;115:12;120:1
photographing (12) 138:11;146:9;149:2; 151:12;156:14;157:11,24; 158:19;159:11;160:7,9,22	pivot (1) 156:12	point (63) 7:15;11:4;14:16;28:17, 19;31:24,24;33:8,19;34:6; 38:7;40:18;41:9;43:17,23; 44:3;45:7;51:8;54:5,6,20; 55:16;56:21,24;60:19; 62:11;69:25;72:21;75:11, 13;86:1;88:5;89:14;90:7;	POSITA (211) 8:11,14,19;9:16;10:14, 18;13:18,22,24;14:2;16:4,8, 21;19:5,13,21,25;20:2,16, 19;21:15,24;22:11;23:6,10; 24:14,18;25:1,9,17,25; 26:10,15,25;27:6,25;28:4, 11,22,25;29:8,14,17,20,24,
photography (1) 159:8	pixel (23) 35:14;45:25;47:7;61:12; 67:14;111:19;121:10,11,12, 22;122:22;123:21,22; 124:22,23;125:3,4,14,15; 173:5,5,7;182:12		
photons (8)			

25;30:2,4,11,15,19;32:11; 33:9,23;35:4;36:16,19; 37:2;40:16;41:15,18,24; 42:9,21;43:7;44:15,24,24; 47:14,17,24;48:2,11;49:2, 16;50:9,22;51:11;52:15,21; 53:2,3,11,22;54:1;55:4; 56:17;59:20;60:7,8,12,13, 16,19,21,23,24;61:16,21; 62:2,7,11;63:15,17,18,20, 24;64:21;65:15,19;67:11; 68:5,11,18;69:4;70:20;71:9, 15;72:18,19,21;73:2,10; 75:7,14;76:7,11,18,22; 77:14,15;81:24;83:15; 84:22;85:6,9,21;86:4,18; 87:18;89:18,19;90:3,8,10; 91:5;93:22;94:7,11,17,21, 23;95:3,19;96:3;98:7; 106:1;107:5,7,18;113:23; 114:20;115:7,20;116:20,25; 117:2,14,17;119:5;120:7; 121:13;122:10,17,20,24; 123:20;125:13,17,19; 126:10,15,21,25;127:3,9, 21;128:5;129:6;139:10; 173:14,16,17;174:7;175:24; 176:14,17,22;177:17; 180:21;181:8,19;183:1,3; 187:1,24;190:1,5;192:7; 193:21;195:5	168:8 possibilities (6) 21:8,22;61:20,24;85:16; 157:22 possibility (3) 129:4;139:23;154:25 possible (11) 34:3,19;41:23;50:13; 51:21;57:1,7,13;69:5; 133:9;182:18 possibly (3) 109:22;122:18;168:14 post (1) 27:17 post-process (1) 27:18 post-processing (11) 24:15,23;27:7,13;28:1,9; 29:15,25;30:5,12;31:8 post-processing' (1) 30:2 potentially (2) 154:10;165:9 power (1) 33:18 practical (1) 117:24 practice (7) 50:10;68:13;73:2;122:18; 128:21;129:23;196:16 practicing (2) 127:18;191:1 practicum (1) 65:8 pre (2) 25:6,24 precalculated (1) 192:12 precalculating (1) 192:10	precede (1) 27:1 precedent (1) 7:10 preceding (3) 54:24;101:11;103:20 predefined (1) 190:22 predetermined (12) 190:25;191:3,22,25; 192:22;193:1,3,4;194:10, 22;195:10;196:17 predict (1) 186:20 predictable (1) 192:7 preface (1) 39:10 prefatory (1) 56:3 preference (1) 74:9 prefix (2) 25:5,24 preliminaries (1) 6:5 premise (1) 185:15 prepare (1) 14:20 preprocess (1) 25:4 preprocessing (12) 24:15,22;25:1,10,18; 26:11,16;27:1;28:1,9,12; 29:16 prescient (1) 166:14 presence (2) 163:22;164:13	present (2) 163:17;168:15 presented (3) 45:17;91:15;197:14 presenting (1) 187:6 preserving (1) 185:9 presume (1) 50:8 pretty (6) 46:19;79:5;95:5;123:7; 138:24;179:4 previous (11) 14:23;28:16;39:3;52:11; 93:8;107:4,12,15;134:1; 148:11;196:8 previously (3) 5:15;33:17;186:23 primarily (1) 176:11 principles (5) 38:16;39:5,6;40:13; 157:21 print (1) 90:10 prior (19) 14:17;15:5;16:15;25:9; 29:8;49:9;65:14;70:18; 71:3;72:24;85:18,20;89:10; 91:14,17;93:18;138:1; 193:20;197:13 priori (1) 129:15 probability (1) 77:8 probably (18) 5:24,25;6:1;29:25;30:13, 16,25;43:1;72:14;73:13; 76:14;83:7;117:18;123:3,3;
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

174:10;187:3;190:3	150:25;151:7,13,16,17;	115:6	72:16;75:19,19;80:1;81:13;
problem (4)	152:10,23,24;153:3,11,12,	provisional (9)	83:7;85:5;88:10,22;94:10,
61:13;87:1;125:8;189:22	19;154:15,16;155:9;156:5,	114:8;119:21;120:6;	17;102:17;104:7,14;105:2,
Procedure (1)	13,20,22;157:3,9,10,10;	122:8;128:23;129:19;	25;108:22;110:24;135:12;
4:8	158:12,17,22,23,25;159:3,4,	130:22;131:16,20	145:14;147:16;150:12,14;
proceed (3)	7,10,15,18,25;160:4,5,8,13,	pull (1)	158:10;161:14;162:22;
121:16;127:2,17	18,19,19;161:1,3;163:2,3;	30:14	163:1;164:10;175:7;177:3,
proceeding (11)	165:8,12;166:13,20;167:16,	pulling (1)	16;182:8;194:2,6,6,16;
23:2;69:22;70:4;72:25;	22;169:6;170:25;171:7;	91:10	195:7;198:17;202:19
91:12,13;113:25;133:1;	182:12;189:1,2;197:10;	purpose (4)	questioning (4)
142:14;171:11;203:9	204:9,10,13,14,23	45:2;77:18;86:21;117:6	31:18;70:6,25;203:18
proceedings (4)	processor (1)	purposes (2)	questions (27)
6:12;9:22;162:17;205:18	191:25	86:3,11	6:20;7:5,8;11:23;12:6;
process (19)	produce (1)	pursuant (1)	16:7;19:24;20:12;29:11;
10:25;21:19;36:3;43:15,	96:24	4:7	31:21;33:21;34:3,6;58:17;
16;45:23;75:2;84:17;	produced (1)	push (1)	69:18,20;86:15;89:25;91:7;
114:20;115:8,21;121:1;	155:24	171:3	93:3;96:25;126:3;139:20;
140:4;158:11,17;159:5,10;	producing (1)	put (6)	203:6,8;205:5,14
168:16;176:7	86:14	9:1;24:9;92:6;122:18;	quick (1)
processed (13)	product (2)	192:24;196:18	164:9
38:18;115:17;120:16;	119:9;126:1	putting (2)	quite (5)
121:9;141:8;145:3,6,25;	Professor (2)	85:2;136:10	22:8;24:5;29:11;56:13;
146:22;147:5,10;148:9;	14:23;15:5		145:14
173:4	programmer (1)	Q	quote (5)
processes (1)	123:16		23:6;109:23;114:7;126:7;
152:2	prominent (1)	quality (6)	130:3
processing (133)	35:20	94:1;150:8,16,19,21,23	quoted (5)
7:7;17:3;18:11;19:2,15;	proper (1)	quantify (1)	115:6,15;127:7;128:22;
21:2,17,18,20,25;24:16;	34:5	82:22	199:15
25:6,7,9,17;26:1,6,7,10,15,	properly (2)	quantitative (3)	quoting (3)
21,23;27:12;30:8;33:24;	128:2;203:1	37:5;122:25;123:18	153:22,23,24
34:18;35:9;37:25;38:6;	provide (2)	quantity (4)	
40:6,12;41:21;42:1;65:10;	68:3;118:21	37:4;52:7,9;66:6	R
84:16,23;85:2,7;87:20;	provided (3)	question (68)	
114:4,24;123:12;132:1;	114:14;119:25;120:11	6:6;10:13;12:9;13:23;	races (1)
133:4,22,23;135:7,14;	provides (3)	14:9,13;20:9,14;28:18,20;	128:12
136:17;137:4,7,15;138:1;	110:16,20;130:23	29:22;31:10;32:3;33:12;	radii (1)
140:9;141:2;142:1,3,10;	providing (1)	34:1;45:12;48:22;54:13;	117:3
144:20;146:8;147:11,12,14,	189:18	55:4,13;56:7;57:14,20,24;	radius (3)
19,22,22,25;148:3,7;	provision (1)	59:18;60:15,18;62:21;64:4;	116:16,16;117:13

raise (3) 136:4;188:23;189:3	rarely (1) 137:24	195:3;199:9	88:11;116:15;167:2;
raising (1) 189:12	rather (6) 59:7;64:2;70:3;96:5;	reads (1) 24:7	169:5
range (239) 12:25,25;13:1;16:17; 21:7;41:25;42:10,25;43:2,5, 7,14,15;44:12,16,24;45:1, 13;46:11,22;47:2,4,12,15; 48:2,6,7,7,8,8,12,15,16,17, 17,20,23,24,24,25,25;49:3, 17,25;50:4,11,12,22;51:2,4, 7;52:2,5,7,9,12,16,25; 53:12;54:2,11,12,12,14,15; 55:3,8,9,10,10,11,14,14,17, 21,23;56:1,5,5,11;57:2,3,8, 19;58:4,11,12,19,20,25; 59:20,24,25;60:1,1,2,8,9,10; 61:4,5,7,8,16,19,22,24;62:3, 10,12,15,17,18,19;63:1,6,7, 7,12,16;64:7,9,14,17,20,21, 22;65:11,16,23;66:2,3,5,7, 10,11,15,20;67:4,7,9,19,19; 68:3,4,5,15,23;69:2,10,13; 93:23;94:2,4,5,6,8,8,12,12, 18,19;95:4,6,7,9,10,11,17, 24;96:5,14,19,22,23;97:10, 11,16,17,19;99:18,20,24; 100:3,7,9,13,15;101:1,5,13, 18,20;102:2,8,9,12,14,19, 23,24,25;103:2,10,24; 104:2,16;105:16,23;106:4, 15,16,18,23;107:1,5,8,9,9, 14,20,23,25;108:3,4,10; 109:5,10,12;110:10;111:6, 11,18,20,21;112:4,12; 124:3;195:6	rational (1) 148:14	ready (1) 172:15	receives (6) 87:25;88:3;168:22;169:3, 7,7
ranges (8) 60:11;62:24;68:20,21,25; 110:21;111:8;113:1	ratios (2) 67:18;68:3	real (3) 14:14;60:24;137:6	receiving (1) 169:1
	ravenous (1) 92:14	realistic (1) 184:6	recent (1) 69:20
	raw (2) 12:15;13:4	reality (2) 27:24;139:4	Recess (5) 44:8;92:19;132:8;166:19; 202:17
	reach (2) 31:24;155:15	realize (4) 21:9;53:24;128:1;175:5	recited (2) 9:17;161:6
	reached (2) 171:14;172:16	really (51) 7:4;8:6,16;11:11;12:17; 13:14,22;20:9;26:4;45:8; 49:11;51:15;57:13;67:23; 68:13;69:3,21;70:25;72:25; 84:12;86:3;87:25;91:15; 96:9;98:23;101:8;104:7; 111:1;113:17;119:8; 139:24;143:25;146:3; 150:13;152:16,16;155:7,20; 162:11;163:16;170:16; 176:17;180:5;186:19,21; 187:19;189:24;196:23; 200:6;201:25;202:1	recites (1) 114:4
	reaches (1) 38:8		recognize (2) 42:5;93:16
	reaching (1) 38:20		recognized (4) 24:15;33:23;148:6;192:7
	react (1) 30:3		recognizing (1) 95:23
	reacting (1) 30:3		recollect (1) 143:7
	read (28) 24:10;34:23;35:11;54:4, 18,21;62:6;73:2,10;76:17; 101:18;110:8;114:19; 136:16;137:12;146:18; 148:1;166:25;171:12; 176:18,18;199:17,22;200:1, 3,25;201:2;206:7	reason (14) 22:14,16;23:8,18;24:13; 69:1;124:24;146:7;147:13, 22;191:3;194:13;195:21; 204:17	reconstruct (1) 56:8
	reader (3) 21:5;121:16;127:13	reasoning (1) 171:21	record (3) 31:14;32:15,17
	reading (19) 29:8;32:10;35:21;43:9; 44:17,18;60:12,16;101:22; 103:3;110:3;127:1;151:2; 167:9;177:2,25;180:21;	reasons (5) 18:3;64:6;155:4;156:5; 193:5	recorded (1) 141:12
		recall (1) 203:18	red (16) 12:22,25;13:1,7,8;37:9; 183:11,14,17,20;184:8,10, 17,18,19;185:4
		received (4)	redefine (1) 32:19
			redirect (1) 203:3
			redness (3) 183:5,5,8

reduce (25) 17:12;40:9;75:21;76:5,5; 78:9;80:11,15;119:2;120:8, 19;150:6,11,16;174:3; 176:5;180:3;182:13; 184:18;185:5;186:5,7,8,10, 12	74:21;137:20	94:14;114:23;119:20; 132:1,2	14
reduced (2) 150:9,15	referred (12) 10:16;11:16;25:23;45:18; 48:12;49:8;58:20;64:16,22; 83:10;177:6;204:10	relates (8) 37:15;38:4;57:19;66:25; 67:22;99:24;100:2;203:11	removed (1) 81:11
reduces (3) 80:17;140:2;150:7	referring (19) 6:16;27:17;35:7;53:3; 54:20;58:16;66:20;77:7; 94:4;106:14,24;108:16; 135:4,9;142:4;146:4; 158:16;161:11;188:12	Relating (2) 38:24;39:3	removing (8) 81:18,20;120:17;173:23; 182:20;183:5;184:17,25
reducing (11) 75:24;76:1,16;122:6,12; 182:4,16,18,22;184:25; 186:9	refers (15) 25:24;48:1;55:2;59:19; 64:20;97:21,23;98:1;108:7, 7,8,24,25;151:4;158:22	relationship (8) 63:1;80:2;108:9;109:3; 124:22;125:2,13;197:25	render (2) 152:17;171:17
reduction (13) 17:13;46:14;76:20;80:11; 116:8,16;182:14,15;184:21, 21;187:7,9,14	reflected (2) 37:21;148:18	relative (11) 74:16;87:21;97:15,23; 98:18;99:12;100:19; 108:20;113:20;119:8; 125:25	rendered (1) 70:2
refer (26) 6:15;7:12,14;8:21;9:6,11, 17;15:22;25:1;44:9;45:13, 20;47:4;49:23;50:14;54:11; 77:4;83:9;89:4;107:5; 113:24;130:3;132:24; 167:17;200:6;201:12	reflects (1) 7:19	relatively (1) 79:14	repeat (2) 10:13;88:10
reference (29) 19:25;37:20;38:10;39:5; 74:1;79:15;93:19,21;94:19, 24;95:4;96:12;97:1,1,7; 107:8;108:20;128:15,18; 132:21;135:6,13;136:22; 162:19;172:8;174:17; 194:3;195:4;204:4	regard (3) 76:6;93:6;185:21	relevant (6) 14:10;19:18;28:18;32:20; 34:15;82:24	repeatedly (1) 20:1
referenced (1) 46:10	regardless (3) 47:12;52:4;145:19	rely (2) 135:6,13	rephrase (1) 54:9
references (7) 14:11;19:14;85:18,20; 93:18;193:20;196:4	regards (5) 18:20;67:16;129:16; 139:25;142:16	remark (1) 56:4	replicated (1) 125:19
referencing (2)	region (13) 73:12;79:7;99:25;101:2, 21,22;102:2;117:11; 134:13;136:6;166:10; 183:23;190:21	remarkably (1) 148:2	report (28) 7:6,16,19;8:7,15;13:15; 14:19;16:16;31:11;34:8; 69:21,24;70:16;91:12; 98:14;136:18;137:3;162:9, 10,12;173:25;178:3;192:6; 193:18;194:17;195:2; 201:15;202:12
	regions (4) 111:22;117:25;186:11; 190:20	remember (6) 118:14;134:10;156:11; 171:24;199:20;203:20	Reporter (3) 4:5;126:13;205:15
	relate (4) 39:25;99:6;101:24;115:3	REMEMBERED (1) 4:1	reports (4) 7:9;8:3;14:12;89:10
	related (19) 36:14;39:11;41:9,20,22; 43:21;48:22;49:14;54:10; 56:12,18,25;59:3;83:12;	remind (1) 9:21	represent (1) 192:19
		removal (12) 17:13;75:22,24;76:20; 81:25;115:19,25;116:7,10; 117:6;182:15;184:22	representation (2) 138:3,16
		remove (13) 17:10,11,11,14;75:21,23; 76:4,4,6;81:7;82:14;121:2,	representations (4) 38:19;41:6,11,22
			represented (2) 136:5;149:5
			represents (2) 104:22;110:14

reproduction (1) 202:13	revealed (2) 164:20;177:14	5:7;7:23;9:3,6,9,11,25; 10:8,14,20;11:6,15;12:7; 14:2;19:5,10;20:11;21:15; 22:11;23:16;24:14,25;25:8, 15,23;26:9,14,25;27:6,25; 28:11,21;29:5;30:11;31:16; 32:8,18;33:3,18;42:8;43:4; 44:5,9;52:1,11,20;57:22; 61:21;62:14;63:11;65:5,15; 66:14,17;67:11;69:6;70:17; 71:9,15,21;75:13;78:3; 80:14;81:15;83:23;84:2; 85:4,21;86:4;87:2;88:1; 89:16;90:9;92:11,15,17,20; 93:12,16;102:4;108:6; 114:12;118:20;119:4; 126:14;131:22;132:5,13,20, 24;147:17;162:2;164:11; 166:2,16,18,20;170:4; 172:6;174:16,21;180:8,14, 21;181:14;182:3,16;188:5; 194:18;196:2;197:23; 202:16,18;203:2;205:7,12	Run (7) 26:13;166:5,7,8,10,14; 170:8 runs (1) 167:15
request (1) 6:20	reverts (1) 143:20		S
require (2) 57:21;195:23	review (4) 15:12;44:23;50:18;171:9		
requires (1) 112:9	reviewed (2) 97:6;194:3		
Rescaling (1) 93:25	Reviewing (29) 9:15;10:12;15:4,11,14; 19:12;40:23;45:12;50:20; 93:24;94:25;95:21;98:9; 110:7;121:15;133:25; 136:2,14;137:1;139:21; 146:18;151:2;155:18; 160:2;180:24;188:16; 193:11;200:2,12		salient (1) 8:7
reservation (1) 187:20			same (116) 18:1;30:3;36:23;42:12; 53:5;56:6;59:14;61:4,5; 62:14;63:3;71:14;74:7; 81:10;82:8;87:10;101:15; 102:24;104:1;105:9,12; 106:22;107:16;109:19; 110:22;111:4,7,7;120:16; 122:15;124:8;131:2,20,24; 134:16,20,23;137:18,24; 138:6,18,18;140:15,20; 141:11,11,12,14,16;142:22; 143:4,4,25;144:17,18,19, 19;145:1,1,2,4,7;146:1,19, 20;147:9;148:10,11;149:8, 10,20,21,23,24;150:5,20; 151:8,10,20,25;152:4,7; 154:6;155:10,10,14,22; 156:11,19;157:1;158:14; 160:21;161:23,25;162:4,4, 5,5,6;163:3,7;167:25; 169:15,16,18;170:23;173:9; 178:15;183:10,12;188:25; 196:22;199:9;201:3,17; 202:23
resided (1) 10:15			
resolution (1) 150:19			
respect (4) 16:5;34:9;79:15;118:17	RGB (10) 12:7,12,13,15;13:4,12,13; 37:5;41:11;56:15	robot (1) 125:19	
respective (1) 177:5	Richardson (1) 4:3	robots (1) 125:20	
respectively (1) 192:12	rid (1) 190:15	rodeo (1) 6:3	
response (6) 48:23;57:23;58:17;59:18; 60:17;138:16	Right (27) 6:24;23:22;33:4,18;36:4; 43:4;46:9;54:25;66:12; 80:19;88:3,7,24;90:22; 94:16;95:2;97:14;98:12; 103:18;104:6;107:15; 109:23;149:18;158:18; 166:18;188:14;202:5	room (5) 159:1,22;161:6;189:17; 202:15	
responses (1) 15:6		rough (1) 5:18	
responsible (1) 94:2	right-hand (5) 114:7,22;115:16;126:8; 127:8	roughly (2) 40:20;66:19	
rest (8) 6:1;108:19;130:11; 190:15;195:20,22,23; 202:15	rise (1) 160:1	row (1) 107:24	sample (3) 13:7,7,8
rest' (1) 196:10	RMS (1) 72:8	Rules (1) 4:8	sampling (1) 40:14
result (6) 105:23;106:3;160:1,14; 178:7;182:4	ROBINSON (116)		saturated (1)
Resulting (3) 197:2;200:16;202:8			

202:22	screen (5)	seem (1)	16,18,20,21,23,24;109:8;
save (3)	133:16,19;139:12;	147:20	113:8;114:19;115:5,7,15,
22:25;40:19;191:5	163:25;168:8	seems (1)	20;116:9,13;119:24;120:7,
saw (1)	searched (1)	59:7	14,19;121:3,8,13;122:3,10;
136:16	73:24	segment (1)	128:22;131:1,4;144:16;
saying (31)	second (55)	54:20	146:17;157:15;158:3,7;
14:5,6;22:24;39:10;	36:4,6,6,8;44:4;67:6;	select (4)	159:9,20;160:16;161:7;
43:22;46:16,17,19,21,23;	106:20;108:4,21;115:15;	117:3;176:25;177:20,23	189:9
47:1;58:21,22,25;59:14;	121:10,12,18,21;122:21;	selected (3)	sentences (10)
67:3;71:2;80:10;86:22;	123:5,22;124:23;125:3,14;	21:10;194:22;195:9	106:17;107:24;126:7,10,
89:4;112:7;120:10;131:15;	143:2,3;156:13;157:9;	selecting (4)	15;127:7,20;130:2;139:18,
140:12;144:4;147:21;	158:17,22,25;159:2,7,9,9;	79:11;172:9,13,19	19
154:13;158:11,11;165:11;	160:8,19;166:1;173:4,6;	selectively (1)	separate (6)
204:4	177:15;180:12;197:5,6,17,	73:20	83:1;192:4,24;196:18;
scaled (1)	19,20,21;199:6,8;200:5,9,	self-modify (1)	203:16;204:20
96:21	15,16,19,21;201:17;202:9,	88:20	separated (2)
scanning (1)	11	sense (25)	138:8;191:11
126:4	Secondly (2)	8:4;24:1;37:16;41:9,23;	separately (1)
scenario (8)	57:5;59:2	51:19;55:23;56:15,16;69:1,	57:8
27:10;51:3;154:11;	seconds (2)	3,5;79:6;89:22;117:8;	separation (1)
155:12,14,22;168:13,15	149:19,21	133:13;141:14,24;143:13;	157:14
scenarios (10)	secret (2)	144:16;169:3;192:23;	separator (1)
12:23;27:4;134:25;	118:18,22	193:25;196:18;205:10	101:16
155:10;156:4,6;162:20;	Section (36)	sensitive (1)	series (4)
163:8,19;199:3	4:7;121:6;133:5,20,22,	37:9	16:7;54:17;58:16;137:25
scene (11)	22;134:17;141:1,2;142:2,2,	sensor (21)	SESSION (1)
138:21;140:25;143:18,	6,10;148:3;151:7,16;	27:2,8;38:2;42:16;64:9;	132:11
20;144:1,19;145:1;148:2;	152:12,23,24;153:11,19;	66:18,19,21;67:2;68:9,20,	set (11)
153:9;163:10;168:9	154:15,16;155:13;159:5,25;	22,22;141:11,12,17;144:17,	4:12;8:3;28:7;78:1;98:9;
SCHROEDER (1)	160:4,13,18;161:3;168:12;	25;145:21,25;149:20	115:18;120:17;121:11;
4:5	170:21,22;189:1;195:2;	sensors (5)	123:21;129:13;173:6
science (5)	202:21	12:24;67:17,18;68:3,19	setting (3)
18:9,11;65:6,7;75:3	sections (3)	sent (12)	64:19;67:14;193:4
scientific (3)	73:21;137:20;198:23	151:11,13,21,25;152:1,8,	several (2)
37:1;56:14;72:12	seeing (2)	15;157:4,24;159:19;160:21,	111:24;130:2
scientifically (2)	137:14;139:16	21	shading (1)
72:13;73:14	seek (1)	sentence (56)	149:4
Scope (11)	130:9	68:2;69:7,7,9;89:4;97:5;	sharp (1)
27:9,12;31:19,21;32:1,4,	seeking (1)	101:12,16;106:14,20;107:7,	157:13
25;33:16;34:7,12;71:3	165:3	11,15,19;108:4,5,6,13,13,	sharper (1)

190:20	simple (3)	115:13;120:3;122:4;128:1,	smooths (1)
sharpness (1)	8:1;88:25;170:24	2;172:10,20;174:1;177:1,	179:3
46:13	simplest (1)	21,23;178:12,19;179:11,14	so-called (1)
shoot (1)	180:25	skin-recognition (2)	41:12
137:13	simplify (2)	122:4,11	sold (1)
shooting (2)	135:7,14	sky (7)	119:10
136:24;137:9	simply (3)	79:8;83:21;84:6;104:22,	solely (1)
short (3)	60:6;147:7;158:11	22;110:14,19	76:22
14:25;126:1;202:18	single (7)	slice (2)	solidly (1)
Shorthand (2)	45:24;108:3;111:10;	21:21,23	72:9
4:5;23:2	113:15;192:4,24;195:22	slightly (1)	somebody (6)
show (4)	sinusoidal (1)	145:3	18:5;24:6;30:19;117:23;
42:3;70:14;91:7;180:18	187:17	small (2)	118:23;139:10
shown (3)	sit (1)	94:1;128:3	somebody's (1)
45:20;138:2;148:3	171:20	smaller (11)	76:19
shows (2)	sitting (4)	5:25;40:10,11;100:14;	somehow (2)
130:21;143:8	15:14;71:20;72:10;139:2	111:6;136:8,12;140:18;	39:20;166:12
shut (1)	situation (12)	144:13;148:12;198:5	someone (1)
166:3	34:13;77:24;123:19,24;	smallest (1)	196:11
sidestep (1)	124:2;134:20;154:7;	72:2	someplace (1)
170:17	156:16;162:4,24;165:22,22	smartphones (1)	96:6
sidestepped (1)	situations (1)	30:20	something (60)
33:11	169:9	smooth (22)	5:22;8:14;17:16;18:4,14;
signal (63)	six (2)	78:25;79:3,5,7,9,12,12,	22:9;23:24;25:25,25;27:19,
135:20,21;136:3,5,6,7,9;	19:21;63:19	13,19,22;80:3,7;83:20;84:5;	19;30:9,14;33:15;36:2,7,13,
137:5;142:23;143:4;	size (22)	178:19,22;179:1,2,4,11,14;	14;45:7;46:2;49:14;51:5,
144:12,13,19,21;145:5,6,7,	40:8;82:19;102:2,9,19;	186:11	18,22;52:23;54:5;56:1;
8,9,18;146:13,19,21;147:2,	103:23,25;108:10,10;109:4,	smoothed (2)	65:2;69:16;71:3;78:14;
9;148:8,9,10;149:1,8,10,22,	4,9,12;116:1,19,25;117:11,	83:19;84:3	80:17;81:2,6;82:4;83:9;
23,24,25;150:5;151:3,9,10,	13,21,25;124:11;199:1	smoothing (46)	84:18,18;91:25;92:14;
11,21,25;152:1,4,4,8;	sizes (2)	46:14;79:10;80:10,12,14,	95:14;99:25;102:11,21;
156:11,19;157:2,4;158:13,	111:4;117:25	20,21,22,23,24,25;81:2,14,	106:9;113:19;122:24;
14;159:13,18;160:6,20,20,	skill (19)	16,21,22,23,24;82:5;83:16,	134:11;136:15;138:19;
21;169:15,17,18,19;187:25	7:17,21,24;16:4;34:16;	20;84:4;115:18,18,23,24,	154:20;169:7,7;171:18;
signals (4)	65:5;118:4,17;121:5,25;	25;116:21;120:16;122:15;	172:2;175:5,12;178:2;
144:15;187:15,16;188:3	123:6;127:17,25;129:21;	173:9,11,15,18,20,21,24;	194:20;203:15
significant (4)	176:9;178:12;194:12;	174:2,5,12;176:6;177:23;	Sometimes (11)
69:18;125:23,25;126:2	195:12,24	178:13,17,20,23	10:25;12:15;20:22;42:18;
similar (4)	skin (18)	smoothness (1)	75:21;124:7;190:11;193:3,
65:7;73:13;139:7,8	46:14;106:10;114:17;	80:3	3;195:19;196:9

somewhere (7) 15:1;42:4;54:6;176:12; 191:24;192:3;193:23	special (2) 27:20;185:21	spectrum (1) 130:18	81:6
sorry (22) 64:12;68:11;70:5;84:1; 87:4;98:4;109:4;110:5; 128:16;135:20;153:16; 154:4;158:8;170:4;172:11; 175:1;4;177:15;185:17; 191:17;198:16;200:8	specific (36) 12:6,18;13:23;14:10,11, 11,12;17:2;19:4;21:14; 24:24;34:22;37:18;43:12; 47:24;58:17;62:7;66:5,6, 13;85:3;89:14;90:1;92:2; 97:3;120:24;121:17; 123:25;124:24;126:25; 127:15;152:13;172:3; 173:22;176:20;184:5	speculate (6) 16:19;20:1;24:20,20; 57:25;162:8	start (11) 6:19;45:9;51:10;54:13; 66:14,18;84:10;85:4; 135:11;175:7;198:11
sort (9) 43:19;64:1;74:21;83:2; 104:18;113:14;117:17; 125:2;144:22	specifically (25) 17:19;19:13;24:8;29:20; 47:3;48:21,22;49:11,19; 69:7;76:15;80:7,11;89:17; 114:2;121:24;143:11; 145:23;159:20;160:15; 163:15;165:3;177:6;188:7; 189:10	speculating (5) 20:13;27:22;65:4;123:18; 196:10	started (1) 170:11
sound (1) 57:18	specification (20) 12:18;14:16;35:7;36:15; 44:19;46:19;50:8;56:22; 65:20,23;66:4;73:16,25; 74:14;127:16;128:21; 152:12;157:18;188:12; 196:15	speculation (2) 18:19;27:23	Starting (4) 43:6;115:5;158:3,7
Sounds (2) 22:6;132:7	specifics (3) 18:21;92:3;96:9	speculative (5) 20:15;34:6;57:21;77:21; 89:24	starts (1) 156:15
space (10) 41:5,5;56:15,16;61:1; 64:3;128:3,10;142:23; 146:21	specified (4) 35:15;96:19,21;98:12	speed (3) 135:7,14;137:5	State (9) 4:6;66:12;74:14;137:4; 168:11;189:24;192:6; 193:14,17
spaces (5) 41:4,7,10;59:10,10	specifies (1) 87:20	spend (3) 6:5;15:10;119:13	stated (8) 56:22;63:6;107:4;179:22; 184:23,24;185:3;190:24
space-time (1) 150:5	specify (5) 56:10;97:22;98:18;99:12; 100:18	spending (2) 119:11;136:15	statement (5) 69:15;89:1;96:6;133:7; 183:2
spanning (2) 119:21;120:14	specs (1) 54:6	spent (2) 96:11,13	states (2) 114:13;185:13
spans (1) 69:8		spirit (1) 74:15	static (3) 138:22,24;145:9
spatial (3) 74:8;185:8,19		spot (10) 183:17,20;184:8,9,10,17, 18,19;185:4;194:24	statically (1) 145:25
speak (3) 31:14;42:7;66:23		spot/blemish (1) 122:12	stating (1) 91:18
speaking (11) 20:22,24;24:25;41:8; 67:13;77:1;87:16;106:15; 175:22;181:25;186:22		spots (5) 120:17;121:9;173:3; 174:3;181:2	stay (1) 82:7
spec (4) 55:19;59:8;146:5;162:3		spots/blemishes (1) 122:5	stayed (1) 145:25
		square (2) 118:6;163:25	Staying (1) 119:20
		squared (2) 72:6,7	step (1) 175:5
		standard (1) 131:5	step-by-step (1) 152:18
		standards (1)	stepping (1)

170:12	25,25	192:18	204:17
steps (5)	struggling (1)	suggested (3)	Surely (1)
26:20;82:23;138:1;	59:15	147:17;192:9,23	162:15
165:15;170:8	students (1)	suggesting (2)	surrounding (1)
stick (2)	123:11	62:16;179:9	147:25
31:12;43:20	studying (1)	suggests (2)	suspend (1)
stickers (1)	96:12	79:22;138:20	31:25
9:1	stuff (2)	suitable (5)	sworn (2)
still (19)	89:14;132:3	152:2;172:9,19;177:1,21	4:11;5:4
38:18;64:4;72:18;75:23,	stupid (1)	Suite (2)	synonymous (9)
24;82:4,7,9,11;110:6;113:2;	83:7	4:4;77:20	22:4,7,8,13;57:6;80:13,
125:10;138:25;149:13,14,	subject (6)	sum (2)	20;178:20;180:13
15,20;150:4;195:7	31:12;51:21;136:23;	37:12;72:3	system (26)
stops (1)	137:8;148:5;168:8	summarize (2)	37:8;48:9,15;49:1,3,17;
143:16	subroutine (1)	63:3;109:15	54:16;55:12,15;56:10;57:1,
storage (4)	165:17	sunlight (1)	4,7;58:10;60:3;62:10,20;
27:1,7,14;192:19	subroutines (1)	148:18	63:8,25;64:1,16,22,24;
store (6)	165:17	superimposed (2)	66:17;149:13;167:20
27:18;191:24;192:2;	subsampling (1)	12:24;156:2	systems (13)
193:15,23;204:24	40:10	supply (1)	11:24;12:4;48:2,5,14,20,
stored (3)	subsequently (2)	78:18	23;55:2,8,17,25;56:4,5
196:21;203:17;204:15	38:5;120:15	support (6)	system's (9)
storing (2)	substance (1)	130:23,25;131:4,8,11,12	59:19,24;62:17;63:1,5,7,
192:12;193:24	132:14	suppose (6)	12,16;64:7
straight (1)	substantially (9)	23:24;27:5;78:18;90:22;	T
200:11	117:1;137:6;138:17,18;	117:19;198:6	
stream (2)	139:7,8;141:13;145:1,2	supposed (4)	table (19)
143:24;145:20	substantive (1)	72:25;110:24;120:10;	
streamline (1)	92:23	127:16	50:1,12;191:4,6;192:3,4,
140:4	subtle (4)	sure (41)	20,20,24;193:2,16,24;
stretch (1)	96:7;124:5;125:6,7	6:17;19:19,19,23;24:23;	194:19;196:19;203:17;
52:24	sudden (1)	27:5;29:10,22;39:7;40:20;	204:16,20,22,24
strike (1)	144:8	42:13;44:7,22;53:7,14;	tables (3)
42:16	suddenly (2)	55:18;62:25;80:19;82:1;	192:13;196:22;203:12
striking (1)	126:1;143:19	87:7,10;97:18;105:6;	taking (3)
141:11	sufficiently (1)	110:18;114:1;116:21;	95:10;149:17;167:9
strongly (1)	189:17	118:15;135:9;141:24;	talk (10)
91:25	suggest (8)	156:19;161:8,15;164:11;	6:9;17:12;45:14;66:1;
structure (5)	90:9;143:16;157:16;	169:16;174:18;175:14;	70:15;78:4;128:24;143:5;
120:24;127:15;164:20,	158:4;162:15;167:14,20;	198:9;199:9;202:7,24;	155:20;157:2

talked (9) 56:13;57:16;70:15;91:15; 16;107:25;121:6;162:9; 178:3	196:12 teachers (1) 196:14 teaches (5) 131:2;140:6,7;157:6; 180:12 teaching (28) 46:24;50:8;51:6;55:20; 56:2;65:21;68:12;107:17; 109:10;113:18,22,22; 121:18;122:17;128:21; 134:6;156:24;157:20; 162:3;168:1,3;173:23; 194:11;195:18,18;196:9,13, 16 teachings (4) 76:17;107:23;177:5; 192:9 team (2) 118:13,16 technical (12) 65:7;67:16;131:7,10,12, 16,18,20,23,24;132:4;190:3 technically (1) 131:7 technique (1) 197:10 techniques (1) 132:3 technology (1) 92:3 television (1) 189:8 telling (4) 28:24;58:2;71:2;147:23 tells (1) 169:22 tend (2) 17:4;32:1 term (56)	7:6,7;8:16;17:1,1,21,25; 18:3;21:18;23:21;24:3,5,7, 22;25:4;26:15;34:24;36:18; 37:1,2;38:22;40:16,25; 41:16,24;48:15;58:15; 59:13;65:10,16;68:15; 70:14,23;71:10,16;75:8,16; 76:7,23;84:22;85:6,22; 91:20;93:22;94:23;95:3,24; 96:4,14;97:1,15;143:7; 173:21;176:9,10,13 terminology (3) 12:16;42:5;72:20 terms (27) 20:3;21:25;24:15,19,19; 27:21;32:9,12,14,16,19,20, 22,24;33:10;46:20;58:5; 64:17;70:12,19;71:4,5; 79:5;98:2,8;142:12;184:3 testified (4) 5:4;33:17;102:18;186:24 testimony (12) 14:21;31:19;65:14;92:22; 93:1,10;107:4;108:15; 132:15,18;200:22;206:10 tethered (1) 31:19 Texas (2) 4:6,9 textbooks (1) 142:15 themselves (1) 77:10 Therefore (2) 144:6;189:17 therein (1) 206:10 thereupon (1) 4:12 thing (16)	6:6;12:5;13:11;58:23; 59:2;107:16,16;119:8; 131:2;144:22;150:20; 159:7;160:14;161:4; 170:13;188:25 things (46) 10:22;17:3,4;18:19; 22:22;35:3;39:9;44:20; 45:3;46:21;48:6,24;49:13, 18;55:9,15;58:21,22;59:25; 60:7,7;70:3;84:16;85:10, 14;90:13;103:18;104:9; 106:12;119:17;124:14,19; 125:21;159:6;161:22; 162:6;169:8;175:18; 177:24;178:1;186:1; 187:11;192:2;198:17; 202:25,25 think (175) 5:13;6:10;8:12;9:8;13:22, 25;18:20;20:2;22:7;25:24; 30:2,15;31:12,17;32:6; 33:13,17;34:5,22;41:1,8,18; 43:20;48:16;49:14,16; 50:10,11;53:24;55:20,22; 56:2,23;58:8;59:8,13; 62:22;63:10,13;64:10;65:3; 66:4,12;67:22;68:1,7,12,14, 18;69:4,15;72:10,14,21; 73:13,25;74:10,12,20,25; 75:18;76:4,15;77:25;79:22; 80:16,18,23,25;81:1,20,22; 84:8,14;86:18;87:13;88:4; 89:10,19;91:16,23;92:8; 94:5;95:5;96:25;97:13,14, 16;104:5;105:2,25;106:5, 20;107:11,12,14,22,24; 108:1,1,2;109:7,9,10,18,20, 20;110:7;111:14,15;112:7, 15,22;113:17,17,20;118:13,
----------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

15;121:5;124:24;125:5,16; 126:21;127:3,12;129:20,25; 130:14;131:25;140:10; 143:21;144:3;155:18; 156:1,3,10;157:6;158:10; 160:2;162:3,18,23,25; 163:18;166:24;171:25; 173:16,23;174:6,12,24; 175:4;176:9,11,15;177:15, 24;179:18;181:25;182:1, 18;183:3;185:19;187:5; 190:5,5;194:11,25;195:1,5, 11,21,24;199:25;201:11	161:22;162:6;163:8; 165:15;170:23;171:12; 179:17,20;181:4,8;189:16; 193:15;195:15;196:14; 197:24;198:23;202:22; 204:24;205:9	81:13 39:14;84:2;86:15;91:3 31:21	162:5 205:16;206:7,10
thinking (8) 15:8;19:4;44:18;54:23; 62:7;71:20;72:13;201:22	though (6) 38:20;129:25;143:17,23; 145:2;168:25	tie (4) tied (1) tightening (1) 189:7	transcript (3) transform (3) 61:5;82:19,22
third (2) 191:11,13	thought (6) 22:15;23:11;60:9;81:17; 110:5;162:21	timeframe (1) 53:6 times (7) 5:12;59:5;61:12;63:13, 19:95:25;96:15	transformation (1) 56:15 transformed (1) 41:11
Thirdly (1) 59:5	thousand (2) 40:8,8	tiny (1) 124:16	transmit (2) 26:19,21
this_day (1) 206:12	thousands (1) 119:10	title (4) 43:6;44:12;47:10,13	treated (1) 112:25
thoroughly (1) 97:6	thread (1) 18:22	today (13) 5:8;6:11;14:21;20:4; 26:23;28:19;92:22;93:10; 132:15,18;171:20;184:2; 195:14	tripod (1) 138:24
those (88) 5:18;6:23;7:15;13:13; 14:6;17:4,16;18:22;20:22; 24:19;29:2;31:3,5,22; 32:14;33:2;34:21;37:12; 39:8;44:20;46:21;48:12; 49:3,8,18;50:18;54:23; 58:21,22;60:10;61:25; 70:19;72:9,12,14;74:12; 81:4;82:14,25;85:20;98:2; 7;102:6;105:2,15;111:7,22; 115:4;117:10;119:17; 121:3;126:8,10,24;127:7; 128:8,9,18;131:3,20; 139:19;149:21;150:7,13,16; 153:7;155:10;156:1,6;	three (9) 5:18;6:2;15:2;65:8;98:2, 7;112:24;139:17,20	together (6) 42:20;74:9;105:16; 126:19;193:24;195:1	trouble (1) 118:2
	threshold (1) 170:15	told (2) 15:17;77:14	true (17) 28:10;29:20;51:23; 128:11;133:7;139:22; 140:2;145:6;154:5;161:22; 162:6;164:7,13;170:23; 183:1;197:25;206:9
	through (30) 33:19,22;45:9,11;46:9; 47:3,16;50:14,17,25;54:11; 58:14;73:19;115:17; 120:16;122:15;137:25; 141:11;144:18,20;168:15; 170:8;172:8,12,16,23; 173:2;177:10;188:6,11	took (2) 52:22;123:16	truth (1) 88:23
	throughout (2) 43:5;96:15	tool (1) 175:23	try (19) 6:9;17:10,15;18:24;23:2; 33:18,22;39:25;53:19,20; 73:22;82:14;118:5,5; 129:23;154:22;163:19; 175:8;182:20
	throwing (2) 91:1;129:15	tools (2) 119:16;178:21	trying (28) 23:3;33:8;34:2,5,9;36:16; 40:2;51:20;56:8;63:3;66:4; 76:3;79:23;80:9;81:22; 88:24;91:7;95:22;120:23; 131:9;139:11;142:20; 162:23;164:2;174:24;
	Thursday (1) 4:1	top (1) 171:2	
	thus (1) 148:19	toward (2) 127:20;150:12	
	tide (1)	towards (6) 20:21,24;30:18;39:25; 65:21;127:13	
		town (1)	

180:22;187:20,21	30:4	21:24;22:12;25:1,9,18;	upon (19)
turn (5)	unaware (2)	26:1;27:1,7;28:23;33:9;	35:14;36:6;47:7;73:3;
73:18;87:6;131:17;	13:25;14:3	41:15,24;43:7;48:11;49:2,7,	87:14;88:8,16,18,21;89:6,
203:22,24	under (2)	17:51;12:52;15:54;7:63;15;	12:96:3;135:6,13;136:15;
two (45)	46:14;206:6	64:21;71:16;76:11,13,23;	140:11,22;178:25;180:19
6:21;9:8;15:1;39:8;	undergoes (1)	77:20;81:24;84:22;85:6,9,	usage (1)
55:15;58:21,22;60:11;72:3,	152:1	22;86:19;87:19;90:3;93:22;	32:23
9,14;106:17;107:24;	undersigned (1)	116:20,25;174:7;178:12	use (56)
110:22;111:22;113:15;	206:6	undesirable (1)	12:16;22:5;26:15;38:22;
122:14;126:8;134:15;	understand (108)	84:18	40:12;49:12;55:24;58:15;
139:20;141:12;144:15;	6:7,11,16;7:16,25;9:16;	unfavorable (1)	59:7;67:24;68:15;69:13;
149:25;150:2,4,13,16;	10:15,18;11:19,20,25;15:8;	165:16	72:22;77:8;91:11;95:14,24;
152:8;153:7;155:10;156:1,	16:22,25;18:9;20:3,9,19;	unintentional (1)	96:1,4;98:19;111:16,23;
21;157:2;161:22;162:6,16;	21:7;29:6,10;30:1,32;11;	85:11	121:18;123:8;135:20,21;
163:19;169:16;192:18;	33:9;34:17,25;35:1,4,21;	unit (4)	136:1,7,9;142:25;143:6;
194:1;196:22;197:24;	36:16;37:3;40:2,16;42:14,	35:13;98:14;155:1;	144:12,14;173:10,18;174:5;
198:23;199:3;203:6	21,23;43:1,2;44:15,17,24;	162:19	175:9,12;177:13,14,22;
two-dimensional (1)	45:15;47:18;50:3,9;54:4;	unless (7)	178:21;179:1,10,12,16,19;
78:14	56:17;59:16;60:25;65:16,	31:15;61:4;92:13;143:9;	181:24;182:9;193:3,4,23;
tying (1)	20;67:12;68:5,19;69:4;	165:17;167:22;168:15	202:15;203:11,16;204:11
27:24	71:10;72:19;73:11,22;76:8,	unpleasant (1)	used (43)
type (9)	17,19;77:2,25;79:23;84:8;	83:5	17:21,25;18:1,1;32:9;
11:20;35:15;51:2;66:5;	86:7,10;89:19;90:8,10;94:7,	un-reddened (1)	36:18;40:18;43:5,9;51:8;
105:9;110:22;174:11;	11,17;95:3;96:4;98:7;	183:14	57:23;58:1;59:18;65:24;
178:15,16	102:17;106:1;107:5,7,19;	unrelated (3)	77:3,4;86:1;91:5,20,23;
types (18)	113:23;117:2,15;121:7,25;	22:22;52:9;175:18	94:18;97:2,15;99:14,21;
12:14;46:11,24;51:4;	123:4;126:21;127:1;128:5;	until (6)	101:5,7,18;106:18,23;
104:11;105:12;107:19;	139:10;145:14;176:1,24;	12:20;54:4;87:24;88:3;	113:14;115:24;129:16;
109:16,17,25;110:17;	177:19;178:2;181:8,20;	146:1;167:15	143:12;156:13;160:6,18,25;
111:12,25;113:15;120:12;	183:1;193:22;194:5,13;	unusual (1)	174:23;175:13,17;178:22;
125:1,6;181:8	195:6,12,20,25;196:10	59:12	181:2
typical (4)	understanding (28)	UNV (1)	useless (1)
13:5;117:21,22;118:10	8:11;17:19;20:16;28:25;	41:13	143:9
Typically (7)	29:7;32:9,20,21;33:14;	up (14)	user (6)
12:22;17:12;72:2;75:4;	42:10;48:3;55:5;59:21;	24:8;30:16;37:12;50:19;	74:9;117:22;118:10;
77:4;82:18;117:11	67:24;68:15;69:12;75:7,15;	67:2;81:13;103:21;117:24;	136:24;137:9,13
U	94:21,23;96:8;103:11,12;	142:12;146:14;160:3;	uses (7)
	135:17;146:4;162:16;	165:9;166:3;167:10	59:6;97:9,11;98:3;
unable (1)	171:15;186:24	updated (3)	135:24;176:24;177:19
	understood (40)	145:24;146:13;147:1	using (39)

11:10;18:3;38:15;39:11; 40:3,14;41:8;50:1,11; 59:13;72:20;73:20;75:3; 78:20;80:20;87:10;114:5, 20;115:8,18,21;120:16; 121:25;122:5,16,19;123:24; 136:19;139:14;172:10,20; 174:25;177:11;178:9; 180:12;184:2,3;186:20; 192:1 usual (4) 23:19;24:21;38:15; 176:12 usually (3) 10:24;40:13;77:12	variegated (1) 28:8 variety (5) 28:6;58:5;86:10,11;107:6 various (7) 45:17;65:21;70:12;73:21; 136:16;157:21;189:23 vary (1) 195:25 vein (2) 62:14;82:8 versa (1) 163:20 version (2) 145:7;151:13 versus (8) 15:13,13;56:5;135:21; 138:10;160:7;184:8;199:5 vibrations (1) 138:25 vice (1) 163:19 video (18) 81:5,10,10;142:17,19,20, 25;143:5,7,9,14,24,25; 144:9;145:17;146:13; 147:1;149:16 videos (2) 129:12;142:16 view (4) 10:24;31:13;32:14;192:8 viewed (2) 81:20;86:14 viewer (1) 39:21 visibilities (3) 158:25;159:21;161:5 visibility (17) 136:23;137:7;146:23; 147:8;148:19,24;188:19;	189:6,17,18,20,23,25;190:2, 4,17,19 visible (12) 35:20;74:5,6,24;75:4,6; 78:5;83:2;113:7,12,18; 148:23 vision (3) 21:1;65:9;132:2 visual (11) 10:23;11:1,16;18:10; 20:24;37:8;38:24;69:10; 83:22;84:7;201:6 vocabulary (1) 28:7	131:24;136:10;138:4,15; 140:13;143:16;153:7; 155:21;156:3;159:18; 160:3,23;166:25;167:25; 181:21,25;182:2;185:20; 200:3 ways (22) 21:23;43:10;52:1,6,10, 16;53:10,11,25,25;54:1; 61:15,22;62:3,8,12;71:24; 83:15;86:2,11;95:19; 189:23 weakly (1) 91:25 week (2) 119:9;123:10 weeks (1) 15:2 Weight (6) 98:6;99:19;100:19; 101:15,17,21 weighted (2) 37:14;42:20 weighting (2) 38:15;113:13 weights (17) 37:13;97:21;98:4,16,23; 99:11,11,13;100:17;101:24; 102:13;103:1;111:13; 116:2,2,18;117:14 well-faring (1) 29:22 well-known (1) 128:4 well-understood (1) 91:20 Whatever (10) 10:6;11:22;15:14;38:19; 48:21;55:23;63:22;77:9; 98:18;192:1
V		W	
value (29) 51:13,20;72:1,2,5;74:17; 78:21;103:16,17;121:11,12, 22;122:22;123:22;124:23; 125:4,15;173:5,7;188:22; 191:25;192:5;193:3,4; 194:12,14;195:22;196:17; 203:17 values (38) 43:2,15;45:1;46:1;64:22; 74:16;94:6,8,12,19;95:7,10; 97:17;99:9;172:21;176:25; 177:12,20;178:10;191:24; 192:11,13,14,15,18;193:2, 15,15,22;194:1,19;196:19; 203:12;204:15,21,23,24; 205:9 variation (4) 74:16;154:20;157:16; 158:5 variations (2) 125:11;157:19		Wait (1) 26:13 wanting (1) 69:2 wants (1) 68:24 watch (1) 39:12 wave (1) 135:23 wavelengths (1) 37:8 way (67) 8:15;12:6;18:1,16;19:3; 21:20,21,22;23:24;25:13; 29:23;30:3;34:4,5,10,15; 39:23;42:22;43:17;52:24; 57:21;59:6;62:20;67:22; 78:15,16,16;79:8;88:22; 90:17;91:3,16;95:13,16,22; 96:3,7;98:2;99:4;102:3; 113:11;121:25;122:18; 125:7;126:2,22;127:13,19;	

what's (37) 8:22;9:25;18:7;24:11; 25:25;29:25;34:15;40:1; 47:25;48:21;63:20;66:11, 20;69:23;93:12;101:23; 113:14;117:21;120:21; 123:9;126:22;127:22; 131:8,12;133:9;135:17; 137:23;138:2,5,8;144:24; 157:16;170:14,18;172:7; 178:23;191:13	72:6;85:16;97:11;100:7; 187:1;189:7	48:15;49:12;55:23;69:1,3; 72:22;77:8;90:4;91:10,19; 97:13;167:18	written (2) 47:25;110:8
Whereas (3) 69:9;156:8;163:14	without (24) 20:12;28:2,12;29:16,21; 30:4;32:17;38:20;73:15; 79:9;80:12;81:9;91:17; 135:1;138:15;151:17; 153:10;163:5,10;167:9; 171:8;173:19;179:5;183:6	words (16) 40:2;47:10;49:9;57:23; 58:1;59:17;60:17;76:4; 77:11;78:20;87:11;102:6; 140:21;143:23;195:14,15	X
wherein (3) 67:3;115:2;199:18	witness (98) 4:11;7:19;9:1,4,10,19; 10:5,12,18;11:3,10;12:2; 13:21;17:24;19:1,9;20:8, 19;22:3;23:14;24:5,18; 25:4,12,20;26:3,13,18;27:4, 10;28:4,15;29:4;30:8;31:8; 34:1;36:1;42:3,13;44:3,7; 49:5;51:15;52:4,19;57:11; 61:19;62:5;63:10;65:1,13, 19;68:18;69:15;70:14;71:8, 13,18;75:10,18;77:1,18; 80:6;83:18;84:1,25;85:9, 25;86:24;87:23;89:9;90:6; 91:23;92:7,13;102:1; 107:22;118:12;131:15; 147:16;161:25;168:25; 169:13;170:1;174:18; 180:5,11,18;181:11,24; 182:7;188:3;194:5;195:17; 197:12;202:19;203:2;206:1	work (6) 30:21;65:8;76:20;93:25; 165:5;190:6	X-Y (1) 40:9
Where's (1) 204:3		worked (1) 18:15	Y
Whereupon (2) 132:8;205:18		working (5) 18:8;30:20,23;31:2; 118:19	YCbCr (2) 41:5,9
whether (33) 29:14,19;35:14;42:9; 87:9;88:16;90:7;93:2; 103:13,13;112:15,18;113:6; 145:19;146:5;154:12,21; 155:1;167:21;169:22,24; 171:4,19;181:19;184:11; 185:3,9;192:13;194:19,25; 197:9,25;199:5		works (4) 6:10;92:16;118:7;164:12	years (5) 6:25;65:8;71:22;75:14; 181:20
whole (9) 53:20;56:22;108:23; 129:1,2,7,24;130:3;198:7	wonder (4) 60:19,21;63:18,20	world (5) 8:6;12:19;14:14;138:25; 166:4	Yep (1) 188:16
who's (1) 60:12	wondered (1) 93:2	worth (1) 119:12	yield (1) 21:4
wide (1) 61:24	wondering (1) 61:14	wrinkle (7) 76:16,19;115:19,24; 116:7,10;174:3	yourself (1) 40:3
within (26) 8:7,14,17;11:23;12:18; 14:8;21:23;24:6;32:1,3,24; 34:7;35:9;46:19;61:10; 62:8,19;63:8;70:12;71:3;	wood (1) 129:14	wrinkle-reducing (12) 75:8,10;76:8,12,18;114:5, 21,24;115:8,21;118:21; 119:6	YUV (2) 41:5,10
	word (17) 11:10;22:5,6;35:4;41:19;	wrinkle-reduction (1) 117:6	Z
		wrinkles (12) 76:1,2;114:17;115:13; 116:4;117:9,10;118:1; 119:2,18;120:3;181:3	zero (2) 26:4;78:19
		write (2) 179:21,25	zeros (2) 90:22;91:6
		writing (3) 47:1;73:15;196:15	Zhang (15) 174:14,15,17;175:4,5; 177:4;178:5,14,18;179:10, 13;186:1,4;187:6;192:8
			Zhang's (8) 178:8;185:11,22;186:5, 14,25;190:17,18
			1

1 (66) 9:7,12,13,14,17;10:16; 11:8;36:6;45:20;64:5,12; 66:1,18;67:6,8,18;68:4,8; 69:8,8;73:3;111:16;126:4; 140:17;172:23;173:2; 188:22;190:21,24;191:3,22; 192:11,22;193:6,9;194:2,9, 13,21;195:6,9,21,25; 196:17,21;198:20,21; 199:21;200:4,13,14,14,19, 24;201:5,11,17;202:4,5,10, 20;204:5,22,25;205:1,3	1012 (3) 114:9,10,13 1017 (12) 10:7,8,10;113:24;119:22; 130:20;191:7,8,9,16;203:8; 205:8 10a (1) 148:3 11 (4) 9:7,12,13,14 11:49 am (1) 92:19 111 (1) 4:3 118 (1) 164:24 12 (1) 5:24 12:00 pm (1) 92:19 1250 (2) 6:12;133:1 1251 (4) 6:12;113:25;171:10; 203:9 12a (2) 133:23;142:2 132 (75) 6:15,15,20;8:22,23;9:21; 11:8;16:5,14,22;19:6,18; 20:6;21:14;22:17,20;23:5, 20;24:21;28:18;29:8;31:20; 32:10,11,15,18;34:12,23; 35:5,7,24;36:5,20,22;39:14, 24;40:1,17,19;41:16;42:14; 43:5,8;44:10;50:4,21;57:17, 24;58:7,9,15;61:25;64:2; 65:11,17;68:6;69:13;70:9, 12,18,19;72:15,17,20; 75:12;85:17,19,20;111:15,	17;164:23,23;196:25; 197:1;201:15 15 (6) 45:9,11;47:3,16;54:11; 58:14 19 (1) 68:8 2 2 (33) 65:25;66:2;67:3;137:10; 172:8,12,16;177:10;188:10, 22;192:11;196:19,21; 198:16,20,21;199:12,23; 200:5,15,20;201:12,14,16, 19,22;202:2,4,5,6,20; 204:22,25 2:03 pm (1) 132:12 20 (7) 104:6;105:3;109:23; 110:4,5,6,15 20_at__ (1) 206:13 200 (2) 67:18;68:3 2009 (20) 8:12;9:16;10:15;13:19, 24;14:3;17:22;19:5;48:11; 53:3;65:6;76:11,22;77:14; 89:18;95:20;118:10,21,24; 119:5 2019 (1) 4:2 207 (1) 50:1 21 (14) 103:20;105:7,16,21; 106:1,14;107:8;108:16,24;	109:3,15;110:3,5,20 22 (17) 64:8,11,12;66:19;67:8; 97:21;98:4,22;99:13;100:5, 17;103:8;111:10;112:3,8, 11;113:14 23 (4) 66:19;67:7,8;69:8 25 (18) 45:10,11;47:3,16;48:1; 54:11,25;55:3,14;57:24; 58:14,18;59:19;60:15;63:5; 114:13;115:6;120:5 26 (2) 68:8;69:8 27 (3) 98:22;137:2,10 270 (1) 98:14 28 (7) 4:2;40:20,22;50:17,19; 74:19;96:16 28a (1) 4:7 2A (2) 188:6,11 2C (2) 188:6,11 3 3 (10) 35:6,7,8;40:20,21;46:8; 74:18;78:3;93:25;135:2 3:33 pm (1) 166:19 3:42 pm (1) 166:19 30 (3) 15:16;78:4;128:23
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

30a (16) 189:3;190:21;198:12,16, 18,19,20;199:4,6,7;201:9, 21,22;203:17;204:20;205:2	16,16;162:1,12;163:2,6,9, 14;165:4;166:22;167:1,1,2, 8,11,14,16,17,20,23;168:5, 7,16;169:1,2,6,6,10,21; 170:8,17,21	52 (9) 49:23;98:14;114:2,3; 115:16;156:12,15;159:7; 160:3	5-megapixel (1) 150:22 5x5 (1) 118:6
30b (17) 188:8,18;189:21;198:14, 18,19,20,20;199:6,12,24; 201:9,20;202:2,6,9,21	43 (1) 175:2 46 (1) 68:4 48 (9) 122:7;154:4;190:23; 191:21;192:23;203:25; 204:2,4,10	53 (7) 49:23,23;116:14;119:21; 120:14;160:3;161:8 54 (9) 50:14,16,19;119:21; 120:14;122:15;126:5; 128:18;173:25	6
31 (1) 78:3	48's (1) 165:11	55 (1) 126:5 56 (17) 132:25;133:2,3;139:18; 143:11;153:14,17,20;157:8, 16;158:8,16;159:24;160:15, 16,24;161:7	6 (5) 43:18;135:1;172:23; 173:1,2 60 (1) 178:11 602.002 (1) 4:8 62 (1) 36:22 63 (4) 43:14;136:21;137:3,4 64 (1) 46:9
32 (5) 40:20,22;74:19;78:4; 96:17	4A (1) 202:13	57 (1) 202:12 58 (55) 133:6,8;134:5,14,18,22, 24,25;151:15;152:19;153:2, 9,15;154:1,5,7,24;155:14, 14,19,20;156:8;157:23; 158:3,6;160:3;161:12,16, 19;162:1,12;163:2,7,9,12; 165:13,14,21;166:4,21,25; 167:10,13;168:1,4,4,13,14, 22,25;169:1,7,23;170:9,21	7
33 (1) 73:19	5	58's (1) 152:10 59 (1) 46:9 5b (20) 133:5,22;141:2;142:2; 148:3;151:16;152:24; 153:11,19;159:5,25;160:4, 13,18;161:3,8;170:21,22; 171:7;189:2	7 (13) 15:23,25;16:3;19:11; 49:24;50:3,6;53:4;73:3; 172:8,12,17;177:10 740 (1) 96:18 77 (1) 148:2 78 (4) 146:7,16;148:16,17
35 (2) 73:19;98:22		57 (1) 202:12 58 (55) 133:6,8;134:5,14,18,22, 24,25;151:15;152:19;153:2, 9,15;154:1,5,7,24;155:14, 14,19,20;156:8;157:23; 158:3,6;160:3;161:12,16, 19;162:1,12;163:2,7,9,12; 165:13,14,21;166:4,21,25; 167:10,13;168:1,4,4,13,14, 22,25;169:1,7,23;170:9,21	7
39 (2) 41:4;78:13	5	58's (1) 152:10 59 (1) 46:9 5b (20) 133:5,22;141:2;142:2; 148:3;151:16;152:24; 153:11,19;159:5,25;160:4, 13,18;161:3,8;170:21,22; 171:7;189:2	7 (13) 15:23,25;16:3;19:11; 49:24;50:3,6;53:4;73:3; 172:8,12,17;177:10 740 (1) 96:18 77 (1) 148:2 78 (4) 146:7,16;148:16,17
4		5 (12) 41:3;49:23;142:10;151:7; 196:25;197:1,9,25;199:10, 13,14,16 5:00 pm (1) 202:17 5:10 (1) 202:17 5:15 (1) 205:19 50 (4) 130:20;188:14,15;189:9 500 (2) 40:11,11 50-megapixel (1) 150:20 51 (1) 160:25 51/49 (1) 159:16	7 (13) 15:23,25;16:3;19:11; 49:24;50:3,6;53:4;73:3; 172:8,12,17;177:10 740 (1) 96:18 77 (1) 148:2 78 (4) 146:7,16;148:16,17
4 (23) 43:11;45:9,11;47:3,16; 54:10;55:3,14;57:24;58:14, 18;62:23;63:5;64:6,8,10,16; 172:8,12,16,24;173:2; 177:10	5 (12) 41:3;49:23;142:10;151:7; 196:25;197:1,9,25;199:10, 13,14,16 5:00 pm (1) 202:17 5:10 (1) 202:17 5:15 (1) 205:19 50 (4) 130:20;188:14,15;189:9 500 (2) 40:11,11 50-megapixel (1) 150:20 51 (1) 160:25 51/49 (1) 159:16	58's (1) 152:10 59 (1) 46:9 5b (20) 133:5,22;141:2;142:2; 148:3;151:16;152:24; 153:11,19;159:5,25;160:4, 13,18;161:3,8;170:21,22; 171:7;189:2	7 (13) 15:23,25;16:3;19:11; 49:24;50:3,6;53:4;73:3; 172:8,12,17;177:10 740 (1) 96:18 77 (1) 148:2 78 (4) 146:7,16;148:16,17
40 (2) 41:4;74:8	5 (12) 41:3;49:23;142:10;151:7; 196:25;197:1,9,25;199:10, 13,14,16 5:00 pm (1) 202:17 5:10 (1) 202:17 5:15 (1) 205:19 50 (4) 130:20;188:14,15;189:9 500 (2) 40:11,11 50-megapixel (1) 150:20 51 (1) 160:25 51/49 (1) 159:16	58's (1) 152:10 59 (1) 46:9 5b (20) 133:5,22;141:2;142:2; 148:3;151:16;152:24; 153:11,19;159:5,25;160:4, 13,18;161:3,8;170:21,22; 171:7;189:2	7 (13) 15:23,25;16:3;19:11; 49:24;50:3,6;53:4;73:3; 172:8,12,17;177:10 740 (1) 96:18 77 (1) 148:2 78 (4) 146:7,16;148:16,17
40th (1) 5:13	5 (12) 41:3;49:23;142:10;151:7; 196:25;197:1,9,25;199:10, 13,14,16 5:00 pm (1) 202:17 5:10 (1) 202:17 5:15 (1) 205:19 50 (4) 130:20;188:14,15;189:9 500 (2) 40:11,11 50-megapixel (1) 150:20 51 (1) 160:25 51/49 (1) 159:16	58's (1) 152:10 59 (1) 46:9 5b (20) 133:5,22;141:2;142:2; 148:3;151:16;152:24; 153:11,19;159:5,25;160:4, 13,18;161:3,8;170:21,22; 171:7;189:2	7 (13) 15:23,25;16:3;19:11; 49:24;50:3,6;53:4;73:3; 172:8,12,17;177:10 740 (1) 96:18 77 (1) 148:2 78 (4) 146:7,16;148:16,17
410 (2) 175:13;182:1	5 (12) 41:3;49:23;142:10;151:7; 196:25;197:1,9,25;199:10, 13,14,16 5:00 pm (1) 202:17 5:10 (1) 202:17 5:15 (1) 205:19 50 (4) 130:20;188:14,15;189:9 500 (2) 40:11,11 50-megapixel (1) 150:20 51 (1) 160:25 51/49 (1) 159:16	58's (1) 152:10 59 (1) 46:9 5b (20) 133:5,22;141:2;142:2; 148:3;151:16;152:24; 153:11,19;159:5,25;160:4, 13,18;161:3,8;170:21,22; 171:7;189:2	7 (13) 15:23,25;16:3;19:11; 49:24;50:3,6;53:4;73:3; 172:8,12,17;177:10 740 (1) 96:18 77 (1) 148:2 78 (4) 146:7,16;148:16,17
42 (53) 133:14,17;134:14,22; 135:4;140:24;141:25; 142:5;150:24;151:4,23; 152:19,22;154:5,9,24; 155:12,14,19;156:7;161:11,	5 (12) 41:3;49:23;142:10;151:7; 196:25;197:1,9,25;199:10, 13,14,16 5:00 pm (1) 202:17 5:10 (1) 202:17 5:15 (1) 205:19 50 (4) 130:20;188:14,15;189:9 500 (2) 40:11,11 50-megapixel (1) 150:20 51 (1) 160:25 51/49 (1) 159:16	58's (1) 152:10 59 (1) 46:9 5b (20) 133:5,22;141:2;142:2; 148:3;151:16;152:24; 153:11,19;159:5,25;160:4, 13,18;161:3,8;170:21,22; 171:7;189:2	7 (13) 15:23,25;16:3;19:11; 49:24;50:3,6;53:4;73:3; 172:8,12,17;177:10 740 (1) 96:18 77 (1) 148:2 78 (4) 146:7,16;148:16,17
			8
			8 (8) 43:12,20;56:25;73:1,23; 74:22;136:3;164:18 8,447,132 (1)

6:13 80 (1) 69:11 801 (1) 4:4 8x8 (1) 82:19			
9			
9 (10) 36:21;43:18,20;50:14,16; 56:25;73:18,19;74:2,7 9:11 (1) 4:2 91 (10) 191:9,14,15,17;193:18, 19;203:9,10,11;205:8 92 (1) 130:20			