Transcript of Durand Begault, Ph.D.

Date: May 22, 2023
Case: Eight kHz, LLC -v- Meta Platforms, Inc., et al.

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

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IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

EIGHT KHZ, LLC,)
Plaintiff,) Civil Action No.
VS.) 6:22-cv-575-ADA-DTG
META PLATFORMS, INC.; META PLATFORMS TECHNOLOGIES, LLC; TWISTED PIXEL GAMES, LLC,)
Defendants.)

VIDEOTAPED REMOTE DEPOSITION OF
DURAND BEGAULT, Ph.D.
MONDAY, MAY 22, 2023

STENOGRAPHIC REPORTER: CHRISTA YAN, CSR NO. 14316

2

APPEARANCES:

FOR PLAINTIFF:
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ALSO PRESENT:
MYLENE SANTIANO, The Videographer
HARUT AKOPYAN The Technician

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3

INDEX OF EXAMINATIONS

	PAGE
MR. HENRY	6
MR. ELLIOTT	256
MR. HENRY	267
MR. ELLIOTT	277
MR. HENRY	278
Witness's Changes or Corrections	281
Reporter's Certificate	283

--oOo--

4

E X H I B I T S

EXHIBIT	FOR IDENTIFICATION	PAGE
Exhibit 1 -	2023 05 03 (92-7) Declaration of Durand Begault in Support of Plaintiff's Reply Claim Construction	8
Exhibit 2 -	Errata Sheet Begault	11
Exhibit 3 -	United States Patent 9,226,090	145
Exhibit 4 -	United States Patent 9,282,196	172
Exhibit 5 -	United States Patent 9,674,628	182
Exhibit 6 -	United States Patent 10,917,737	187
Exhibit 7 -	United States Patent 11,290,836	199
Exhibit 8 -	United States Patent 10,368,179	202
Exhibit 9 -	United States Patent 10,448,184	211
Exhibit 10 -	3-D Sound for Virtual Reality and Multimedia April 2000	221

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1 BE IT REMEMBERED that on MONDAY, the 22ND DAY OF
2 MAY, 2023, at the hour of 9:03 A.M., Pacific Standard
3 Time, of said day, before me via video conference, CHRISTA
4 YAN, a Certified Shorthand Reporter, State of California,
5 appeared via video conference DURAND BEGAULT, Ph.D., who
6 was examined as a witness in said cause; that said
7 transcript format was prepared in accordance with
8 California Code of Regulations Section 2473.
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1 THE VIDEOGRAPHER: Here begins Media Number 1 in the
2 videotaped deposition of Durand Begault, PhD, in the
3 matter of Eight kHz, LLC, vs. Meta Platforms, Inc., et
4 al., in the United States District Court for the Western
5 District of Texas Waco Division, Case Number
6 6:22-cv-575-ADA-DTG. Today's date is May 22nd, 2023. The
7 time on the video monitor is 9:03 a.m., Pacific Standard
8 Time.
9 The remote videographer today is Mylene Santiano
10 representing Planet Depos. All parties of this video
11 deposition are attending remotely. Would counsel please
12 voice identify themselves and state whom they represent
13 starting with the taking attorney.
14 MR. HENRY: Chris Henry from the law firm Latham &
15 Watkins for defendants.
16 MR. ELLIOTT: Kyle Elliott and Patrick Dunn on behalf
17 of the law firm Spencer Fane on behalf of the plaintiffs.
18 THE VIDEOGRAPHER: The court reporter today is Christa
19 Yan representing Planet Depos.
20 Would the reporter please swear in the witness.
21 DURAND BEGAULT, Ph.D.,
22 the Witness, called on behalf of the Defendants, being
23 duly sworn to state the truth, the whole truth, and
24 nothing but the truth, testified on oath as follows:
25 EXAMINATION

7

1 BY MR. HENRY:
2 Q Dr. Begault, my name's Chris Henry. Nice to meet
3 you.
4 **A Nice to meet you.**
5 Q Would you please state your full name for the
6 record?
7 **A Yes. Durand, D-u-r-a-n-d, René, R-e-n-é, with an**
8 **accent mark on the final E, Begault, B-e-g-a-u-l-t.**
9 Q And, Dr. Begault, where are you sitting today?
10 **A I am sitting in my home office, and that is**
11 **located in Muir Beach, California.**
12 Q And what materials did you bring with you to the
13 deposition today?
14 **A I brought a clean copy of my declaration in paper**
15 **form. So there are no notes or anything on it. It's a**
16 **clean copy. I also have a clean copy of an errata sheet**
17 **that we provided to you that is pertinent to that**
18 **declaration.**
19 Q Anything else?
20 **A No.**
21 Q Great.
22 So what we're going to -- have you done a remote
23 deposition before, Dr. Begault?
24 **A Yes.**
25 Q And so you're probably already familiar with this

8

1 whole, what we're going to do is we're going to introduce
2 exhibits via the chat.
3 **A Via the chat? Okay. So I should open the chat**
4 **window then?**
5 Q Once they're in, it should pop up, but either
6 way, the exhibits will come via the chat function in Zoom.
7 Have you done that before in a remote deposition?
8 **A Yes. Typically, the software is a little**
9 **different, in that there's sort of a split screen for the**
10 **documents. So they're large. Since we're going to be**
11 **doing it via the chat window, I might have to make a few**
12 **adjustments as we go, but yes. So I will indicate, show**
13 **chat previews. I'm not sure if I'm going to be doing it**
14 **right. So when you show your first exhibit, we might need**
15 **to take a moment to make sure that it's visible.**
16 Q That's totally fine. As we go, if we need to --
17 any clarifications throughout the day, just let me know,
18 including with exhibit distribution. Okay?
19 **A Will do.**
20 Q And let's just get your report, your declaration
21 on the record as Exhibit 1. And then we're going to get
22 your errata sheet on Exhibit 2. And that will give us a
23 chance to practice the chat distribution. Okay?
24 (Whereupon Deposition Exhibit 1 was
25 marked for identification.)

9

1 THE WITNESS: Sounds good.
2 MR. HENRY: All right. So, Mr. Akopyan, what I'd like
3 you to distribute to mark as Mr. Begault as Exhibit 1 and
4 distribute via the chat is a document that you will find
5 in the document folder with the file name 20230503,
6 parentheses, 92-7 Exhibit 7_Begault declaration.
7 THE TECHNICIAN: I see that, Counsel. Stand by,
8 please. (Indicating.)
9 Okay. It should be in the chat now.
10 BY MR. HENRY:
11 Q Dr. Begault, let me know if you see that
12 document.
13 A Give me a moment. Okay. I see what appears to
14 be a PDF that could be downloaded.
15 Q And now, Dr. Begault, as -- what I have found in
16 these remote depositions is what helps is for you to
17 download that and then just save it locally on your
18 desktop. It's a lot easier to maneuver through the
19 document as we go today. So I'd suggest you do that.
20 Okay?
21 A All right. And then what I will be doing if I
22 need to refer to the documents, is leaving the Zoom page
23 and then going to the document page and sort of
24 alternating back and forth. Is that the way that it --
25 Q Yeah, what I would -- yes, sorry to interrupt.

10

1 What I would suggest is you open it in your separate Adobe
2 Reader so it's next to you.
3 A Right, right. Okay. Well, stand by then. I
4 need to do a little adjustment here to allow that to
5 happen.
6 All right. And then are you going to be doing
7 any sort of pointing to different lines or... et cetera in
8 this document?
9 Q Yeah, throughout the day, I'll invite your
10 attention to different lines in this document --
11 A I see.
12 Q If they look familiar, and other documents.
13 A Got it.
14 Q I could screen share, but oftentimes it's enough
15 for us just to look at it. And I'll invite your attention
16 to certain things.
17 A Okay. That sounds fine to me. Okay. So I have
18 the document open now in a PDF reader, and I have my
19 screen split between Zoom and the exhibits that we have
20 downloaded. So I see now Exhibit 01.
21 Q Okay. And, Dr. Begault, you recognize Exhibit 1
22 as your May 3rd, 2023, declaration?
23 A Give me a moment.
24 Okay. I see my declaration, and then it's
25 followed by my CV. Yes.

11

1 MR. HENRY: All right. Mr. Akopyan, what I'd like you
2 to do now is circulate another PDF in the chat which we
3 will mark as Begault Exhibit 2. The filename for that is
4 errata sheet Begault-C.PDF.
5 THE TECHNICIAN: Stand by.
6 (Whereupon Deposition Exhibit 2 was
7 marked for identification.)
8 THE WITNESS: Okay. I am downloading it now.
9 BY MR. HENRY:
10 Q All right. Dr. Begault, let me know when you
11 have it open.
12 A Okay. I now have it open.
13 Q And Dr. Begault, do you recognize Begault
14 Exhibit 2 to be a document entitled, Errata sheet to
15 declaration of Durand R. Begault, PhD, dated May 22nd,
16 2023?
17 A I do.
18 Q And that's errata sheet for your May 3rd, 2023,
19 declaration fixing some typos, right?
20 A Right. Specifically Exhibit 2 corrects typos
21 that are found in Exhibit 1.
22 Q Okay. All right, Dr. Begault. Is there anyone
23 else with you in your office today?
24 A No.
25 Q Okay. And as we've already discussed, Zoom has a

12

1 chat feature on it. But you understand that throughout
2 the day, when we're on the record, you're not supposed to
3 be chatting with counsel for Eight kHz via that feature,
4 right?
5 A I will not be chatting with anybody via the chat
6 function or any other function. I will strictly be
7 communicating with you and examining documents that you
8 present in the chat.
9 Q Sounds good.
10 And it sounds like this is not the first time
11 you've been deposed, Dr. Begault. Do I understand that
12 correctly?
13 A That is correct.
14 Q How many depositions, about, have you been a part
15 of?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: I'd have to look at my CV to give you an
18 exact number. I know it's over -- see, I'm not
19 distinguishing trial and deposition since some trials
20 don't have depositions. Some trials do have depositions,
21 et cetera. But it's on the order of 70 or 80 times. I
22 think if you combine the trials and the depositions, I'm
23 up to about 90.
24 BY MR. HENRY:
25 Q So you have about 90 testifying experiences then,

13

1 right?
2 **A Yeah, that sounds about right. I haven't counted**
3 **in a while. But it's present on my CV if you need an**
4 **accurate number.**
5 Q Okay. Oh, and you mentioned that your CV is an
6 exhibit to your May 3rd, 2023, declaration, right?
7 **A That's correct. I note that my latest CV has**
8 **maybe one or two additional publications that aren't on**
9 **this version of the CV because they just came out**
10 **recently. So I'm happy to provide that if you would like**
11 **it. As I say, I think it's just -- there's no change at**
12 **all to the CV, including in terms of the trials and**
13 **depositions, other than I think two additional**
14 **publications.**
15 Q So beyond the two publications that you just
16 mentioned, the CV you attached on your declaration was
17 accurate?
18 **A Yes.**
19 Q And it accurately reflects your experience in the
20 industry and your testifying experience?
21 **A It represents it to the degree that a CV can.**
22 Q And you don't have any other changes besides the
23 two publications that you mentioned; is that right?
24 **A Two or three. Yeah. I don't remember the exact**
25 **number. I think it might have been three. I don't recall**

14

1 **exactly.**
2 Q And you have a number of patents in your own
3 name, right?
4 **A That's correct, yes.**
5 Q About how many?
6 **A Well, referring to my CV, my name is present on**
7 **four patents that were published.**
8 Q Did you file for other patents that didn't issue?
9 **A Well, I filed these patents through NASA,**
10 **National Aeronautics and Space Administration. And so I**
11 **have submitted other patents, but they ultimately were not**
12 **developed to the point where they were submitted for**
13 **publication.**
14 Q Do you mean that you submitted invention
15 disclosure statements that were not submitted to the
16 patent office or do you mean you filed applications with
17 the patent office that didn't issue?
18 **A The former.**
19 MR. ELLIOTT: Objection to form.
20 BY MR. HENRY:
21 Q Dr. Begault, what's your hourly rate for work in
22 this case?
23 **A Well, I have been retained through a third party,**
24 **if you will. So I don't know what their hourly rate is,**
25 **but I know it's a markup over my standard hourly rate. I**

15

1 **can tell you my standard hourly rate, but I don't know**
2 **what the billing rate is for this particular deposition**
3 **nor do I know what the billing rate is for the attorneys**
4 **at Spencer Fane.**
5 Q Yeah, I don't need you to tell me Spencer Fane's
6 rates.
7 What's your standard hourly rate, Dr. Begault?
8 **A My standard hourly rate is $400 an hour and 580**
9 **for testimony or deposition.**
10 Q So $400 an hour for nontestifying work in the
11 cases in which you're engaged?
12 **A That's correct.**
13 Q Okay. And $580 an hour for testifying work?
14 **A Yes, that's correct.**
15 Q And as far as you know, that's the rate being
16 charged for your services, plus a markup fee for the
17 expert retention firm, right?
18 **A As far as I know --**
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: My apologies for talking over.
21 MR. HENRY: Yeah, sorry. I did interrupt a little
22 bit. Just give me --
23 THE STENOGRAPHIC REPORTER: I'm sorry. Because of the
24 talking over each other, I did not hear the objection
25 correctly, I don't think.

16

1 MR. ELLIOTT: Yeah, just objection to form.
2 And, Dr. Begault, if you can, give a little bit
3 of pause so you can tell whether I'm going to object or
4 not. I think there's probably a little bit of lag over
5 this stuff, and I apologize for that.
6 BY MR. HENRY:
7 Q Do you want me to repeat the question,
8 Dr. Begault?
9 **A Yes.**
10 Q Okay.
11 All right. As far as you know, your $400 an hour
12 and $580 an hour rates are the rates being charged for
13 your services in this case, plus a markup for the expert
14 retention firm, right?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: I am not exactly sure if those are the
17 exact rates that were settled with the outside firm that
18 is handling the billings, et cetera, et cetera. It might
19 have been negotiated differently. I don't recall exactly.
20 But I can tell you that's usually my rate for these sorts
21 of things.
22 BY MR. HENRY:
23 Q Do you know who Glen Norris is?
24 **A I believe he's one of the named individuals on**
25 **one of these patents.**

17

1 Q Did you know who Glen Norris was before you got
2 involved in this lawsuit?
3 **A No.**
4 Q Do you know who Philip Lyren is?
5 **A Same answer as about Glen Norris. I only heard**
6 **of him or of that person, in connection with his name on**
7 **the patents.**
8 Q So you didn't know of Philip Lyren before you got
9 involved in this lawsuit?
10 **A No, I did not.**
11 Q Had you ever heard of Eight kHz, the plaintiff in
12 this case, before you got involved in this lawsuit?
13 **A No.**
14 Q When did you get involved in this lawsuit?
15 **A Honestly, I don't recall. It was sometime last**
16 **year I was contacted, I believe. And then I think there**
17 **was a period of time where I didn't hear anything from the**
18 **counsel. And then I was retained later on formally. I**
19 **think there was an initial discussion.**
20 Q Around when in 2022 was the initial discussion
21 you had with counsel about this case?
22 **A I do not recall. I'd have to research that.**
23 Q Do you remember around when you were formally
24 retained in this case?
25 **A Same answer.**

18

1 Q Is that a no?
2 **A I don't recall.**
3 Q Do you understand that Eight kHz has asserted
4 patents in this case against the Meta defendants, right?
5 **A Yes, I do. I do understand that.**
6 Q How many asserted patents are at issue in this
7 case?
8 **A Well, based on my declaration, I can count them**
9 **for you. Those are the ones I'm familiar with. 1, 2...**
10 **Did I hear an objection?**
11 MR. ELLIOTT: No.
12 THE WITNESS: Okay.
13 1, 2, 3, 4, 5, 6, 7, 8, 9.
14 BY MR. HENRY:
15 Q So you know there are nine asserted patents at
16 issue in this case?
17 **A That's my understanding.**
18 Q And have you reviewed each of those patents?
19 **A Briefly.**
20 Q You've briefly reviewed each of those patents?
21 **A Well, should I say it this way, I'm still**
22 **reviewing them.**
23 Q How much time have you spent reviewing all of the
24 patents?
25 **A I don't recall exactly.**

19

1 Q Is it more than 5 hours?
2 **A Yes.**
3 Q Is it more than 10 ten hours?
4 **A Yes.**
5 Q Is it more than 15 hours?
6 **A Probably.**
7 Q Is it more than 20 hours?
8 **A Yeah, that sounds reasonable. Yes.**
9 Q Is it more than 25 hours?
10 **A Well, now you're getting into an area of**
11 **estimates that are difficult for me to make. I think I**
12 **could say safely that it's been somewhere over a certain**
13 **amount of hours. And that's about as best I can do for**
14 **you.**
15 Q Can you estimate a number under which you spent
16 hours reviewing the patents?
17 **A I don't understand that question.**
18 Q Sure, you said you could estimate for me some
19 number over which you've spent in hours reviewing the
20 patents. I'm just asking you, can you tell me whether
21 you've spent less than 30 hours reviewing the patents?
22 **A Oh, I understand what you're asking. I could**
23 **tell you I spent less than 100 hours.**
24 Q Did you spend less than 50?
25 **A That, I'm not certain about.**

20

1 Q Did you spend less than 75?
2 **A That, I'm not certain about.**
3 Q Spent less than 85?
4 **A That, I'm not certain about.**
5 Q Did you spend less than 95?
6 **A That, I'm not certain about.**
7 Q You keep records of your time spent on this case,
8 right?
9 **A I submit my hours.**
10 Q Okay. About how much time have you spent total
11 on this case to date?
12 **A I honestly don't recall.**
13 Q Give me your best estimate, please.
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: Under 100 and over 20.
16 BY MR. HENRY:
17 Q So you spent somewhere between 20 hours and
18 100 hours on this case to date?
19 **A Yes.**
20 Q You can't give me any further specificity in the
21 amount of time you spent on this case between those two
22 numbers?
23 **A Not without looking at my billing records.**
24 Q Can you tell me a little bit more about how you
25 got hired for this case?

21

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: I believe a phone call interview was set
3 up between myself and the attorneys via the third party
4 that I had mentioned before.
5 BY MR. HENRY:
6 Q Which attorneys?
7 **A I believe it was the attorneys that we are -- are**
8 **present today.**
9 Q Who is that?
10 **A I see Kyle Elliott and I see Patrick Dunn. But**
11 **there might have been other attorneys involved in the**
12 **initial interview. I don't recall.**
13 Q Do you remember any other attorneys by name who
14 might have been involved in the initial interview?
15 **A I don't recall, no.**
16 Q In your work on this case, do you remember any
17 other attorneys besides Kyle Elliott and Patrick Dunn that
18 you've interacted with?
19 **A There -- I can give you some names I have heard,**
20 **but you asked me specifically about interaction. So you'd**
21 **have to define what you mean by interaction.**
22 Q Sure.
23 Have you emailed, spoken with, or met with any
24 attorneys other than Kyle Elliott and Patrick Dunn
25 representing Eight kHz?

22

1 **A The only name I can pull out for you out of my**
2 **memory, I believe, is a Mr. Brian Bear who was on an**
3 **email. I remember that name from an email. I don't**
4 **believe I've spoken directly with Mr. Bear. I really**
5 **don't recall.**
6 Q Can you tell me a little bit about what you did
7 to prepare for this deposition, Dr. Begault?
8 MR. ELLIOTT: Objection to form, ambiguous.
9 THE WITNESS: I reviewed my declaration. I reviewed a
10 document from defendant that pertained to claim
11 construction. And I also reviewed the patents at issue.
12 BY MR. HENRY:
13 Q What was that document that you said you reviewed
14 from defendants that pertains to claim construction?
15 MR. ELLIOTT: Objection to form, and may call on
16 attorney work product as to the actual contents of the
17 document that was reviewed.
18 Go ahead and you can answer, Dr. Begault.
19 THE WITNESS: I don't recall the exact title of that
20 document. I believe that it had to do with defendants'
21 arguments regarding claim construction. That's all I
22 recall about its title or its general topic area.
23 BY MR. HENRY:
24 Q Was it a brief or an expert declaration?
25 MR. ELLIOTT: Objection to form.

23

1 THE WITNESS: I reviewed a brief. I believe I also
2 reviewed, in part or briefly, an expert declaration as
3 well.
4 BY MR. HENRY:
5 Q Okay. So you mentioned having reviewed your
6 declaration, a document from defendants, and the asserted
7 patents. And now you also mentioned reviewing an expert
8 declaration, at least briefly; is that fair?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: That's -- that's some of the things I
11 mentioned that I reviewed.
12 BY MR. HENRY:
13 Q What else did you review?
14 **A You would have to look at my answer from about**
15 **three minutes ago, but I believe I also just said that I**
16 **reviewed some of the patents.**
17 Q Yeah, I'm asking if there's anything you haven't
18 identified yet that you reviewed.
19 **A No, not that I could recall.**
20 Q The expert declaration that you reviewed, do you
21 recall the name of that -- of the expert on that
22 declaration?
23 **A I don't know how to pronounce it or exactly how**
24 **to say the name. I believe the name was from -- I'm**
25 **sorry. I would munge it. So I'm not going to attempt it.**

24

1 **I know that the first initial is K, last initial is M.**
2 Q Kyle McMullen, does that help?
3 **A It does, if that's the person.**
4 Q Do you know if that's the person?
5 **A I would have to look at the document to confirm**
6 **that, but I'll trust you on that.**
7 Q Do you know Dr. Kyle McMullen?
8 **A I do not.**
9 Q Have you ever met Dr. Kyle McMullen?
10 **A Not that I recall.**
11 Q Do you know anything about Dr. Kyle McMullen's
12 reputation in the field?
13 **A No.**
14 Q Had you ever seen the asserted patents before you
15 got involved in this lawsuit?
16 **A No.**
17 Q Have you reviewed the file histories for the
18 asserted patents?
19 **A No.**
20 Q Did you have any meetings to prepare for today's
21 deposition?
22 **A Yes.**
23 Q How many?
24 **A One.**
25 Q When was that meeting?

Meta Platforms, Inc.
Exhibit 1095
Page 007

25

1 A **Yesterday.**
2 Q How long was that meeting?
3 A **Somewhere between two and three hours.**
4 Q Who was present at that meeting besides you?
5 A **Mr. Kyle Elliott.**
6 Q Was Patrick Dunn there?
7 A **No.**
8 Q Nobody other than Mr. Kyle Elliott?
9 A **That's correct.**
10 Q Have you ever spoken to anyone at Eight kHz?
11 A **No.**
12 Q And, Dr. Begault, because you've been in so many
13 depositions before, I sort of skipped the rules of the
14 road, but I'll cover a few them just quickly so that we're
15 on the same page.
16 You understand that as we go today, you can ask
17 me for breaks as we go, right?
18 A **I do understand that.**
19 Q And when you do and if you need one, I'm happy to
20 take a break. It's totally fine. At your convenience,
21 okay?
22 A **Sounds good.**
23 Q Okay. And you already understand the process
24 that I'll ask you questions throughout the day. And your
25 counsel may intersperse objections, but then you still

26

1 have to proceed and answer my questions unless instructed
2 not to, right?
3 A **I do understand that.**
4 Q All right. Is there any reason that you can't
5 provide accurate and truthful testimony to my questions
6 today?
7 A **There's no reason.**
8 Q You're not under the influence of any drugs or
9 medication that would prevent that, right?
10 A **That's correct.**
11 Q Now, when you read the -- or also you've been
12 a -- strike that.
13 Dr. Begault, in your experience as a testifying
14 expert in patent cases, are familiar with the sort of
15 shorthand used to refer to patents, where they're referred
16 to by their last three numbers?
17 A **Yes.**
18 Q Okay. And can we use that shorthand today, and
19 you'll know the patents that I'm discussing with you?
20 A **Well, I'll qualify that by saying I will know**
21 **that if you use the last three digits of a patent that**
22 **that's a unique identifier for a longer patent number.**
23 Q Okay. But similar to how you did that in your
24 May 3rd declaration, right?
25 A **Precisely.**

27

1 Q Now, with respect to the '090 Patent, you
2 understand that's one of the asserted patents in this
3 case, right?
4 A **I do.**
5 Q Okay. When you read that patent, did you reach
6 any conclusion as to whether what was being claimed was
7 new and different as opposed to things that had come
8 before the '090 Patent?
9 MR. ELLIOTT: Objection to form, also scope and
10 objection to relevancy.
11 THE WITNESS: No.
12 BY MR. HENRY:
13 Q When you read the '196 Patent, did you reach any
14 conclusion as to whether what was being claimed was new
15 and different, as opposed to things that had come before
16 the '196 Patent?
17 MR. ELLIOTT: Objection to form, ambiguous, scope, and
18 relevancy.
19 THE WITNESS: No.
20 BY MR. HENRY:
21 Q When you read the '090 Patent, did you anything
22 jump out to you though based on your experience where you
23 said, oh, wow, that's something new and different that
24 you've never seen before?
25 MR. ELLIOTT: Objection to form and relevancy.

28

1 THE WITNESS: Repeat your question? I want to make
2 sure I'm answering it correctly.
3 BY MR. HENRY:
4 Q Sure.
5 When you read the '090 Patent, did anything jump
6 out to you based on your experience, where you said oh,
7 wow, that's something new and different that you've never
8 seen before?
9 MR. ELLIOTT: Same objection.
10 THE WITNESS: At this point, no, I haven't -- let's
11 put it this way, analyzed the patent thoroughly yet. So I
12 can't answer that question about jumping out.
13 BY MR. HENRY:
14 Q When you read the '196 Patent, did anything jump
15 out to you based on experience where you said, oh, wow,
16 that's something new and different that you've never seen
17 before?
18 MR. ELLIOTT: Objection to form and relevancy.
19 THE WITNESS: I would give you the same answer I gave
20 you for the prior patent that you mentioned.
21 BY MR. HENRY:
22 Q And same answer for each of the other seven
23 asserted patents?
24 MR. ELLIOTT: Objection to form and relevancy. Scope
25 also.

29

1 THE WITNESS: Correct.
2 BY MR. HENRY:
3 Q And, Dr. Begault, you obtained a PhD in 1987 from
4 the University of California San Diego, right?
5 **A Correct.**
6 Q What other degrees have you earned?
7 **A Master of fine arts in electronic music and**
8 **recording media from Mills College in 1981. And I**
9 **received my bachelor's degree in a hybrid major at UC**
10 **Santa Cruz in 1979 called music and heuristic models.**
11 Q And you're currently a director of the Audio
12 Forensic Center; is that right?
13 **A I currently hold that title, yes.**
14 Q What's the Audio Forensic Center?
15 **A It is a wholly owned subsidiary of Charles M.**
16 **Salter Associates.**
17 Q And what type of company is it?
18 **A Salter Associates or Audio Forensic Center.**
19 Q Audio Forensic Center.
20 **A Oh, Audio Forensic Center is a -- represents the**
21 **legal work that is done as part of consulting for Charles**
22 **M. Salter Associates for various types of cases involving**
23 **litigation or due diligence, not necessarily litigation.**
24 Q It's a consulting firm?
25 **A Charles M. Salter Associates is a consulting firm**

30

1 **in the area of acoustics, telecommunications, and**
2 **security. And certain types of cases generally come to me**
3 **that are typically of a forensic nature.**
4 Q And typically come to you at the Audio Forensic
5 Center; is that fair?
6 **A Yes. That's a way of putting it.**
7 Q How many employees are there that are employed in
8 the Audio Forensic Center subsidiary of Charles M. Salter
9 Associates?
10 **A There is not a group of employees specifically**
11 **titled with that. It is, again, a wholly owned subsidiary**
12 **of Salter Associates, which has -- I believe we have 25 or**
13 **30 engineers with expertise in acoustics,**
14 **telecommunications, and security. It may be more. And so**
15 **as I direct the Audio Forensic Center for these types of**
16 **cases, if I need other people power to assist with the**
17 **case, I will draw from those employees of Charles M.**
18 **Salter Associates.**
19 Q Okay. But then do I understand correctly from
20 that response that there aren't other employees besides
21 you that are assigned specifically to the Audio Forensic
22 Center?
23 **A There may be or there may not be depending on the**
24 **particular matter that we're dealing with.**
25 Q But that's matter specific, right?

31

1 **A That's correct. I do most of the forensic work**
2 **that involves things such as audio authentication, for**
3 **instance.**
4 Q What do you mean by that, you do the forensic
5 work? What do you mean by forensic work?
6 **A By forensic work, I mean issues that have --**
7 **pertain to a legal matter.**
8 Q Can you explain that a little more? I'm not
9 understanding the connection you're making between the
10 term forensic and legal?
11 MR. ELLIOTT: Objection to form.
12 THE WITNESS: Well, I'm doing my best to give you a
13 kind of dictionary definition of forensic, which usually
14 has to do with things -- well, when you're talking about a
15 forensic expert, you're talking about an expert who might
16 have greater expertise than a layperson in certain areas,
17 that that expert has a background in.
18 And so I have expertise in both audio acoustics
19 and video. There are other people at Charles M. Salter
20 Associates that also have these types of expertise. And
21 so people are brought together either under the title of
22 Audio Forensic Center or under Charles M. Salter
23 Associates on occasion to do consulting for legal matters,
24 as opposed to let's say consulting for an architect who is
25 designing the acoustics of a room.

32

1 BY MR. HENRY:
2 Q Do you also do that type of consulting for
3 architects?
4 **A No. Not so much now. I don't do that. I used**
5 **to, but not now.**
6 Q Is most of your work litigation oriented at the
7 Audio Forensic Center?
8 MR. ELLIOTT: Objection to form.
9 THE STENOGRAPHIC REPORTER: I'm sorry. Mr. Henry, I'm
10 not hearing you very well right now.
11 MR. HENRY: I will turn up my volume and speak up.
12 BY MR. HENRY:
13 Q My question for you, Dr. Begault, is, is most of
14 your work at the Audio Forensic Center litigation
15 oriented?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: So litigation is a legal term, and I
18 don't know if my understanding of that word is the same as
19 yours. Because if litigation means that something is
20 actually litigated, at times, I will provide information
21 to attorneys where litigation has not occurred. If I
22 understand what litigation means, where an actual lawsuit
23 is filed.
24 So at times, for instance, I might analyze
25 evidence before actual litigation occurs, presuming I'm

33

1 understanding the precise definition of litigation. So
2 legal matters might be a better word than litigation here
3 or potentially legal matters.
4 BY MR. HENRY:
5 Q Sure, that's fine.
6 Is most of your work at the Audio Forensic Center
7 related to legal matters or potential legal matters?
8 MR. ELLIOTT: Objection to form.
9 THE WITNESS: Yes. Yes. Most of it is. There's a
10 percentage of it that's also concerned with due diligence,
11 product development, testing. That sort of thing.
12 BY MR. HENRY:
13 Q And what's your ballpark of that percentage?
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: I don't know exactly, but I could give
16 you a guess.
17 BY MR. HENRY:
18 Q Sure, what's your best guess? It's your work.
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: Oh, my best guess is maybe 10 percent is
21 due-diligence-type of work, and the other 90 percent is
22 some sort of legal matter.
23 BY MR. HENRY:
24 Q Have you ever designed (indecipherable utterance)
25 a CPU?

34

1 THE STENOGRAPHIC REPORTER: I'm sorry. Can you repeat
2 that, Mr. Henry?
3 MR. HENRY: Sure.
4 BY MR. HENRY:
5 Q Have you ever designed a CPU?
6 **A I have not designed an entire central processing**
7 **unit.**
8 Q Have you designed some component of a CPU?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: I have designed signal processing for
11 spatial audio that uses a CPU.
12 BY MR. HENRY:
13 Q And what did that design work entail?
14 **A It entailed designing sound processing in order**
15 **to take and input sound and spatially distribute it to a**
16 **listener.**
17 Q What do you mean when you say spatially
18 distributed to a listener?
19 **A I mean many things. Basically my interests, my**
20 **career has been focused on either measuring or propagating**
21 **sounds that contain spatial audio cues of various types**
22 **using different techniques. That could include unrelated**
23 **transfer functions. That could include beamforming. That**
24 **could include microphone arrays or loud speaker arrays.**
25 **So a whole variety of different things.**

35

1 Q When you say spatial audio, what do you mean by
2 that?
3 **A I use that as a kind of general description for**
4 **audio presentation where there is likely an intention on**
5 **the part of someone who's operating the software to create**
6 **a spatial presentation of audio, in other words, to**
7 **manipulate it somehow in acoustic space for the perception**
8 **of a listener.**
9 Q And would the manipulation include trying to
10 position sound sources around a user, maybe --
11 MR. ELLIOTT: Objection --
12 BY MR. HENRY:
13 Q -- so they're perceived from different locations?
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: Yes.
16 BY MR. HENRY:
17 Q Are you -- did you see in the asserted patents
18 that the patents often use the term sound localization
19 point?
20 **A I believe that is the phrase that's associated**
21 **with the acronym S, as in Sam, L, as in Larry, P, as in**
22 **Paul.**
23 Q And you saw that phrase and that acronym used in
24 the asserted patents, right?
25 **A I did.**

36

1 Q And what do you understand a sound localization
2 point to be?
3 **A A location in acoustic space as perceived by a**
4 **listener. I will give you a qualification to that, that I**
5 **have not read every mention of the word sound localization**
6 **point in all of the asserted patents. Therefore, I've**
7 **given you my understanding of that phrase. I may come to**
8 **a different conclusion as I understand the totality of the**
9 **contents of these patents.**
10 **So I would like to qualify what I just said by**
11 **stating that.**
12 Q Sure, and as we go today, Dr. Begault, as I'm
13 sure other attorneys have told you in other depositions,
14 if you want to make a clarification or qualification, just
15 let me know. I'm happy to make sure that you get your
16 testimony on the record clearly as you prefer. Okay?
17 **A I appreciate that.**
18 Q Yeah, sure.
19 And I'm not -- I wasn't trying to trick you with
20 the asking you about SLPs. I'm just trying to make sure
21 that we can talk about them in a way where we don't get
22 tripped up by that term as we go today. Okay?
23 **A That's fair enough. I thought you might be**
24 **referring to the use of that phrase throughout the**
25 **totality of the patents, which is why I made the**

Meta Platforms, Inc.
Exhibit 1095
Page 010

37

1 qualification that I made. So I'm giving you my
2 understanding of that phrase as I understand it today.
3 Q Yeah, that's totally fine. And I'm happy to
4 represent to you that the parties are in general agreement
5 that that term means a location where a listener localizes
6 sound. Okay?
7 A Yes.
8 Q And so when I use that phrase, is that fair
9 between us that you'll understand that's what I'm talking
10 about when I use either sound localization point or SLP,
11 we're talking about a location where a listener localizes
12 sound, you understand that?
13 A I do.
14 Q Okay. And that that's consistent with your
15 understanding of that term, right?
16 MR. ELLIOTT: Objection to form.
17 THE STENOGRAPHIC REPORTER: I'm sorry. What was your
18 answer, Doctor?
19 THE WITNESS: As of today.
20 THE STENOGRAPHIC REPORTER: Thank you.
21 BY MR. HENRY:
22 Q Have you ever designed a digital signal
23 processor?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: Yes.

38

1 BY MR. HENRY:
2 Q And what did that design work entail?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: That involved designing -- or should I
5 say, using the facilities afforded by a Motorola 56001
6 digital signal processing chip.
7 BY MR. HENRY:
8 Q And what did you use that DSP chip in?
9 A What did I use it in? I think you're asking what
10 was that DSP part of?
11 Q Yes, that's what I'm asking.
12 A It was part of a spatial audio communication
13 system.
14 Q Okay. So did that spatial audio communication
15 system have a name?
16 A Yes, it did.
17 Q What was that name?
18 A The Ames Spatial Auditory Display.
19 Q Is that the same as or different than the VIEW
20 system, The NASA VIEW System.
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: Different. This was a prototype device
23 that I designed and demonstrated to launch control at
24 Kennedy Space Center.
25

39

1 BY MR. HENRY:
2 Q Did you also work on the VIEW system?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: The VIEW system came about, I believe, a
5 year before I came on the scene at NASA. When I came to
6 NASA, the VIEW system, which was a virtual reality system
7 that had audio controlled by a device called the
8 Convolvotron had already been implemented. So I was
9 working in the area of auditory perception and
10 psychoacoustics, where we would use the Convolvotron in
11 studies.
12 So I could say that my research work might have
13 fed back into the usage of the VIEW system or
14 understanding of its capabilities. But the design of the
15 VIEW system was done by some folks about a year or so
16 before myself.
17 THE STENOGRAPHIC REPORTER: I'm sorry. Are you saying
18 VIEW System, V-I-E-W?
19 THE WITNESS: Yes.
20 THE STENOGRAPHIC REPORTER: Thank you.
21 THE WITNESS: All caps.
22 BY MR. HENRY:
23 Q Dr. Begault, what does VIEW stand for?
24 A I don't recall all of the letters, but I believe
25 it was Virtual Interactive Environment. And then I forget

40

1 the W. Might have been wearable. I don't recall exactly.
2 Q And so Dr. Begault, is it fair to say your
3 research used the Convolvotron in the VIEW system?
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: Over the years my research has used
6 components of the total VIEW System. I think the VIEW
7 system could -- you know, it's been 35 years or something,
8 what you're referring to. So I'm having to go back
9 thinking about its initial implementation. But it was a
10 goggles and glove and 3D audio interactive system.
11 And there might have been some variants on it,
12 even, as we went along, for instance, instead of a
13 head-mounted display, there could have been another type
14 of display on a boom, that you look through. So the
15 hardware components would change. And I don't really
16 recall if these variants still were described under the
17 rubric of VIEW System.
18 So to answer your question, my research involved
19 components of the VIEW system, but I think if you went
20 back 35 years and looked at the literature, I think the
21 literature was mostly talking about the system originally
22 compiled by Scott Fisher, which involved a interactive
23 system involving a beta glove, a head-mounted display, and
24 3D audio. And I believe it had six degrees of freedom
25 capability as well.

Meta Platforms, Inc.
Exhibit 1095
Page 011

41

1 THE STENOGRAPHIC REPORTER: I'm sorry. Did you say
2 what glove?
3 THE WITNESS: Boy, what did I say?
4 MR. HENRY: Data. It's d-a-t-a, right, Dr. Begault?
5 THE WITNESS: Thank you, that's what they referred to
6 it as, a data glove.
7 BY MR. HENRY:
8 Q And, Dr. Begault, when in time did that system
9 you just described with the HMD, the data glove, and the
10 3D audio that was designed or developed by Scott Fisher
11 exist?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: So you're asking me to give you an exact
14 historical point, which I'm unable to do. So I arrived at
15 NASA in I believe it was 1988. The system had already
16 existed, I believe. If you look at the literature, you
17 would find an article authored by Fisher, Wenzel,
18 W-e-n-z-e-l, and -- yeah, Fisher, Wenzel, and... there's
19 another person -- Foster, F-o-s-t-e-r. And I don't recall
20 the exact date of that.
21 And, again, publications usually follow
22 embodiments or whatever the proper term is, you know, the
23 manifestation by a year or two. So I can't give you an
24 exact historical point in time. That's a historical
25 question which could be researched, I guess.

42

1 BY MR. HENRY:
2 Q Totally fair.
3 But by the time you got to NASA in 1988, the VIEW
4 system and the Convolvotron system already existed; is
5 that fair?
6 **A Yes. So they were going through different**
7 **iterations and development of the systems. But some form**
8 **of those existed, yes.**
9 Q And the system already had an HMD, which is a
10 head-mounted display, right?
11 MR. ELLIOTT: Objection to form.
12 THE WITNESS: Yes.
13 BY MR. HENRY:
14 Q And the system, there's a data glove, right?
15 **A Yes.**
16 Q Okay. And you said the system also used 3D
17 audio, fair?
18 MR. ELLIOTT: Objection to form.
19 THE WITNESS: Yes.
20 BY MR. HENRY:
21 Q What's a data glove?
22 **A A data glove was a thin glove which had both a --**
23 **oh, I'm going to give you the 1980s version of what a data**
24 **glove was. It had a Polhemus tracker device on it so that**
25 **the position of the hand could be registered. And it also**

43

1 **had sensors in the fingers so that different gestures**
2 **could be interpreted by a computer, such as gripping and**
3 **pointing and that sort of thing.**
4 Q And you said, for the benefit of the court
5 reporter, Polhemus. Could you spell that, please?
6 **A Sure. Capital P-o-l-h-e-m-u-s.**
7 THE STENOGRAPHIC REPORTER: Thank you.
8 BY MR. HENRY:
9 Q So a user of the data glove would wear that data
10 glove on the user's hand?
11 MR. ELLIOTT: Objection; relevancy. I'm just going to
12 object to the line of questioning as being irrelevant.
13 This is on claim construction. So obviously, you can
14 continue down the line of questioning if you want, but
15 none of this is relevant to the claim construction we're
16 here for today.
17 THE WITNESS: So your question again, please?
18 BY MR. HENRY:
19 Q Sure. So the user of the data glove would use
20 that glove on the user's hand, right?
21 **A It's hard to imagine somebody wearing a glove**
22 **somewhere else other than their hand.**
23 Q And you said sensors could track gestures like
24 pointing; is that fair?
25 **A Well, again, I'm relying on 35 years of memory**

44

1 **here, but what I recall was that there was a type of**
2 **sensor that went along the fingers and maybe in the hand**
3 **part. And those sensors would transmit a voltage based on**
4 **the position of the fingers. And then there was also,**
5 **again, this tracker device. So the idea was at the time**
6 **that you might be able to point to a menu, a virtual menu**
7 **floating in the sky that you would see through the HMD or**
8 **you might be able to grab a virtual object and move it.**
9 **I don't know, honestly, how much development was**
10 **present at the time. I mean, again, it was a continual**
11 **evolution. So I know that in theory, that's what these**
12 **things were capable of doing. I don't know how often the**
13 **computer needed to be restarted or how successful these**
14 **things were. If you give me a particular year or, you**
15 **know, if smoke was coming out of the computer at a certain**
16 **point.**
17 **But conceptually, that's how all this stuff was**
18 **supposed to work, and I actually did try it at some of**
19 **these demonstrations when I was at NASA in the late 1980s.**
20 **So I think it was developed pretty well by that point.**
21 **BY MR. HENRY:**
22 Q I apologize. I thought you were done.
23 **A No, that's my fault. I didn't give you a proper**
24 **pause. I am done now.**
25 Q Thank you.

Meta Platforms, Inc.
Exhibit 1095
Page 012

45

1 So you actually used that system in the late
2 1980s?
3 MR. ELLIOTT: Objection; relevance, scope.
4 THE WITNESS: Well, I'm going to test my memory here,
5 but I'm pretty certain that we had quite a few people
6 coming through for demonstrations of the system. This is
7 one of the earliest virtual reality systems. And it
8 was -- made quite a splash, if you will.
9 And there were demonstrations of different
10 applications that would be relevant to NASA's mission.
11 But of course, popular media became entranced by what it
12 had potential to do. So folks like Jaron Lanier, who I
13 don't remember how to spell his name, I know he'd come
14 through the lab and various people would come and... it
15 was a new thing at that time.
16 BY MR. HENRY:
17 Q Sure.
18 But you also used it yourself, right?
19 MR. ELLIOTT: Objection; relevancy, scope.
20 THE WITNESS: I used --
21 MR. ELLIOTT: Calls (indecipherable utterance) for
22 speculation.
23 THE STENOGRAPHIC REPORTER: What was that,
24 Mr. Elliott?
25 MR. ELLIOTT: Also objection, calls for speculation.

46

1 THE STENOGRAPHIC REPORTER: Thank you.
2 THE WITNESS: I used primarily the Convolvotron,
3 because my work was in psychoacoustics. So I was using it
4 for psychoacoustic studies. And then I think some of my
5 earlier work might have fed into the larger virtual
6 reality system as far as, oh, here's something Begault
7 developed. And now let's try it as part of the full
8 system.
9 But I wasn't engineering the visual component,
10 let's say, of the system.
11 BY MR. HENRY:
12 Q Yeah, that's totally fine. I wasn't asking if
13 you were engineering the visual component. I just want to
14 know if you actually used the system, like did you wear
15 the data glove and wear the HMD and then try out the VIEW
16 and Convolvotron system?
17 MR. ELLIOTT: Objection to scope, relevancy, and calls
18 for speculation.
19 THE WITNESS: I'll repeat my prior answer. I used the
20 Convolvotron in my own studies, and I was one of many
21 people who used the system in terms of trying out
22 demonstrations of it. I might have even participated in a
23 study that a different researcher was doing, you know, as
24 a subject, that used some parts or components of the VIEW
25 system.

47

1 So, again, it was a system that was demonstrated
2 to many people. I was one of the people that tried it
3 out. I was very interested, of course, in the audio
4 portion of the system. And we were all part of the same
5 team, in the same group.
6 BY MR. HENRY:
7 Q And you could point at and move virtual objects
8 with this system?
9 MR. ELLIOTT: Objection to form, outside the scope,
10 and not relevant.
11 THE WITNESS: Could I -- I'm sorry. State your
12 question again?
13 BY MR. HENRY:
14 Q Sure.
15 Would this system, the VIEW system and the
16 Convolvotron system, could you point at and move virtual
17 objects?
18 MR. ELLIOTT: Objection to form, scope, and
19 irrelevant.
20 THE WITNESS: Yes. At various points in its
21 development, you could select things from a menu, I
22 recall, and interact with it. And I believe you could
23 interact with virtual objects.
24 BY MR. HENRY:
25 Q Now, could you also point at and move sound

48

1 sources?
2 MR. ELLIOTT: Objection to form, outside the scope and
3 irrelevant.
4 THE WITNESS: That, I don't recall specifically. It
5 might have come up at some point. I don't really recall
6 anything where sound sources were moved by let's say in
7 the virtual environment using one's hand.
8 BY MR. HENRY:
9 Q Do you recall them being moved by any other
10 process?
11 MR. ELLIOTT: Objection to form, outside the scope,
12 irrelevant, and calls for speculation.
13 THE WITNESS: The Convolvotron allowed you to create
14 sound trajectories or to move sounds so you could play
15 sounds in different locations. So in that sense, you
16 could move them.
17 BY MR. HENRY:
18 Q What were some of the processes that the
19 Convolvotron used to facilitate that movement?
20 MR. ELLIOTT: Objection to form, outside the scope,
21 and irrelevant.
22 THE WITNESS: Well, to be a little more specific here,
23 I mean, you could move your head, and sound sources would
24 maintain their same virtual position, unlike with a normal
25 set of headphones where the sounds would move with your

49

1 head. So the sounds would maintain their position. But
2 if you wanted to move the sounds, what I recall was that
3 that was a matter of (indecipherable utterance)
4 interacting with the computer display.
5 THE STENOGRAPHIC REPORTER: I'm sorry. Matter of
6 what?
7 THE WITNESS: Moving the sounds with a computer
8 display.
9 THE STENOGRAPHIC REPORTER: Thank you.
10 BY MR. HENRY:
11 Q How did the Convolvotron maintain sound sources
12 in the same virtual position when a user's head was
13 (indecipherable utterance) moving?
14 MR. ELLIOTT: Objection to form --
15 THE STENOGRAPHIC REPORTER: I'm sorry. Mr. Henry,
16 your sound really isn't that good on my end for some
17 reason. I can hear everyone really great, but I'm not
18 hearing your -- like this one question, you trailed off
19 for some reason. Your audio is trailing off.
20 MR. ELLIOTT: Chris, I think you're turning your head,
21 and that's what's causing it to trail off. I don't know
22 if Chris is watching the screen, but I do hear your voice
23 trail off as you like turn your head as you finish your
24 question.
25 THE TECHNICIAN: Mr. Henry, we can try doing something

50

1 in Zoom if you want to go off record real quick.
2 THE WITNESS: I'm going to take a two-minute break.
3 I'll be right back.
4 MR. HENRY: Yeah, that's fine. Let's go off the
5 record.
6 THE VIDEOGRAPHER: The time is 10:09. We're going off
7 the record.
8 (Recess taken.)
9 THE VIDEOGRAPHER: The time is 10:21. We are back on
10 the record.
11 BY MR. HENRY:
12 Q All right. Dr. Begault, how did the Convolvotron
13 maintain sound sources in the same virtual position when a
14 user's head was moving?
15 MR. ELLIOTT: Objection to form. Objection to form,
16 scope, and irrelevant.
17 THE WITNESS: Basically, it was a matter of analyzing
18 head position relative to the intended virtual source
19 position, and then selecting or interpolating between the
20 appropriate HRTFs.
21 BY MR. HENRY:
22 Q And when you say HRTFs, you mean head-related
23 transfer functions?
24 **A That's correct.**
25 Q Where was the (indecipherable utterance) Polhemus

51

1 tracker on VIEW and Convolvotron system.
2 THE STENOGRAPHIC REPORTER: I'm sorry. Mr. Henry,
3 what was the what tracker?
4 MR. HENRY: Polhemus again, P-o-l-h-e-m-u-s.
5 MR. ELLIOTT: And objection to form, calls for
6 speculation, outside the scope and irrelevant.
7 THE WITNESS: Where was the Polhemus tracker? That is
8 a system of devices. Do you want me to describe where
9 each of the devices were located?
10 BY MR. HENRY:
11 Q Please, that would help me. Go ahead.
12 **A Sure.**
13 MR. ELLIOTT: Objection to form, calls for
14 speculation, irrelevant, and outside the scope.
15 THE WITNESS: There was a transmitter that in the VIEW
16 system was mounted to the top of the headband of a
17 headset. For the audio transformations to the
18 Convolvotron. And then there was a receiver that was
19 mounted I believe on a pole. It was kind of an arbitrary
20 location, and sometimes it would be mounted to the
21 ceiling. And then those were wired to the actual box that
22 would take the coordinates of the transmitter and the
23 receiver and transmit them to the computer. And I don't
24 know exactly where that was located, but I believe
25 proximate to the computer.

52

1 BY MR. HENRY:
2 Q And the transmitter on the top of the headband,
3 did that track head movement or did something else track
4 head movement?
5 MR. ELLIOTT: Objection to form, outside the scope,
6 irrelevant. Compound. Just to be clear, we're talking
7 about the first versions of the Convolvotron, in the 1980s
8 using a Polhemus tracker device. So if that's what we're
9 referring to now, you have to remind me your question.
10 BY MR. HENRY:
11 Q Sure.
12 Was it the transmitter on the top of the headband
13 that tracked head movement or was it something else?
14 MR. ELLIOTT: Objection to form. Outside the scope,
15 irrelevant. Calls for speculation.
16 THE WITNESS: It was not just the transmitter. It was
17 also the receiver and the interface box.
18 BY MR. HENRY:
19 Q Working as unit, the components that you
20 testified about to before?
21 MR. ELLIOTT: Objection to form and irrelevant.
22 THE WITNESS: Yes. Correct. That's how that system
23 works.
24 BY MR. HENRY:
25 Q Did you say, Dr. Begault -- actually, strike

Meta Platforms, Inc.
Exhibit 1095
Page 014

53

1 that.
2 Dr. Begault, at what period of time did you work
3 on the AMES Spatial Audio Display?
4 MR. ELLIOTT: Objection to form and irrelevant.
5 THE WITNESS: This would be approximate, but I believe
6 I came up with the concept in 1990. And I believe -- I'd
7 have to refer to my CV to give you an exact year, but I
8 think our prototype was ready by '92 or '93. It's been a
9 while.
10 BY MR. HENRY:
11 Q When did you stop doing work that was related to
12 the AMES Spatial Audio Display?
13 MR. ELLIOTT: Objection to form and irrelevant.
14 THE WITNESS: That's a difficult -- the way you phrase
15 the question is difficult to answer specifically. Because
16 much of my work is related to what the Ames Spatial
17 Auditory Display was designed for. But if you mean -- why
18 don't you clarify what you mean in your question.
19 BY MR. HENRY:
20 Q I would imagine at some point you -- well,
21 actually, are you still working for NASA?
22 **A Yes.**
23 Q Are you still working on that project?
24 **A The Ames Spatial Auditory Display specifically?**
25 Q Yes?

54

1 **A That was a hardware prototype. So I stopped**
2 **working on that. Let's put it this way. I demonstrated**
3 **the prototype. I wrote a paper about it. There was a**
4 **patent that was related to it, and so I probably stopped**
5 **working, other than doing demonstrations, I know we did a**
6 **number of demonstrations with the device through the**
7 **mid-90s, but I wasn't really doing any additional**
8 **development on that specific device past, I don't know,**
9 **1995 or something.**
10 **BY MR. HENRY:**
11 Q So you weren't doing any specific development
12 work on the AMES Spatial Audio Display past around 1995;
13 is that fair?
14 MR. ELLIOTT: Objection to form and irrelevant.
15 THE WITNESS: First part of your question was garbled.
16 You'll have to repeat it.
17 BY MR. HENRY:
18 Q Sure.
19 So you weren't doing any specific development
20 work on the AMES Spatial Audio Display past around 1995;
21 is that fair?
22 MR. ELLIOTT: Same objection.
23 THE WITNESS: Yes. And by the way, the audio is
24 getting more garbled. So I could hear you say the word
25 specific, but it sounded like (indicating.)

55

1 And, Court Reporter, you don't need to transcribe
2 that, other than noise.
3 But maybe some other people have their
4 microphones open that shouldn't. I don't know. But there
5 was some garbling in there. So just as a heads up.
6 BY MR. HENRY:
7 Q For the purposes of a clean record, Dr. Begault,
8 I'm going to ask this again.
9 You weren't doing any specific development work
10 on the AMES Spatial Audio Display past around 1995; is
11 that fair?
12 MR. ELLIOTT: Objection to form and irrelevant.
13 THE WITNESS: That's my best estimate.
14 BY MR. HENRY:
15 Q Dr. Begault, did you write your May 3rd, 2023,
16 declaration?
17 **A I wrote it interactively with counsel.**
18 Q Which counsel?
19 **A I'm not sure which counsel were actually**
20 **involved, but I will state that I was communicating with**
21 **Patrick Dunn and Kyle Elliott about it.**
22 Q Anyone else?
23 **A I don't recall.**
24 Q And what do you mean by you wrote it
25 interactively with counsel?

56

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: The substance of the arguments I wrote,
3 and I would say that the formatting and the outline and
4 some of the references that were addressed in the errata
5 came from counsel -- were provided by counsel.
6 But let me follow up and says the references.
7 BY MR. HENRY:
8 Q I'm sorry. I'm not following. What are you
9 referring to when you say the references?
10 **A The errata addresses specific sections or**
11 **references to specific quotes in the materials in the**
12 **patents.**
13 Q And those were provided by counsel?
14 **A Yes. I asked for examples of these processor**
15 **claims that I was asked to address.**
16 Q And in response to that request, counsel provided
17 the citations presented in the errata?
18 **A Presented in the declaration and corrected in the**
19 **errata.**
20 MR. ELLIOTT: Objection to form.
21 BY MR. HENRY:
22 Q Did the AMES Spatial Audio Display use 3D audio?
23 MR. ELLIOTT: Objection to form, outside the scope,
24 and irrelevant.
25 THE WITNESS: Yes.

57

1 BY MR. HENRY:
2 Q What in your view is 3D audio?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: Three-dimensional audio presentation.
5 BY MR. HENRY:
6 Q How, if at all, is that different from binaural
7 sound or binaural audio?
8 MR. ELLIOTT: Objection to form.
9 THE WITNESS: There are similarities and differences.
10 We could go into those if you like.
11 BY MR. HENRY:
12 Q Sure.
13 How does binaural audio differ from 3D audio in
14 your view?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: Binaural audio has been a term of art,
17 so to speak, in the research community for many, many
18 years going back decades. And so one can find references
19 to binaural recording technique, for instance, where a
20 dummy head might be used to capture spatial audio cues
21 from the perspective of a dummy head.
22 3D audio was a term that came about, I think, in
23 the 1980s, late 1980s. I don't know exactly who invented
24 that term, but generally speaking, without being
25 restrictive about the overlap between the two terms or

58

1 excluding one thing from the other because of course there
2 are similarities, 3D audio is kind of a term that came
3 about when virtual reality became known to the public. It
4 became a kind of way of capturing the concept of
5 manipulating binaural sound, if you will, with a computer.
6 BY MR. HENRY:
7 Q Did the AMES Spatial Audio Display use binaural
8 audio?
9 MR. ELLIOTT: Objection to form and irrelevant.
10 THE WITNESS: In a sense, yes. That's the overlap
11 with 3D audio, if you will, in that it used head-related
12 transfer functions for its processing.
13 BY MR. HENRY:
14 Q Did it use a digital signal processor for that
15 head-related transfer function processing?
16 MR. ELLIOTT: Objection to form. And irrelevant.
17 THE WITNESS: Yes.
18 BY MR. HENRY:
19 Q Were you the only one in the industry using a
20 digital signal processor to process head-related transfer
21 functions -- (simultaneous cross-talk) --
22 MR. ELLIOTT: Objection; form --
23 BY MR. HENRY:
24 Q -- in the 1990s?
25 MR. ELLIOTT: Objection to form, calls for

59

1 speculation. Also irrelevant.
2 THE WITNESS: No.
3 BY MR. HENRY:
4 Q At that time, in the 1990s were there
5 publications that you were aware of discussing using
6 digital signal processors to process head-related transfer
7 functions to generate binaural audio?
8 MR. ELLIOTT: Objection to form, irrelevant.
9 THE WITNESS: There were many.
10 BY MR. HENRY:
11 Q Were there also many references at that time
12 discussing using convolution processes to process
13 head-related transfer functions with digital signal
14 processors for binaural audio?
15 MR. ELLIOTT: Objection to form and irrelevant.
16 THE WITNESS: Yes.
17 BY MR. HENRY:
18 Q What is convolution, Dr. Begault?
19 **A Convolution is a mathematical operation by which**
20 **the frequency domain of two signals can be multiplied.**
21 Q You recall mentioning convolution in your May 3rd
22 declaration?
23 **A I do.**
24 Q Is there only one convolution process,
25 Dr. Begault, or are there many different convolution

60

1 processes?
2 MR. ELLIOTT: Objection to form.
3 THE WITNESS: Literally speaking, I guess there's an
4 infinite number of convolution processes.
5 BY MR. HENRY:
6 Q Why do you say that, Dr. Begault?
7 MR. ELLIOTT: Objection to form.
8 THE WITNESS: I say infinite because any number of an
9 infinite number of things can be convolved with another.
10 BY MR. HENRY:
11 Q Sure, I think you're referring to inputs to a
12 convolution process.
13 What I'm asking is, is there just one convolution
14 process known to you into which such --
15 MR. ELLIOTT: Objection to form.
16 BY MR. HENRY:
17 Q -- or are there more than one convolution
18 process?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: I'm aware of the basic convolution
21 process.
22 THE STENOGRAPHIC REPORTER: I just want to let you
23 know, Mr. Henry, I didn't hear your full question because
24 there was some talking over one another with the objection
25 so I wasn't able to hear the full question.

Meta Platforms, Inc.
Exhibit 1095
Page 016

61

1 MR. HENRY: Thank you. I'll repeat it.
2 BY MR. HENRY:
3 Q Dr. Begault, is there just one convolution
4 process or are there more than one convolution processes?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: I'm familiar with one convolution
7 process.
8 BY MR. HENRY:
9 Q And --
10 **A And if you mean the literal definition of**
11 **convolution in the time domain.**
12 Q I'm sorry. I think -- is it in the time domain
13 or in the frequency domain that convolution is used?
14 **A In the time domain.**
15 Q And in the frequency domain, you just use the
16 matrix multiplication process; is that right?
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: I don't understand your question.
19 BY MR. HENRY:
20 Q Sure.
21 Well, what do you use in the frequency domain if
22 you don't use convolution to render 3D audio?
23 **A We use convolution in the time domain in order to**
24 **multiply signals in the frequency domain. So in my use of**
25 **the word convolution in 3D audio, we're performing that**

62

1 **operation in the time domain in order to impart the**
2 **frequency domain transfer function of a head-related**
3 **transfer function.**
4 Q But isn't convolution using head-related impulse
5 responses and not head-related transfer functions?
6 **A That is correct. One is using head-related**
7 **impulse responses or transformed head-related impulse**
8 **responses to convolve in order to get the frequency domain**
9 **equivalent.**
10 Q So the convolution process is used with
11 head-related impulse responses, right?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: Either head-related impulse responses or
14 some approximation of it.
15 BY MR. HENRY:
16 Q But you don't actually use convolution on
17 head-related transfer functions, do you?
18 **A Well, people will use the phrase convolve with a**
19 **head-related transfer function and what they really mean**
20 **is that the operation is happening in the time domain in**
21 **order to filter something with a head-related transfer**
22 **function. But technically speaking, convolution is used**
23 **is a time domain operation that's used to multiply two**
24 **spectra.**
25 Q What does the acronym IIR stand for, are you

63

1 familiar with that?
2 **A I am familiar with that. Do you want me to**
3 **define it?**
4 Q Please?
5 **A Infinite impulse response.**
6 Q And what does the acronym F, as in fox, I, as in
7 indigo, R, as in Roger, stand for?
8 **A Finite impulse response.**
9 Q And what do you use infinite impulse responses
10 for?
11 **A Well, they can be used for the same purpose as an**
12 **FIR filter. IIR filters can be used to filter a sound**
13 **just as an FIR can be used to filter sound. And, in fact,**
14 **you can use an IIR filter to approximate the transfer**
15 **function of an HRTF.**
16 **So in a way, these are two approaches in terms of**
17 **digital signal processing to create a spectral**
18 **modification, and both can be used -- I'll just follow up**
19 **with that. And both can be used in spatial audio**
20 **processing.**
21 Q Can you perform convolution processes with IIR
22 filters for spatial audio?
23 **A No. I don't believe it's referred to in that way**
24 **as a convolution operation. It's a feedback system for**
25 **developing a filter. So one could design IIR filters that**

64

1 **are using feedback, whereas the convolution operation is**
2 **more towards feed-forward operation.**
3 Q Can you perform convolution processes with FIR
4 filters for spatial audio?
5 **A That is what is typically done.**
6 Q Can you describe what the one convolution process
7 that you said you're familiar with entails?
8 MR. ELLIOTT: Objection to form.
9 THE WITNESS: Sure. So we have a sequence of numbers
10 that represents, let's say, a digital filter. And we have
11 another sequence of numbers that represents an input
12 signal that has been digitized. So these are both in the
13 digital domain. So I'm familiar with it. And what we're
14 doing is we are multiplying the two arrays, shifting one
15 of the arrays relative to the other one, and then summing
16 the output and then shifting again and summing the output.
17 BY MR. HENRY:
18 Q And what types of digital filters can be used in
19 that process?
20 **A Band pass filters. Low pass filters. High pass**
21 **filters. Filters that represent head-related transfer**
22 **functions.**
23 Q Any others?
24 **A Reverberation.**
25 Q Any others?

65

1 **A Arbitrary filters.**
2 Q Any others?
3 **A I think I've exhausted the list. If I think of**
4 **any others later, I'll tell you.**
5 Q What's an arbitrary filter?
6 **A Well, it's to contrast what I was describing as a**
7 **band-pass filter, a low-pass filter, or a high-pass**
8 **filter. So an arbitrary filter means that its frequency**
9 **response can be, quote/unquote, arbitrarily designed to**
10 **have a particular characteristic.**
11 Q I think you mentioned reverberation filter. What
12 would that be?
13 **A What that would be, it's -- maybe I didn't say**
14 **reverberation filter. I meant that the FIR filter could**
15 **be used to simulate reverberation. That's what I meant to**
16 **say.**
17 Q What is a biquad configuration of a filter?
18 **A A biquad -- a biquad filter in digital signal**
19 **processing has both a feed forward and a feedback**
20 **component.**
21 Q Are those used in convolution processes?
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: More properly stated, it could be used
24 in a filtering process.
25

66

1 BY MR. HENRY:
2 Q Will you help me understand that qualification?
3 I'm just... what is the relationship between the filters
4 that we've gone through and the convolution process? Are
5 they used in that convolution process or am I not
6 capturing that correctly? Just trying to understand.
7 MR. ELLIOTT: Objection to form -- sorry, objection to
8 form.
9 THE WITNESS: My understanding is the convolution
10 process applies to a feed forward operation but not to a
11 feedback operation.
12 BY MR. HENRY:
13 Q So then what filters of the filters that we
14 mentioned could be used in the convolution process?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: I can't answer your question the way you
17 phrased it. What filters can be used?
18 BY MR. HENRY:
19 Q Sure. We've covered the FIR filter, and we
20 mentioned the biquad configuration of a filter, and an IRR
21 filter. Are any of those used in convolution processes?
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: My understanding is that the feed
24 forward operation of the FIR portion of a filter
25 represents convolution. I don't know if it's properly

67

1 addressed the feed forward portion of a biquad filter also
2 which has a feedback portion as a convolution process. I
3 guess you could, but I'm not entirely sure about that.
4 BY MR. HENRY:
5 Q What I'm trying to understand, Dr. Begault, and
6 just help me out because I'm not an audio expert. But I
7 thought you testified that you have a sequence of numbers
8 that you're going to use in convolution that represents a
9 digital filter, and then you have a sequence of numbers
10 that represent the input. And then those two things are
11 convolved in order to render spatial audio signal. Is
12 that not the case?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: If I know what you're referring to with
15 my example of two sequence of numbers where I was doing a
16 shift and a feed forward operation, I would call that
17 convolution. It's not the only way to render a spatial
18 audio filter, though.
19 BY MR. HENRY:
20 Q Sure.
21 But what I just mentioned, where you have the
22 numbers that represent the filter, and the numbers for
23 your input and you're doing a feed forward process for
24 convolution, which of the filters that we discussed can be
25 used in that process?

68

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: You could design a filter using FIR
3 techniques of any type.
4 BY MR. HENRY:
5 Q So any FIR filter could be used?
6 **A No. Wait a minute. That's twisting my words in**
7 **some weird way.**
8 Q I --
9 **A You said you could use -- let me clarify.**
10 Q Sure, please.
11 **A You could use an FIR filter to design just about**
12 **any type of filter.**
13 Q And then would you use that resulting filter for
14 your convolution?
15 **A No. The filter is the convolution.**
16 Q Okay.
17 **A That's where I'm getting mixed up with your**
18 **question.**
19 Q Is the filter the kernel you use for the
20 convolution process?
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: I would reverse those words. The
23 convolution process is what I might use in some
24 circumstances to create a digital filter.
25

69

1 BY MR. HENRY:
2 Q Can you describe for me how you would use HRTFs
3 in a convolution process?
4 **A I would use them possibly, not exclusively.**
5 **By -- and, again, there's many ways to represent a**
6 **head-related transfer function. But one way of doing it**
7 **would be using the convolution process that we just**
8 **described.**
9 Q So if you wanted to convolve an audio signal with
10 a HRTF, how would you do that?
11 **A I have already answered that question for you.**
12 **You could do it via a feedforward FIR filter.**
13 Q How else could you do it?
14 **A You could do it with any of the other types of**
15 **filters that I mentioned. Could represent the frequency**
16 **domain characteristics.**
17 Q Dr. Begault, do you understand that the parties
18 have disputes in this case about the terms electronic
19 call, electronic phone call, and telephone call?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: I addressed those topics within my
22 declaration. So that's the limits of my understanding of
23 that dispute.
24 BY MR. HENRY:
25 Q But the terms electronic call, electronic phone

70

1 call, and telephone call are terms that you addressed in
2 your May 3rd, 2023, declaration, right?
3 **A That is correct.**
4 Q Dr. Begault, before we talk about those terms,
5 how much time did you spend reviewing Dr. McMullen's
6 declaration?
7 MR. ELLIOTT: Objection to form.
8 THE WITNESS: I don't recall.
9 BY MR. HENRY:
10 Q Give me your best guess, Dr. Begault.
11 **A Is her declaration the one that she had authored,**
12 **as opposed to the... sorry. I sometimes don't know the**
13 **legal terms for these documents. There were two documents**
14 **that I mentioned earlier, that I had reviewed briefly.**
15 **One was a document provided by defense that might have**
16 **quoted Dr. McMullen. I'm not certain about that.**
17 **And then there's a much longer document by**
18 **Dr. McMullen. I think I spent a few hours on the longer**
19 **document of approximately 130 pages of Dr. McMullen's.**
20 **But I didn't spend a lot of time looking at that one. I**
21 **was mostly looking at the one with the 30 pages.**
22 Q I was referring to the declaration from
23 Dr. McMullen, just like you submitted a declaration in
24 this case. With respect to the declaration from
25 Dr. McMullen, please give me your best guess on how much

71

1 time you spent reviewing that.
2 MR. ELLIOTT: Objection to form.
3 THE WITNESS: No more than --
4 Sorry.
5 If we are indeed talking about a document that's
6 approximately 130 pages, I think I put less than five
7 hours into it.
8 BY MR. HENRY:
9 Q Dr. Begault, what is an electronic call?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: An electronic call is a communication
12 between two parties.
13 BY MR. HENRY:
14 Q What is an electronic phone call?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: An electronic phone call is a
17 communication between two parties that is facilitated by
18 electronic means.
19 BY MR. HENRY:
20 Q Any electronic means?
21 **A Yes. I'm excluding semaphore, smoke signals, and**
22 **acoustic communication. But any means involving**
23 **electrical communication.**
24 Q What is a telephone call?
25 MR. ELLIOTT: Objection to form.

72

1 THE WITNESS: Same answer.
2 BY MR. HENRY:
3 Q That answer being, a communication between two
4 parties that is facilitated by electronic means?
5 **A Yes.**
6 Q Any electronic means?
7 **A Yes.**
8 Q Do you draw any distinction between the terms
9 electronic call on the one hand and electronic phone call
10 and telephone call on the other?
11 MR. ELLIOTT: Objection to form.
12 THE WITNESS: I draw no distinctions between those
13 terms.
14 BY MR. HENRY:
15 Q Even though the latter terms recite phone and
16 telephone?
17 **A I'm sorry. The latter terms recite what?**
18 Q Phone and telephone.
19 **A I think the question you originally asked was are**
20 **those equivalent, and I said yes.**
21 Q And I'm asking you, that's your opinion despite
22 the fact that electronic call does not recite phone or
23 telephone, and the other terms do.
24 MR. ELLIOTT: Objection; form.
25 THE WITNESS: Correct -- oh, correct.

Meta Platforms, Inc.
Exhibit 1095
Page 019

73

1 BY MR. HENRY:
2 Q In your May 3rd, 2023 declaration, did you set
3 out any legal understandings that govern the formation of
4 your opinions?
5 **A Well, I'm not an attorney. So... I don't**
6 **understand what you mean by legal. If you mean that I put**
7 **it in a legal declaration, then I set out my understanding**
8 **in my declaration.**
9 Q Did you write in your declaration any rules
10 governing claim interpretation or legal understandings of
11 any other applicable rules for claim construction?
12 **A I know I gave you my understanding as an expert**
13 **or as a person skilled in the art regarding these issues.**
14 **And as far as -- yes, so that's what I offered. To the**
15 **degree that they might be legal tests, I'm not exactly**
16 **sure. But it seems that the interpretation of a person**
17 **skilled in the art, such as myself, matters legally.**
18 Q I'm actually asking you if you set forth -- out
19 in your declaration sort of the rules that a court would
20 apply or that -- that the court will apply in interpreting
21 these claims.
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: I know I defined -- no, I didn't define
24 any rules, no. I did not use the word rules or I did not
25 think about this in terms of rules.

74

1 BY MR. HENRY:
2 Q If you -- if it's your opinion that electronic
3 call, electronic phone call, and telephone call all mean
4 the same thing, then isn't your opinion rendering
5 meaningless the terms phone and telephone?
6 MR. ELLIOTT: Objection to form.
7 THE WITNESS: No.
8 BY MR. HENRY:
9 Q If not, how is your interpretation of the terms
10 electronic phone call and telephone call any different
11 from your interpretation of the term electronic call?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: There's three different ways of saying
14 the same thing, a communication between two parties
15 facilitated electronically.
16 BY MR. HENRY:
17 Q And since you're telling me that they all mean
18 the same thing, aren't you telling me that the terms phone
19 and telephone have no impact on the interpretation of
20 those terms?
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: It seems like a hypothetical that's hard
23 to answer because, I mean, we have to read these terms
24 within the context of the patent. They seem to be
25 referring to the same thing, when I read them.

75

1 BY MR. HENRY:
2 Q Dr. Begault, what patents do these terms appear
3 in?
4 **A I don't recall.**
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: I don't recall which ones exactly.
7 BY MR. HENRY:
8 Q As we have established, Dr. Begault, we're
9 conducting this deposition over Zoom, right?
10 **A I hope that's what this is.**
11 Q Is this Zoom meeting an electronic call?
12 **A Yes.**
13 Q Is it an electronic phone call?
14 **A Yes.**
15 Q Is it a telephone call?
16 **A Yes.**
17 Q Do you believe that the computers we're using for
18 this Zoom deposition are phones?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: I do. The word tele means distant.
21 Phone means sound. And so we are communicating sound over
22 a distance.
23 BY MR. HENRY:
24 Q So my computer is a phone?
25 MR. ELLIOTT: Objection to form.

76

1 THE WITNESS: It's exactly equivalent to the use of a
2 phone. If you mean by a phone, a landline with a piece of
3 plastic encasing it, that goes over a landline
4 communication or you're referring to a handheld device
5 that's using radio communication, et cetera, it's
6 basically the functionality of the three terms involves
7 communications between two parties using electronic means.
8 BY MR. HENRY:
9 Q Is my computer a phone?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: Your computer is being used to transmit
12 sound. So when you use a computer to transmit sound
13 between two or more parties electronically, then you're
14 using a computer as a phone in our sort of old-fashion way
15 of thinking of a phone as a landline device. But it has
16 the exact same functionality as a phone.
17 So in essence, it is a phone.
18 BY MR. HENRY:
19 Q Is your computer a phone?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: Can you hear my voice?
22 BY MR. HENRY:
23 Q Please answer the question.
24 **A Sorry for the rhetorical answer. Yes, I'm using**
25 **it as a phone.**

77

1 Q If you and I were talking over walkie-talkies,
2 would we be using a telephone?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: We would be communicating sound over a
5 distance. So telephone, yes. We would be using a
6 walkie-talkie as a telephone.
7 BY MR. HENRY:
8 Q So is a walkie-talkie a telephone?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: You can use a walkie-talkie as a
11 telephone form of communication. You can also use a
12 walkie-talkie as a hammer. But people use it for voice
13 communication between two parties.
14 BY MR. HENRY:
15 Q Is it a phone?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: I have to give you the same answer. If
18 you beam by a telephone or a phone, I'd have to know what
19 you mean exactly by a phone. I've given you my definition
20 of what a phone is. A phone is a device that enables
21 electronic communication between two parties because it
22 uses the word sound.
23 And if we talk about telephone, we're talking
24 about transmitting sound between a distance, which phone
25 implies.

78

1 BY MR. HENRY:
2 Q So applying your definition, Dr. Begault, is a
3 walkie-talkie a phone?
4 **A Yes, we are using it that way. If on the, other**
5 **hand, we wanted to point to a specific piece of hardware,**
6 **like a Western Electric telephone that was used by Ma Bell**
7 **in the 1960s, then you could say, well, that's a phone.**
8 **And that implementation in that specific form of hardware**
9 **is a phone.**
10 Q Dr. Begault, if we were conductors on trains
11 communicating through the consoles of our trains, would we
12 be using telephones?
13 MR. ELLIOTT: Objection to form, asked and answered.
14 Argumentative.
15 THE WITNESS: Yes. You would be -- that would be a
16 form of phone. I think they're even referred to as
17 phones.
18 BY MR. HENRY:
19 Q Would that make the trains telephones in your
20 view?
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: No. The communication system itself is
23 the phone.
24 BY MR. HENRY:
25 Q The train's radio is a telephone?

79

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: The train's radio communication can be
3 one component of the train is a telephone communication
4 system, just as my computer has one component to it.
5 Which allows us to communicate via voice and video.
6 BY MR. HENRY:
7 Q If we were members of the coast guard on boats
8 communicating over our radios, would we be making a
9 telephone call?
10 MR. ELLIOTT: Objection to form, argumentative.
11 THE WITNESS: Yeah. That would be a form, would be
12 called a radio telephone perhaps in the coast guard or a
13 ship-to-shore phone is another word that is sometimes used
14 to refer to the specific hardware. But, again, my use of
15 the word phone has to do with the idea of sound
16 communicated between two or more parties electronically.
17 BY MR. HENRY:
18 Q So would the boat radios be making telephone
19 calls?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: It would be the equivalent of a
22 telephone call, yes. Exactly the -- it's another way of
23 referring to it. The term of art might be radio
24 communication over a radiofrequency. But, of course,
25 that's now much more ambiguous distinction since cellular

80

1 telephones are using radio communication as well.
2 BY MR. HENRY:
3 Q What if we were airplane pilots communicating
4 over radios, would we be making telephone calls then?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: In a sense, yes, by the definition I've
7 given you of what a phone call is.
8 BY MR. HENRY:
9 Q Can you identify for me any type of electronic
10 voice communication that is not, in your view, a telephone
11 call?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: I'm trying to think if sound weren't
14 involved. So if we were communicating by video phone, and
15 we were both deaf, and so we might use hand signals. Then
16 I'd have to remove the audio component there and say that
17 we were just having a video phone call.
18 But I was using the word phone to apply to sound.
19 So, no, it's hard for me to think of any electronic
20 communication between two persons that couldn't be
21 referred to as an electronic call or as an electronic
22 phone call or a telephone call that would be absolutely
23 clear that these mean the same thing.
24 BY MR. HENRY:
25 Q So sitting here right now, can you identify for

81

1 me any electronic communication between two people that
2 you believe would not qualify as a telephone call?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: I'm not certain if telegraph would
5 necessarily qualify if there was no sound involved. But,
6 no, I think -- that essentially translates into a
7 communication. But sound's not involved in that one. I
8 gave you another example of a video phone call, but where
9 two people have the sound turned off. And so they were
10 communicating by hand signals.
11 So would that be a video call without a video
12 telephone call, although the system was capable of it if
13 the sound were turned on or if both people were able to
14 use audio and speech to communicate? Then, yes, then it
15 becomes a phone call or telephone call and an electronic
16 call.
17 BY MR. HENRY:
18 Q Dr. Begault, sitting here right now, can you
19 identify for me any electronic voice communication between
20 two people that, in your view, would not be a telephone
21 call?
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: No.
24 MR. HENRY: Why don't we take a ten-minute break,
25 please. Let's go off the record.

82

1 THE WITNESS: Sure. See you in ten.
2 MR. ELLIOTT: Okay.
3 THE VIDEOGRAPHER: The time is 11:13. We're going off
4 the record.
5 (Recess taken.)
6 THE VIDEOGRAPHER: The time is 11:26. We're back on
7 the record.
8 BY MR. HENRY:
9 Q Dr. Begault, you said you were in Muir Beach,
10 California today, right?
11 **A That's correct.**
12 Q And did you say you were in your home office or a
13 building?
14 **A Home office, home office, yes.**
15 Q Okay. Dr. Begault, is Boston, where I am, a
16 distance from Muir Beach?
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: Yes.
19 BY MR. HENRY:
20 Q Is Paris, France a distance from Muir Beach?
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: Yes.
23 BY MR. HENRY:
24 Q Is Tokyo, Japan a distance from Muir Beach?
25 MR. ELLIOTT: Objection to form, argumentative.

83

1 THE WITNESS: Yes.
2 BY MR. HENRY:
3 Q Is the moon a distance from Muir Beach?
4 MR. ELLIOTT: Objection to form, argumentative.
5 THE WITNESS: Yes.
6 BY MR. HENRY:
7 Q Is Mars a distance from Muir Beach?
8 MR. ELLIOTT: Objection to form, argumentative.
9 THE WITNESS: Yeah.
10 MR. ELLIOTT: Badgering the witness.
11 THE WITNESS: Yes.
12 BY MR. HENRY:
13 Q If I used an air horn in Boston right now, would
14 the sound of that air horn be a distance from you in Muir
15 Beach?
16 MR. ELLIOTT: Objection to form, argumentative,
17 badgering the witness.
18 THE WITNESS: Hypothetically, all things are at a
19 distance from me.
20 BY MR. HENRY:
21 Q So if I used an air horn in Boston right now,
22 would the sound of that air horn be a distance from you in
23 Muir Beach?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: I just gave you an answer. All things,

84

1 hypothetically, are a distance from me. And you can
2 include air horns in Boston.
3 BY MR. HENRY:
4 Q Could we also include air horns on the moon if I
5 could use an air horn on the moon?
6 MR. ELLIOTT: Objection to form, argumentative, and
7 badgering the witness.
8 THE WITNESS: Well, I did answer that. I said all
9 things are essentially at a distance from me.
10 BY MR. HENRY:
11 Q So any sound anywhere in the galaxy would be a
12 distance from you?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: The only types of sounds that I think of
15 as not being distant from myself would be sounds that we
16 refer to in the literature as inside the head
17 localization. So there is a phenomenon that is sometimes
18 experienced where sound is not externalized. So all
19 sounds are external to me when you talk about physical
20 sounds.
21 It is possible that sounds can sound inside of
22 your head, though or be localized inside of your head.
23 It's not even clear if your own physical sounds like
24 breathing are located inside your head or inside your
25 body. But outside -- but those are the sounds that are

85

1 located where I am, as part of my physical corporal being.
2 Everything else is external.
3 BY MR. HENRY:
4 Q So then would you agree that any sound that's
5 external to your inside the head hearing is a distance
6 from you?
7 MR. ELLIOTT: Objection to form.
8 THE WITNESS: With the exclusion of sounds generated
9 by my own body. Certain sounds, I guess I should say too
10 because if I snap my fingers outside of my head, that
11 sound -- I generated that sound with my body, but it is
12 located outside of me. The sound source is outside of me.
13 I guess what I'm referring to are sound sources that are
14 inside of me. Like my lungs, my own voice.
15 BY MR. HENRY:
16 Q Dr. Begault, putting aside sounds from inside
17 your corporal body and sounds that you hear inside the
18 head as you've described, would you agree that all other
19 sounds are a distance from you?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: That's more or less the essence of my
22 answer that I gave you earlier, that all sounds or all
23 things are external to me.
24 BY MR. HENRY:
25 Q Dr. Begault, is a sound in Tokyo, Japan right now

86

1 a distance from you?
2 MR. ELLIOTT: Objection to form.
3 THE WITNESS: I think you asked that earlier. And I
4 think the answer was yes.
5 BY MR. HENRY:
6 Q Is the answer yes?
7 **A A sound in Tokyo would be at a distance from me.**
8 Q And would a sound on Mars be a distance from you?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: Yes.
11 BY MR. HENRY:
12 Q Dr. Begault, is your computer proximate to you
13 right now?
14 **A How do you define proximate?**
15 Q Well, Dr. Begault, you recall opining about the
16 term proximate, right?
17 **A Right, I used the term proximate to refer to a**
18 **normal conversational distance.**
19 Q Let me ask you this, Dr. Begault, is your
20 computer proximate to you?
21 **A It can be made --**
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: Okay. In terms of the physical object,
24 it's within about... oh, I don't know how many inches.
25 I'd have to estimate. It's whatever was recommended

87

1 ergonomically. Maybe 20 inches.
2 BY MR. HENRY:
3 Q Is that proximate to you?
4 **A If we define proximate for a computer as the**
5 **distance that we would want that computer to be, in order**
6 **to reasonably see visual objects on that computer, yes.**
7 **If we define proximate in that way.**
8 Q Dr. Begault, what does proximate to mean to you?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: It would depend on what we're talking
11 about.
12 BY MR. HENRY:
13 Q Okay. Is the back wall of your home office
14 proximate to you?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: I would need to qualify that somehow. I
17 don't know what that would mean.
18 BY MR. HENRY:
19 Q Is the chair you're sitting on proximate to you?
20 **A Again, I've never used the word proximate in**
21 **connection with a chair.**
22 Q Is it proximate to you?
23 MR. ELLIOTT: Objection to form.
24 THE WITNESS: It's in proximity to me.
25

88

1 BY MR. HENRY:
2 Q Is the chair you're sitting on proximate to you?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: The idea of a chair being proximate to
5 me seems strange and difficult for me to answer. I could
6 say that I'm sitting on it. I could say that it's not at
7 a far distance from me. So if I'm sitting on it, I guess
8 by that definition, it's in a proximate relationship to
9 me.
10 BY MR. HENRY:
11 Q Is there a coffee cup next to you, Dr. Begault?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: No.
14 BY MR. HENRY:
15 Q What's the brown and blue cylinder next to you in
16 your home office?
17 **A It's a water cup.**
18 Q Dr. Begault, is the water cup next to you,
19 proximate to you?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: It's in a proximate location to me
22 because it's not inside of me.
23 BY MR. HENRY:
24 Q Is anything that is not inside of you proximate
25 to you?

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Page 023

89

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: No. I wouldn't say... it would depend
3 on the particular context. Maybe for a cup, for instance,
4 you might define proximate as something that I could
5 physically grab. So like, you know, I can grab my water
6 cup now, and I can take a drink from it. (Indicating.)
7 If the cup were so far away as I could not grab
8 it, then I would maybe say, oh, that's not really
9 proximate to me. I'd like to move my cup so it is more
10 proximate to me.
11 BY MR. HENRY:
12 Q So do you define proximate to as being within a
13 distance that you can grab it?
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: No. Only for the case of the water cup
16 as we sit here and explore hypothetical applications of
17 the term proximate. I have a specific meaning for
18 proximate, for -- in my declaration.
19 BY MR. HENRY:
20 Q What if there was coffee in the cup, Dr. Begault,
21 would your answer change?
22 MR. ELLIOTT: Objection to form, argumentative,
23 badgering the witness.
24 THE WITNESS: It's the cup itself, not the contents of
25 the cup.

90

1 BY MR. HENRY:
2 Q Is there a house next to yours, Dr. Begault?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: Yes.
5 BY MR. HENRY:
6 Q Is that house proximate to you?
7 MR. ELLIOTT: Objection to form.
8 THE WITNESS: Well, it would depend on what we might
9 define as proximate. That might be a subjective term.
10 Some people might think that the house was too close, and
11 that would be a proximate house, versus somebody who might
12 say, oh, maybe that's not proximate to.
13 Somebody else might use the criteria of, can I
14 see that house next to me. So it would depend on, in your
15 hypothetical, what criteria I would use for that specific
16 hypothetical, like seeing houses or finding coffee cups.
17 You would adopt a kind of criteria.
18 BY MR. HENRY:
19 Q Based on what, Dr. Begault?
20 **A Well, on the cup --**
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: -- we discuss --
23 Sorry. I'm going to slow down my answers a bit.
24 So in relationship to the cup, I use the
25 proximate to explore the idea of proximate meaning that I

91

1 could grab it with my hand. It's not -- somebody else
2 might use a different criteria and say, well, it's
3 proximate if I can see it.
4 Maybe with a house example that you gave,
5 proximate might have to do with a completely different
6 kind of criteria, whether or not I can see it or not. If
7 my neighbor was far, far away, and I could not see the
8 house, then I might use that as my criteria. But these
9 are hypotheticals and odd examples when we're talking
10 about these different kinds of visual objects because it's
11 not typically used.
12 I don't think of a chair in terms of proximate.
13 I would say it's in proximity to me. But I don't think of
14 it, is it proximate.
15 BY MR. HENRY:
16 Q When would your chair stop being in proximity to
17 you if it were to gradually increase its distance from
18 you?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: Well, it depends on the criteria you
21 would use.
22 BY MR. HENRY:
23 Q Dr. Begault, do you believe proximate is a
24 subjective term?
25 **A Not when applied to speech communications.**

92

1 Q In speech communications, what does it mean,
2 Dr. Begault?
3 **A Proximate --**
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: Well, proximate to me means that
6 communication -- wait, can you restate your question? I
7 want to make sure I answer it exactly.
8 BY MR. HENRY:
9 Q Sure.
10 I asked you, do you believe proximate is a
11 subjective term. And you answered not when applied to
12 speech communications. Do you recall that?
13 **A Yes.**
14 Q Okay. All right. Then I asked you, in speech
15 communication, what does it mean.
16 **A Proximate means at a distance at which speech**
17 **intelligibility between two talkers can be maintained**
18 **without necessitating the use of shouting or a megaphone**
19 **or something of that sort. In other words, it has to do**
20 **with the normal distances or the distance range, I should**
21 **say, at which face-to-face communications occur.**
22 Q What criteria do you apply to determine whether
23 someone is speaking normally versus shouting?
24 **A I use the criteria of -- well, two kinds of**
25 **criteria. One would be vocal effort. And then that vocal**

93

1 **effort could be objectively measured using a sound**
2 **pressure level meter and so that we could measure vocal**
3 **effort in terms of average speech levels and know when**
4 **someone is communicating in a voice level that's**
5 **intelligible.**
6 Q And what vocal effort levels or sound pressure
7 levels do you identify as where speech changes from normal
8 speech to shouting?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: Normal --
11 I apologize.
12 Normal speech levels are roughly about
13 58 decibels A-weighted at a distance of about a meter. It
14 drops to maybe 52 decibels at 2 meters. At such levels,
15 those are the levels that we typically communicate with
16 one another at. One might raise one's voice a little bit
17 as the distance increases. By the time we get to a
18 shouted level, I believe we're getting into the high 60s
19 in terms of decibel levels. I'd have to check some
20 references on that. But that's my recollection or higher.
21 BY MR. HENRY:
22 Q What do you call the level of speech that would
23 be below normal speech level on your -- with these
24 standards you just mentioned?
25 **A Oh, maybe 52, 53. You're starting to get into a**

94

1 **quiet voice there.**
2 Q And then below that, you get to a whisper or what
3 would you call it at an even lower decibel level?
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: At a fixed distance, it becomes a lower
6 decibel level. I don't get your question.
7 BY MR. HENRY:
8 Q Oh, my question was, we sort of went shouting,
9 normal, quiet level. Is there something below quiet level
10 in your view?
11 MR. ELLIOTT: Objection to form.
12 THE WITNESS: I guess there's gradations within each
13 of these categories I'm giving you. There's a lot of
14 literature where people were asked to speak or shout at
15 different levels, and then that's used as the scientific
16 basis for evaluating speech communication.
17 BY MR. HENRY:
18 Q So I'm asking, so is there a gradation below what
19 you refer to as quiet level?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: No. I mean, I don't know of anything
22 that's in the literature that goes below quiet speech. As
23 we get quieter and quieter, you know, if one is -- well,
24 it's difficult to produce articulate speech very quietly.
25 And then, yes, you are getting into inarticulate speech

95

1 perhaps. I don't know. It's -- I don't know of levels
2 that are measured for that in the literature.
3 BY MR. HENRY:
4 Q Do you know what asserted patent uses the term
5 away from and proximate to?
6 **A I don't recall which patent uses that phrase.**
7 Q Do you know if any of the asserted patents
8 discuss decibel levels at which one might characterize
9 voices as normal or shouting or quiet?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: I don't know of any patents. Although,
12 I haven't reviewed them all carefully, but I don't recall
13 seeing anything where a specific decibel level was
14 mentioned.
15 BY MR. HENRY:
16 Q Do you recall having seen anything in any of the
17 asserted patents where they actually talk about a normal
18 conversational level?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: I know from the patents that there is a
21 discussion of speech communications, and I believe there
22 is reference to distances that seem equivalent to
23 proximate talkers.
24 BY MR. HENRY:
25 Q What distances are those, Dr. Begault?

96

1 **A In the range of 1 to 3 meters, I believe.**
2 **Somewhere in there.**
3 Q Is that how you define proximate, 1 to 3 meters?
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: I haven't thought about how to define it
6 exactly, but what I think about it, if a normal voice as
7 58 decibels at a meter and goes down to about 52 decibels
8 at 2 meters, and that's at a normal conversation. And
9 that's typically what's used -- well, I'm sorry, that's
10 typically what's measured, right, in normal speech
11 communications, then those would be the levels, if you
12 will, that would be equivalent to a proximate talker in
13 the real world -- or in reality, right?
14 BY MR. HENRY:
15 Q Do you know if the asserted patents discuss those
16 levels at all that you just mentioned?
17 **A I don't know one way or the other at this point.**
18 **I know that they discuss speech communication in a range**
19 **of 1 to 3 meters. I think there's also discussion of**
20 **people farther away, like for instance, in another room or**
21 **something of that sort. I don't recall exactly. But**
22 **there is a -- there are what appears to be proximate**
23 **conditions for another talker based on my definition here,**
24 **having to do with normal speech levels.**
25 **And then there are distant sounds beyond a**

97

1 **proximate distance.**
2 **BY MR. HENRY:**
3 Q What's your definition for proximate distance?
4 **A My definition for proximate distance would be**
5 **normal speech levels, the levels at which those -- normal**
6 **speech level would be intelligible.**
7 Q I'm sorry. I think you said my definition for
8 proximate distance would be normal speech levels, the
9 levels at which those normal speech level would be
10 intelligible. I'm not --
11 **A Right, as a function of distance --**
12 Q So --
13 **A So speech changes its level as a function of**
14 **distance to the receiver, between a source and a receiver.**
15 **And I would say that you are still proximate to the degree**
16 **that a normal talker -- I'm sorry, a talker speaking in a**
17 **normal level of voice or a virtual talker speaking at a**
18 **normal level of voice would be intelligible, that**
19 **equivalent distance. And that equivalent distance is**
20 **roughly between 1 and 3 meters, if I recall.**
21 Q Do you know if any of the asserted patents
22 discuss or mention intelligibility as a demarcation of
23 when something is proximate?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: I don't recall the word demarcation

98

1 appearing in any of the patents.
2 BY MR. HENRY:
3 Q Do you recall the asserted patents in any other
4 way referring to intelligibility as a way to judge whether
5 a sound is proximate to a listener?
6 MR. ELLIOTT: Objection to form.
7 THE WITNESS: I would have to review the patents to
8 give you an accurate answer to that.
9 BY MR. HENRY:
10 Q So without doing that and sitting here right now,
11 you can't remember any of the asserted patents discussing
12 intelligibility as a way to determine whether something is
13 proximate to something else?
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: I don't recall exactly where I believe I
16 saw something along those lines, having to do with
17 intelligible speech. And maybe the word intelligible
18 wasn't used, but it did use the word speech communication
19 which would infer somebody talking at a proximate distance
20 equivalent to a level for a normal speaker, which is in
21 that range of 1 to 3 meters. So that's what I recall.
22 BY MR. HENRY:
23 Q Do you remember any of the asserted patents even
24 mentioning intelligibility?
25 MR. ELLIOTT: Objection to form.

99

1 THE WITNESS: I don't remember the specific word
2 intelligibility.
3 BY MR. HENRY:
4 Q Now, Dr. Begault, is the water cup next to you
5 away from you?
6 MR. ELLIOTT: Objection to form.
7 THE WITNESS: Yes. It is not inside of me.
8 BY MR. HENRY:
9 Q Is the house next to your house away from you?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: Yes, it is not inside of me.
12 BY MR. HENRY:
13 Q Is that your definition of when something is away
14 from you, that it's not inside of you?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: I think 20 minutes ago to half an hour
17 ago, I gave you a definition -- or not a definition. I
18 said a statement that all things are essentially outside
19 of me except for physical sounds that occur from within
20 inside my body or certain audio sounds that I might hear
21 inside of my head.
22 BY MR. HENRY:
23 Q And when we were having that discussion earlier,
24 we were talking about sounds being a distance from you,
25 and now I was asking you about things that are away from

100

1 you. Do you distinguish between those at all?
2 MR. ELLIOTT: Objection to form.
3 THE WITNESS: I guess it depends on what we're talking
4 about and the context away and distant. And I don't know.
5 It could mean different things in different contexts.
6 You'll have to be more specific.
7 BY MR. HENRY:
8 Q Sure.
9 Is the house next to your house away from you?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: Well, in discussing houses, I think we
12 decided that that was a -- we didn't decide. I should say
13 I stated that the judgment of a house being away from me
14 might be subjective in terms of distance. Right?
15 So it's clearly away from me because it's not
16 inside my body. So it is away from me at some distance.
17 BY MR. HENRY:
18 Q When is a sound away from you?
19 **A When it is externalized.**
20 Q If there's a distance of five feet between you
21 and a sound, is that sound away from you?
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: A sound that is 5 feet away from me, is
24 that away from me? Is that what you said? So your
25 question -- you answered your own question, right? Is the

101

1 sound away from me away from me.
2 BY MR. HENRY:
3 Q I can repeat the question.
4 **A Or phrase it differently.**
5 Q I'll ask it again.
6 If there's a distance of 5 feet between you and a
7 sound, is that sound away from you?
8 **A Oh, I apologize. I didn't hear --**
9 MR. ELLIOTT: Objection to form.
10 BY MR. HENRY:
11 Q I don't mind repeating questions, Dr. Begault.
12 Go ahead.
13 **A Well, and I apologize for mishearing. Yes, that**
14 **sound is away from me.**
15 Q If there is a distance of 5 feet between you and
16 a sound, is that sound proximate to you?
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: It depends on what kind of sound we're
19 talking about. If we're talking about, you know, dropping
20 a pin on a desk, then that might be not very proximate to
21 me. Because I was trying to hear the sound of the pin
22 dropping on the desk.
23 If it's a talker, of somebody speaking at a
24 normal tone of voice, 5 feet might be proximate.
25

102

1 BY MR. HENRY:
2 Q Why do you draw the distinction between the pin
3 and the talker?
4 **A Because speech intelligibility is a well-studied**
5 **subject where -- and speech communication as well between**
6 **people, where distance for normal speech communication is**
7 **well-understood. I draw the distinction because of the**
8 **pin dropping, it's a very, very tiny sound. And to hear**
9 **that sound, let's assume that it's 20 decibels or**
10 **something like that, peak, you'd have to be very close to**
11 **that sound to be able to hear it.**
12 **So it might be, quote/unquote, unintelligible at**
13 **that 5-foot range.**
14 Q And your view that the speaker sound at 5 feet
15 would be proximate to you, is that also dependent on the
16 intelligibility of that sound?
17 **A The 5-foot distance corresponds to intelligible**
18 **speech or intelligible talker, to a normal hearing**
19 **listener speaking at a normal tone of voice.**
20 Q So would the quiet tone of voice we discussed
21 earlier at that same distance be proximate to you?
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: It could be.
24 BY MR. HENRY:
25 Q It's not necessarily?

103

1 **A Depends how quiet we're talking about -- sorry.**
2 **I can understand most talkers at 5 feet distance.**
3 Q At a certain decibel level a talker at 5 feet, in
4 your view, would cease to be proximate to you?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: Hard to imagine unless the person were
7 doing something unusual to make their speech incredibly
8 quiet, like maybe put their hand over their mouth or
9 something of that sort.
10 BY MR. HENRY:
11 Q But that would do it in your view, right?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: That's a hypothetical. I'd have to
14 really think about that. I'm not even sure. I mean, I'd
15 probably -- you still would hear something at that
16 distance. But clearly the levels that we can hear at 5
17 feet from a vocal apparatus from a human are pretty wide,
18 right? We can hear a fair amount of speech at that level.
19 It's as that distance increases, that the speech
20 will become less intelligible.
21 BY MR. HENRY:
22 Q Would a speaker who shouted at 5 feet away from
23 you be proximate to you?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: Yes. They would be proximate.

104

1 BY MR. HENRY:
2 Q If there were a distance of 10 feet between you
3 and a sound, would that sound be away from you?
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: What kind of sound are we talking about?
6 BY MR. HENRY:
7 Q Does it matter?
8 MR. ELLIOTT: Objection to form.
9 THE WITNESS: Yes.
10 BY MR. HENRY:
11 Q Why?
12 **A If you are 10 feet away -- was that the distance**
13 **you would use, 10 feet? Can you say yes or no?**
14 Q I can say it. It was 10 feet.
15 But let me ask you this question again,
16 Dr. Begault.
17 **A Okay. I just want to answer you accurately.**
18 Q If there were a distance of 10 feet between you
19 and a sound, would that sound be away from you?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: I restricted my answers to talking about
22 speech. If it were a trombone blasting away at, you know,
23 triple forte, then 10 feet might seem too close. Right?
24 Because the trombone sound would be very intelligible not
25 only at 10 feet but maybe even 20 feet or 30 feet.

105

1 Whereas speech at 10 feet or maybe a quiet
2 talker, you might start to lose certain consonants due to
3 the reduction in level. So it depends really on the type
4 of sound.
5 BY MR. HENRY:
6 Q So are you using intelligibility as a measurement
7 or criteria for a sound being away from you in addition to
8 using it as criteria for determining when sound is
9 proximate to you?
10 MR. ELLIOTT: Objection; form.
11 THE WITNESS: No. You've mixed up the criteria.
12 BY MR. HENRY:
13 Q My question was about whether the sound would be
14 away from you if there was a distance of 10 feet between
15 you and a sound. Would it be?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: Again, anything that is not inside of my
18 body or inside of my head is technically away from me.
19 BY MR. HENRY:
20 Q And so if there was a sound that was at a
21 distance from you of 20 feet, would that sound be away
22 from you?
23 MR. ELLIOTT: Objection to form.
24 THE WITNESS: Yes. Yes. Anything, again, that is not
25 inside my body or inside of my head is technically at a

106

1 distance or away from me.
2 BY MR. HENRY:
3 Q And if there were a distance between you and a
4 sound of 30 feet, would that sound be away from you?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: Yes.
7 BY MR. HENRY:
8 Q Now, if there were a distance of 10 feet between
9 you and a sound, would that sound be proximate to you?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: It depends on the type of sound. We
12 went through that exercise discussing the pin drop versus
13 speech.
14 BY MR. HENRY:
15 Q If there were a speech sound, at a distance of 10
16 feet from you, would that speech sound be proximate to
17 you?
18 MR. ELLIOTT: Objection to form.
19 THE WITNESS: That might be around -- yeah, we're
20 getting close to the limit, but yeah, I would still
21 consider a speech sound at 10 feet, that would probably be
22 proximate, or we're within the range of 3 meters.
23 BY MR. HENRY:
24 Q If there were a speech sound at a distance of
25 15 feet from you, would that speech sound be proximate to

107

1 you?
2 MR. ELLIOTT: Objection to form.
3 THE WITNESS: I think we are getting past 3 -- the
4 3-meter approximation I was making. It could be. It
5 might not be. I think we're getting towards the edge of
6 that. I think the example I used in my declaration was
7 something around 20 feet being the edge. I said a long
8 distance of 20 feet or more.
9 BY MR. HENRY:
10 Q So we were just talking about speech sound at
11 15 feet, and you said it might be proximate or it might
12 not be proximate. When would it be and when would it not
13 be?
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: Well -- so I would say you're getting at
16 the edge of proximate, and it kind of depends on the
17 context. You can be 15 feet away from somebody in a
18 conference room, for instance, and having intelligible
19 speech communication because the background sound is low.
20 So that might qualify as proximate to -- or at the edge of
21 it because a person could speak in a normal tone of voice.
22 And for most talkers, would be intelligible at 15 feet
23 because we would have the absence of other sounds in the
24 background.
25 But in most everyday conversation, people use

108

1 visual cues as well as audio cues to understand speech.
2 We're all doing some form of lip reading, and so when you
3 get out to about 15 feet or so, it's harder to see the
4 details in people's faces as they talk. So there's a
5 diminution of, intelligibility I would think, at that
6 range.
7 BY MR. HENRY:
8 Q So --
9 **A So it's a gray area, I would say, to follow up on**
10 **this. But I've been using an example. I gave a far**
11 **distance of 20 feet in my declaration.**
12 Q So if there were a distance of 20 feet between
13 you and a speech sound, would that sound be proximate to
14 you?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: I think that's where I would draw the
17 line. I would say at 20 feet, you are no longer proximate
18 to somebody, from a speech communication standpoint. I'd
19 have to look -- yeah.
20 BY MR. HENRY:
21 Q Okay. Were you finished?
22 **A Yeah, I'm finished.**
23 Q Okay. And, Dr. Begault, you draw that line
24 because that's the line at which intelligibility drops
25 below the level of normal speech in your view?

109

1 **A Under certain background sound conditions.**
2 Q So you draw that line because that's the line at
3 which intelligibility drops below the level of normal
4 speech under certain background conditions; is that fair?
5 MR. ELLIOTT: Objection; form.
6 THE WITNESS: I use 20 feet because that's about the
7 distance at which normal speech you might start getting a
8 reduction in intelligibility under specific background
9 conditions -- background noise conditions, I should say.
10 BY MR. HENRY:
11 Q What background noise conditions are those?
12 **A I'm not sure. There are --**
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: I'm not sure exactly which ones, but I
15 think those correspond to normal background levels in
16 rooms. So it wouldn't apply to let's say, a noisy day
17 outdoors with lots of wind in the trees, the wind at
18 30 miles an hour, and so the background noise increases.
19 Or let's say you're near a freeway, busy freeway,
20 then that proximate point would need to be closer because
21 speech intelligibility would be degraded. You'd need to
22 be closer to somebody with a large -- with a high
23 background noise level.
24 BY MR. HENRY:
25 Q So if you were out in your backyard under windy

110

1 conditions, then, a speech sound at 20 feet from you might
2 not be proximate to you, because of those conditions; is
3 that fair?
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: Speech intelligibility might be degraded
6 at that level of background noise.
7 BY MR. HENRY:
8 Q And then in your view, that would affect whether
9 the speech sound is proximate to you or not proximate to
10 you?
11 MR. ELLIOTT: Objection to form.
12 THE WITNESS: Well, this is a highly specialized
13 situation you're describing where we're kind of out at the
14 limits here. Again, I said there's a kind of a gray area.
15 But in normal speech communications, let's say if you and
16 I were speaking to one another over a conference table, we
17 would probably be at a different -- at a distance, I'm
18 sorry, of 2 to 3 meters approximately so that we wouldn't
19 need to raise our voices to be heard and that we could
20 make eye contact and also use visual cues, lip reading and
21 other things to augment speech intelligibility.
22 BY MR. HENRY:
23 Q And those factors that you just mentioned are
24 factors that in your view go into determining when a
25 speech sound is proximate to a listener or not proximate

111

1 to a listener?
2 MR. ELLIOTT: Objection to form.
3 THE WITNESS: Generally speaking, yes.
4 BY MR. HENRY:
5 Q Dr. Begault, what is a spatial acoustic image?
6 **A Well, that's a phrase that I don't think I use**
7 **typically. So I could speculate as what is meant by that.**
8 **Did a specific person make that phrase? Or did I? Or**
9 **somebody else? I can give you my best guess as to what it**
10 **means.**
11 Q Sure, you did use it.
12 I won't hide the ball from you, Dr. Begault. I
13 asked because you used it in paragraph 11 of your
14 declaration. If you want to go ahead and --
15 **A Sure.**
16 Q -- look at paragraph 11 of Begault Exhibit 1.
17 **A Sure, sure, I did use it. Okay. Well a spatial**
18 **acoustic image means the virtual position of a sound**
19 **object.**
20 Q And what's a sound object?
21 **A That would be the virtual representation of a**
22 **talker.**
23 Q Acoustically or visually?
24 **A I'm talking acoustically.**
25 Q So that's not -- you're not actually talking

112

1 about -- when you say spatial acoustic image, you're
2 actually talking about an audio source, not necessarily a
3 visual image, right?
4 **A Correct. Acoustic modifies image.**
5 Q Okay. In your experience are acoustic images and
6 visual images often tied together in virtual reality
7 settings?
8 **A Not always.**
9 Q Under what circumstances would they not be?
10 **A Well, the acoustic image can have a different**
11 **position from the talker. So you could see something**
12 **visually, and the sound can come from somewhere else.**
13 **I've done experiments like that.**
14 Q To test what?
15 **A I'm sorry, to test what?**
16 Q Mm-hmm.
17 **A Oh. So there was a device that I developed once,**
18 **so that you would hear your voice -- well, basically, I**
19 **would shift the sound of your voice from inside your head,**
20 **to outside your head because I would put microphones in my**
21 **ears. And so you would wear a pair of headphones and hear**
22 **my microphone, and so my voice becomes internalized in**
23 your head. And then you hear your (indecipherable
24 utterance) voice outside of your head. We humorously
25 refer to this as to --

113

1 THE STENOGRAPHIC REPORTER: I'm sorry. Doctor, you
2 cut off for me. Hello?
3 THE WITNESS: The court reporter is having a problem.
4 MR. HENRY: Yeah, why don't we go off the record and
5 fix that.
6 THE WITNESS: Yes, then I'll continue my example.
7 THE VIDEOGRAPHER: The time is 12:14. We're going off
8 the record.
9 (Recess taken.)
10 THE VIDEOGRAPHER: The time is 12:46. We are back on
11 the record.
12 BY MR. HENRY:
13 Q All right, Dr. Begault. Before we took a break,
14 you were describing an example experiment you did. If
15 you'd like to continue, I'd like to give you the
16 opportunity to finish your explanation of that experiment.
17 **A If you'd like, I was basically giving you an**
18 **example where -- maybe you could restate your question.**
19 **You were asking for an example of something. And so... if**
20 **you could just restate that, yeah.**
21 Q No worries. We can come at it a different way
22 too. I'm just wondering if -- can we agree that most
23 sounds in virtual reality are (indecipherable utterance)
24 connected to visual events?
25 MR. ELLIOTT: Objection to form.

114

1 MR. HENRY: Sorry. Somebody's got an open mic, and
2 we're getting echoes.
3 THE STENOGRAPHIC REPORTER: Mr. Henry, can you repeat
4 your question, and then I'll mute myself.
5 MR. HENRY: Sure.
6 BY MR. HENRY:
7 Q Dr. Begault would you agree that most sounds in
8 virtual reality applications are connected to visual
9 events?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: And now Kyle has an echo, but I think I
12 can understand his objection sufficiently. It's like you
13 might have a speaker on and -- I don't know. Something's
14 feedbacking.
15 In any event, let's get to your question. No,
16 there are -- there's not necessarily a connection between
17 sounds and visual objects in virtual reality, if I stated
18 your question correctly. There's not necessarily a
19 connection for most. I don't know how I would quantify
20 most versus -- and times, but I can imagine many
21 situations where there are many sounds involved in virtual
22 reality that are not connected to a specific visual
23 object.
24 BY MR. HENRY:
25 Q Would you agree that most sounds in virtual

115

1 reality applications are somehow connected to visual
2 events?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: No, not necessarily.
5 BY MR. HENRY:
6 Q What is monaural sound, Dr. Begault?
7 **A Monaural is usually a term used in audio**
8 **reproduction to refer to a single channel of recorded**
9 **audio information.**
10 Q What is stereo sound?
11 **A Same answer, but two channels of information.**
12 Q Do you draw any distinction between monaural
13 sound and binaural sound?
14 **A Between monaural and binaural?**
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: Yes, I do draw a distinction.
17 BY MR. HENRY:
18 Q What distinction do you draw between monaural
19 sound and binaural sound?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: Again, I'm focusing my answers here on
22 the way that something is recorded, not necessarily
23 reproduction method. But usually monaural sound involves
24 one channel of recorded sound, and usually binaural
25 sound -- no, binaural sound always involves two channels

116

1 of sound recorded typically either through the ears of a
2 dummy head or using some sort of 3D audio technique.
3 BY MR. HENRY:
4 Q Do you draw any distinction between stereo sound
5 and binaural sound?
6 **A Yes, I do.**
7 MR. ELLIOTT: Objection to form.
8 THE WITNESS: Yes, I do.
9 BY MR. HENRY:
10 Q What distinction do you draw between stereo sound
11 and binaural sound?
12 **A Stereo sound can include recording techniques**
13 **that is two microphones, for instance, arranged in**
14 **coincident pairs or two microphones spread apart without**
15 **any reference to the anatomy of the head or the outer ear.**
16 **Binaural sound usually includes some anatomical feature of**
17 **the human head.**
18 Q I'd like to talk a little bit about head
19 related -- a little bit more about head-related transfer
20 functions, Dr. Begault. Okay?
21 **A Yes.**
22 Q And if you look at your declaration, which is
23 Exhibit 1, in paragraph 13.
24 **A Yes.**
25 Q Okay. And you have a subparagraph there of 1 --

117

1 well you have three subparagraphs, 1, 2 and 3. Do you see
2 that?
3 **A I do.**
4 Q Okay. In the first subparagraph of paragraph 13
5 in your declaration, you wrote, Many factors other than
6 HRTFs are responsible for how sound reaches the ears of a
7 listener, such as room acoustics, head movement, intensity
8 of the sound source, et cetera.
9 Do you see that?
10 **A I do.**
11 Q So can we agree that in processing sound with
12 HRTFs to generate binaural sound, there are many factors
13 other than HRTFs that must be considered?
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: Repeat the question?
16 BY MR. HENRY:
17 Q Sure.
18 Can we agree that in processing sound with HRTFs
19 to generate binaural sound, there are many factors other
20 than HRTFs that must be considered?
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: It's very vague the way you put that. I
23 mean, one could imagine a situation where we didn't
24 consider anything else but HRTFs.
25

118

1 BY MR. HENRY:
2 Q Typically --
3 **A Like it's -- but you might consider other**
4 **factors.**
5 Q I thought you were done.
6 **A Sorry.**
7 Q Sure. Typically in your work in (indecipherable
8 utterance) audio, do you consider more than just HRTFs
9 when you're working the process --
10 THE STENOGRAPHIC REPORTER: I'm sorry. Mr. Henry,
11 there was talking over one another, and I have to take
12 some seconds to unmute myself for the audio. So I didn't
13 hear. Can you restart your question?
14 MR. HENRY: That's fine, totally fine.
15 BY MR. HENRY:
16 Q Let's start again.
17 Typically in your work, Dr. Begault, in the
18 industry when you're working to render spatialized audio,
19 do you consider more than just HRTFs?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: From the processing standpoint, it
22 depends.
23 BY MR. HENRY:
24 Q Okay. When -- in paragraph 13 when you refer to
25 room acoustics, what did you mean?

119

1 **A Well, in this paragraph, what I'm addressing is**
2 **defendant's claim construction. And defendant's claim**
3 **construction added this phrase about how sound reaches the**
4 **listener. And I was making a counterargument to that,**
5 **that a head-related transfer function is not defined as**
6 **how sound reaches a listener because many things can**
7 **affect a sound as it reaches the listener, for example,**
8 **the things I have mentioned here.**
9 **But that's not a definition of a head-related**
10 **transfer function.**
11 Q Okay. What I'm asking you, Dr. Begault, is how
12 do room acoustics then affect how sound reaches the
13 listener?
14 **A There can be the addition of reverberation.**
15 Q What else?
16 **A There could be attenuation.**
17 Q What else?
18 **A Those are two things I think of. And I don't**
19 **know if that's what was meant in defendant's claim**
20 **construction or not. I'm just giving you some examples of**
21 **two ways of the way sound can be affected by how it**
22 **reaches a listener.**
23 Q Sure, and, Dr. Begault, I'm asking about this
24 because you wrote room acoustics, that's not in
25 defendant's construction. So I want to know what you

120

1 meant by that term.
2 **A Well, okay. So I meant reverberation, and in**
3 **primarily, but I could have been more specific and said**
4 **things such as defraction, absorption, things of that**
5 **sort, reflection. I could have gone into greater detail**
6 **on the characteristics of room acoustics if you will.**
7 Q Okay. And all those factors that you just
8 mentioned affect how sound reaches a listener's ear?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: It -- it can.
11 BY MR. HENRY:
12 Q Okay. How does head movement affect how sound
13 reaches a listener's ears?
14 **A Head movement can change the orientation of a**
15 **sound source to a listener.**
16 Q And how would that affect how the sound actually
17 reaches the ears of a listener?
18 **A It would change the spectrum and time of arrival**
19 **of the sound to the two ears.**
20 Q What's attenuation?
21 **A It's a fancy way of saying a reduction in sound**
22 **pressure level.**
23 Q You use the term gain. What does that mean?
24 **A That's a simplified way of saying an increase in**
25 **sound pressure level.**

121

1 Q Is it different than intensity, sound pressure
2 level?
3 **A From a lay standpoint, people would**
4 **interchangeably use the word intensity, and sometimes I've**
5 **even used the word intensity to mean volume or sound**
6 **pressure level. But there's a technical term. There's a**
7 **technical definition of intensity that has to do with**
8 **particle velocity of a sound, which I'm not really**
9 **considering. So if I used the word intensity, I probably**
10 **should have just used sound pressure level or gain.**
11 Q But when you are speaking in those terms, you're
12 talking about the volume of sound. Is that fair?
13 **A In a lay way, you could say volume as far as when**
14 **we adjust what's called a volume knob on our receiver or**
15 **car radio.**
16 Q What's an ILD?
17 **A Interaural level difference.**
18 **BY MR. HENRY:**
19 Q And for the court reporter, that's inter
20 a-u-r-a-l, right?
21 **A Yes.**
22 Q And what is an ILD?
23 **A An interaural, a-u-r-a-l, level difference.**
24 Q Right. What does it mean?
25 **A Oh, the difference in level at the two ears.**

122

1 Q What's an ITD?
2 **A Interaural time difference.**
3 Q And what does that mean?
4 **A Simply the difference in time of arrival of a**
5 **signal in two ears.**
6 Q Any environmental factors affect how sound
7 reaches the ears of a listener?
8 **A Room acoustics.**
9 Q Any other types of environmental factors besides
10 room acoustics?
11 **A Sure, I guess you could say background noise**
12 **might influence the way a sound reaches a listener. Under**
13 **certain conditions maybe even temperature could affect how**
14 **sound reaches a listener.**
15 Q What about familiarity with a sound. Does that
16 have an effect on how sound is perceived by a listener?
17 **A Well, that's different than how it reaches the**
18 **listener. Now you're talking about perception. So, yeah,**
19 **you can -- familiarity will affect the way somebody**
20 **perceives a sound.**
21 Q And what about associated visual cues? How does
22 that affect how listeners might perceive sound?
23 **A I gave you an example --**
24 MR. ELLIOTT: Objection; form.
25 THE WITNESS: I gave you an example earlier how speech

123

1 intelligibility is enhanced by lip reading.
2 BY MR. HENRY:
3 Q What's the ventriloquism effect, have you heard
4 of that?
5 **A Oh, yes.**
6 Q What is it?
7 **A The ventriloquism effect is where sound emanates**
8 **from one location, and it's perceived to be at another**
9 **location.**
10 Q Is it like a ventriloquist dummy, where the
11 ventriloquist is behind the dummy?
12 **A I wouldn't know specifically, but I think they**
13 **are referred to as ventriloquists, where the idea is to**
14 **throw one's voice. I think in the back of comic books**
15 **from the 1950s or something, there used to be ads for**
16 **throw your voice. But really what it is is it's a**
17 **decoupling of visual stimuli from audio stimuli. And**
18 **sometimes you can shift the audio stimulus to correspond**
19 **with the visual stimulus.**
20 Q And you said you would shift it to correspond
21 with the visual stimulus, but I think you mentioned sort
22 of injecting some incongruity there. Am I not following
23 correctly?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: I didn't use the word incongruity.

124

1 BY MR. HENRY:
2 Q No, I know. But you mentioned you could put them
3 in different locations.
4 **A One might be able to. I mean, I did speak**
5 **earlier that not in all cases, is there a corresponding**
6 **visual and auditory cue that are collocated. One can**
7 **manipulate those things independently.**
8 Q Okay. And you talked just a moment ago talked
9 about decoupling visual and audio stimuli, right?
10 **A Yes.**
11 Q And is that what the ventriloquism effect refers
12 to?
13 **A I don't know exactly how it's used in all cases,**
14 **but when I've referred to it in the past, I've referred to**
15 **the decoupling of an auditory stimulus to a visual**
16 **stimulus. So, for instance, you could be watching a music**
17 **video, for instance, and the loud speaker might be several**
18 **feet away from the performers on the screen or on your**
19 **home television, for instance. But one tends to localize**
20 **the sound to correspond to the visual image.**
21 Q How long has the ventriloquism effect been
22 studied in the industry?
23 MR. ELLIOTT: Objection to form.
24 THE WITNESS: In which industry? I wouldn't know the
25 answer to that question.

125

1 BY MR. HENRY:
2 Q When did you first learn of the ventriloquism
3 effect?
4 **A Oh, I don't recall. I know I mentioned it in my**
5 **book in 1994 which I probably wrote in 1992.**
6 Q Why would you decouple audio and visual stimuli?
7 **A I don't know of a specific reason, other than you**
8 **may want to increase speech intelligibility or sound**
9 **quality, or sometimes they call it the user experience.**
10 **You might want to enhance that somehow by having a**
11 **different location for the audio stimuli or the visual**
12 **stimuli. So, for instance, in film sound, oftentimes**
13 **sounds are generated from locations other than the visual**
14 **stimuli because obviously you can't have the two**
15 **corresponding to one another, unless you had a loud**
16 **speaker following the person behind the screen.**
17 **And so often those are decoupled for the purpose**
18 **of increasing either speech intelligibility or for an**
19 **emotional effect or for some other enhancement of the user**
20 **experience.**
21 Q You mentioned HRTFs being recorded for the use of
22 dummy heads earlier. Do you remember that?
23 MR. ELLIOTT: Objection to form.
24 THE WITNESS: Not specifically, but I don't think we
25 talked about HRTF measurement.

126

1 BY MR. HENRY:
2 Q Do you remember -- either way, do you know that
3 HRTFs are measured with dummy heads?
4 **A They can be. I've done it myself.**
5 Q Okay. Are you familiar with KEMAR, K-E-M-A-R?
6 **A Yes.**
7 Q What is KEMAR?
8 **A It is a dummy head that was originally developed**
9 **by Knowles, K-n-o-w-l-e-s Electronics. And I believe now**
10 **is distributed by GRAS, g-r-a-a-s, Acoustics.**
11 Q Was the KEMAR dummy used to develop a database of
12 HRTFs?
13 **A Yes. It's been used many times to develop HRTFs**
14 **databases. It has interchangeable ears. So there's many**
15 **varieties of KEMAR HRTFs, and the KEMAR itself has gone**
16 **through several phases of modification.**
17 Q And how are the measurements taken around a KEMAR
18 dummy to collect HRTFs?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: Well, I'll tell you a typical way that
21 it's done, is that an anechoic chamber is used, and the
22 dummy head is located centrally. And then a sound source
23 is located 1 to 2 meters away from that dummy head,
24 sometimes farther away depending on the side of the
25 anechoic chamber.

127

1 And then an analytic impulse is sounded from the
2 loud speaker and then a measurement is made at the ears of
3 the dummy head, et cetera, for different locations of
4 where the sounds are.
5 BY MR. HENRY:
6 Q And you mentioned the HRTFs being collected
7 through use of a sound source located at 1 to 2 meters or
8 sometimes farther away. Is there any particular distance
9 that's typically used or usually used?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: Yes. Ideally, you want to get out to at
12 least a wavelength of interest from the dummy head when
13 you make these measurements.
14 BY MR. HENRY:
15 Q And what distance would correspond to a
16 wavelength of interest?
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: Depends on your --
19 Sorry.
20 Depends on your application, but in most
21 applications, you would want to be out to something -- if
22 we're talking about speech, you might want to be -- let's
23 see, just doing a calculation in my head.
24 So I think if you get out to about two and a half
25 feet from the dummy head, you're capturing most

128

1 frequencies of speech.
2 BY MR. HENRY:
3 Q Do you know if measurements have been made with a
4 KEMAR dummy at a distance of 1.4 meters to create a
5 database?
6 MR. ELLIOTT: Objection to form.
7 THE WITNESS: It would -- sure. I believe that maybe
8 that has occurred. I don't recall the exact measurement
9 distances. People are frequently constrained by the size
10 of their anechoic room when they do these kinds of
11 measurements.
12 BY MR. HENRY:
13 Q But you could measure HRTFs at different
14 distances; is that fair?
15 **A Well, you can measure all kinds of crazy things,**
16 **but you definitely want to be able to have a planer wave**
17 **form for the distance that you're measuring so that you're**
18 **avoiding the effects of what we would call a near field**
19 **measurement where you're closer than a wavelength of**
20 **interest, and therefore, some different things occur that**
21 **aren't translatable over to the use of the HRTF in most**
22 **applications.**
23 Q Do you dispute that HRTFs could be collected with
24 a KEMAR dummy head at a spherical -- with a -- strike
25 that.

129

1 Do you dispute that you could collect HRTFs with
2 a KEMAR dummy head at a radial distance of 1 meter around
3 that dummy head?
4 **A You can collect the measurements at any distance**
5 **you want.**
6 Q Are you familiar with the CIPIC database?
7 **A Yes, I am.**
8 Q And that's C-I-P-I-C, CIPIC, right?
9 **A I believe that's the correct acronym, yeah.**
10 Q Do you know what it stands for?
11 **A I used to know. I'm sorry, I don't remember.**
12 Q Center for Image Processing and Integrative
13 Computing. Does that ring a bell?
14 **A Yeah, is that the UC Davis database?**
15 Q It is.
16 **A Yes, so those were collected fairly near field.**
17 Q Do you know the distance at which those HRTFs
18 were measured?
19 **A I don't recall.**
20 Q Would you be surprised to learn that they were
21 measured at a radial distance of 1 meter?
22 **A Not at all. Because most of the effects of HRTFs**
23 **that people are concerned with have to do with where the**
24 **acoustical effects of the pinnae are most influential.**
25 Q And where are the acoustical effects of the

130

1 pinnae most influential?
2 **A Six kilohertz and above.**
3 THE STENOGRAPHIC REPORTER: I'm sorry. You said
4 pinna?
5 THE WITNESS: P-i-n-n-a-e.
6 THE STENOGRAPHIC REPORTER: Thank you.
7 THE WITNESS: Did I say that right? P-i-n-n-a-e,
8 that's two, and one is a p-i-n-n-a.
9 THE STENOGRAPHIC REPORTER: Thank you.
10 BY MR. HENRY:
11 Q How does that -- how does that correspond to the
12 distance at which HRTFs were measured?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: I don't understand your question.
15 BY MR. HENRY:
16 Q Sure. I asked you would you be surprised to
17 learn that the CIPIC database collected HRTFs at 1 meter,
18 and you said not at all because most of the effects of
19 HRTFs that people are concerned with have to do with where
20 the acoustical effects of the pinnae are most influential.
21 Do you remember that?
22 **A Yeah, I do.**
23 Q And then I basically asked you where is that, and
24 you said 6 kilohertz and above. Right?
25 **A Yes. That's where the pinnae is most**

131

1 **influential.**
2 Q So my question for you is so then how does that
3 relate to your lack of surprise in the CIPIC database
4 having collected HRTFs at 1 meter?
5 **A Well, because 1 meter is so much longer**
6 **wavelength than 6 kilohertz.**
7 Q Okay. Are you aware of people using near field
8 HRTFs?
9 **A It is a term that has been used or explored. For**
10 **instance, I know that it is used in the patents as a kind**
11 **of category, and I've heard it used with relationship to**
12 **Dolby Atmos, where there isn't a precise definition.**
13 THE STENOGRAPHIC REPORTER: I'm sorry, Doctor. You
14 said Dolby at most?
15 THE WITNESS: A-t-m-o-s. Dolby, like the movie
16 theatre, and then Atmos, A-t-m-o-s.
17 THE STENOGRAPHIC REPORTER: And then you said where
18 there is not a precise definition or where there is a
19 precise definition?
20 THE WITNESS: Where there is not a precise definition.
21 THE STENOGRAPHIC REPORTER: Thank you.
22 THE WITNESS: You're welcome.
23 BY MR. HENRY:
24 Q What would constitute -- sorry. Were you
25 talking? I got some feedback. Strike that.

132

1 What would constitute a near field HRTF in your
2 view?
3 **A Well, my answer to that would depend on the**
4 **frequency of interest.**
5 Q Why?
6 **A Because it has to do with the sound source that's**
7 **being used as either radiating a plane wave or a spherical**
8 **wave.**
9 Q How would that change the meaning that you would
10 have strived to near field HRTF?
11 **A At the point at which the sound source is no**
12 **longer producing a plane wave and becomes spherical, the**
13 **HRTF would modify from being a -- from being constant**
14 **across different farther distances, except for a gain**
15 **term, as I described in my declaration.**
16 **So when you get very close to the device you're**
17 **measuring, and the sound source that you're using is no**
18 **longer producing a plane wave, then there can be certain**
19 **distortions or changes in the... particularly, the low**
20 **frequencies and maybe the time domain of some of the**
21 **measurements.**
22 **But that's one -- that's my definition, and I**
23 **don't know if that's necessarily the definition that's**
24 **used in the patents. I believe the definition in the**
25 **patents is more categorical.**

133

1 Q Is it your opinion that all 3D audio systems use
2 HRTFs that are only measured at one distance?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: I can't answer a question that has the
5 superlative all in it. But I can tell you that most HRTFs
6 are measured at one distance, and then those HRTFs are
7 scaled. There could be exceptions. Maybe somebody was
8 doing some experiments trying to find this effective on
9 low frequencies for very close distances. There could be
10 some experimental data that way.
11 I can tell you from experience that it doesn't
12 make a lot of difference in many applications. I've
13 heard -- well, some of the literature's reported it as
14 being a very weak effect.
15 BY MR. HENRY:
16 Q You said that most HRTFs are measured at one
17 distance. What is that distance?
18 **A Usually, the distance of the wavelength of**
19 **interest and where the sound source is capable of putting**
20 **out a plane wave.**
21 Q Is it 1 meter, is it 1.5 meters, is it 2 meters?
22 What distance?
23 **A Depends --**
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: I didn't hear your objection.

134

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: Oh, form.
3 It depends on the wavelength of interest and
4 depends on the sound source that you're using.
5 THE STENOGRAPHIC REPORTER: Doctor, you said is
6 capable of putting out. Did you say a plane wave?
7 THE WITNESS: Yes. P-l-a-n-e wave.
8 BY MR. HENRY:
9 Q So you're not saying that all systems use HRTFs
10 that were measured at the same distance, and then used for
11 example, just HRTFs measured at 1 meter and then those are
12 used in every single 3D audio system, right?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: Many -- I could think of -- strike that.
15 I know that some 3D audio systems allow you to
16 switch between different HRTF measured sets that have been
17 measured at different distances. I know of HRTFs sets,
18 where only the high frequencies were measured and then the
19 low frequencies were synthesized at a later time or
20 otherwise assumed through an equalization process to have
21 a constant frequency response so that the main interest
22 was to capture the effects of the head shadow and the
23 pinna. But it's not a constant distance that is used in
24 all systems.
25

135

1 BY MR. HENRY:
2 Q That's what I was getting at. It's not a
3 constant distance for HRTFs across all 3D audio systems,
4 fair?
5 **A That's fair.**
6 Q Okay. In your own patents, you've described
7 processing sound with HRTFs, right?
8 **A Correct.**
9 Q Including in patents from before 2014, right?
10 **A That is correct. All of my patents, I believe,**
11 **are from before 2014.**
12 Q And you've also disclosed in your own patents
13 from before 2014 processing sound to move virtual sound
14 images to different locations, right?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: That's correct.
17 MR. ELLIOTT: And relevancy.
18 THE WITNESS: Yes. That's correct. I have described
19 that in at least one of my patents.
20 BY MR. HENRY:
21 Q And you've also described in your own patents
22 from before 2014, generating binaural sound through
23 digital signal processors processing HRTFs, right?
24 MR. ELLIOTT: Objection to form and irrelevant.
25 THE WITNESS: That is correct.

136

1 BY MR. HENRY:
2 Q I'd like to look at your declaration again, which
3 is Begault Exhibit 1. Okay?
4 **A Yes.**
5 Q Okay. And specifically, why don't you look at
6 paragraph 8, please.
7 **A Okay.**
8 Q Okay. The second sentence of paragraph 8 from
9 your declaration reads, These three terms are used
10 interchangeably in the specifications to describe the use
11 of any type of medium to enable communication between two
12 or more locations. Right?
13 **A Yes, that's what it says.**
14 Q Okay. After that sentence, you did not cite to
15 any disclosures from any of the asserted patents, right?
16 **A If you are saying that I didn't point out**
17 **specifically where these interchangeable usages occur, I**
18 **didn't cite them, no.**
19 Q And do you know what specifications you're
20 referring to in that sentence?
21 **A I recall seeing some specifications that were**
22 **like that. But I don't recall which ones.**
23 Q Looking at paragraphs 9 to 11 now, those relate
24 to the term away from and proximate to, right?
25 **A Yes, sir.**

137

1 Q Okay. Looking at paragraph 10, in the last
2 sentence, are you there?
3 **A Yes.**
4 Q Okay. The last sentence of paragraph 10 of your
5 declaration reads, There are a plethora of examples in the
6 specifications where proximate to indicates two people
7 having a conversation in the same room. Do you see that?
8 **A I do.**
9 Q In your view, what qualifies as a plethora?
10 **A Many.**
11 Q How many examples would there have to be to
12 qualify as a plethora?
13 **A I can't put a number on it. I think I saw it at**
14 **least twice, if not more.**
15 Q It's your declaration. Is that the best you can
16 give me for what a plethora means?
17 MR. ELLIOTT: Objection; argumentative.
18 THE WITNESS: At this point that's the best I can give
19 you.
20 BY MR. HENRY:
21 Q Okay. And at the end of the sentence, you did
22 not cite to any of the asserted patents; is that correct?
23 **A If what you're saying is did I give any specific**
24 **references to -- I'm sorry, if I -- if what you're saying**
25 **is did I give any citations to specific examples, I did**

138

1 **not provide that.**
2 Q I'd like to look at paragraph 16, and then we'll
3 circle back to some others. Let me know when you're
4 there.
5 **A Yes.**
6 Q Okay. Paragraph 16 in your declaration is the
7 only paragraph in which you offer any opinion regarding
8 algorithmic support for functions recited in the asserted
9 claims of the asserted patents, right?
10 **A No, that's not true.**
11 Q Okay. In what other paragraph did you identify
12 algorithmic support for the functions that are cited in
13 the asserted claims of the asserted patents?
14 **A In the paragraph above it, I refer to common**
15 **industry programming techniques or software libraries for**
16 **audio processing.**
17 Q And is it your testimony now that those are
18 disclosed in the asserted patents?
19 **A In my declaration I was saying that the citations**
20 **that I give above, such as process sound to generate**
21 **binaural sound, et cetera, are known audio DSP structures**
22 **understood by a POSITA -- or I'm sorry, PHOSITA.**
23 Q All right. And we're going to talk about that.
24 But I'm asking you if you identify or you opined in any
25 other paragraph besides 16, where algorithmic support for

139

1 the functions were cited in the asserted claims of the
2 asserted patents can be found in the asserted patents?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: Same answer from the standpoint that
5 known audio DSP structures within the art is referring to
6 functional recitations in the patent. And so those can be
7 viewed as kind of descriptors, if you will, to functional
8 recitations of algorithmic steps.
9 BY MR. HENRY:
10 Q Are you saying that you analyzed the asserted
11 patents and found known audio DSP structures within the
12 art and common industry programming techniques and
13 software libraries for audio processing in the asserted
14 patents?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: I -- I found references to processes.
17 And these processes, to me as a PHOSITA immediately
18 suggested certain algorithmic techniques that one would
19 use.
20 BY MR. HENRY:
21 Q And I'm asking you if in any of the paragraphs of
22 your declaration other than paragraph 16, did you identify
23 any algorithmic techniques from the asserted patents?
24 MR. ELLIOTT: Objection; form.
25 THE WITNESS: Paragraph 15.

140

1 BY MR. HENRY:
2 Q What is it in paragraph 15 that you believe
3 identifies algorithmic support or functions recited in the
4 asserted claims that appears in the asserted patents?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: Again, it's the recited functions that
7 define the structure, such as providing binaural sound to
8 a PHOSITA, that points me to my toolbox of techniques by
9 which a signal processing and algorithmic kinds of
10 structures would exist.
11 BY MR. HENRY:
12 Q Are you referring to just the recited functions
13 themselves in the claims there?
14 **A I don't know if that's all I'm referring to. I'm**
15 **referring kind of holistically to reading these patents.**
16 Q Well, what I'm asking you, Dr. Begault, is if in
17 your declaration, anywhere, you actually identified
18 algorithmic disclosure for the functions recited in the
19 asserted patents that appears in the asserted patents
20 other than what you state in paragraph 16?
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: Again, I have found the processor terms
23 in paragraph 15, to indicate to me the equivalent of what
24 I discuss in 16. So there we're talking about convolution
25 operations, is what is typically used.

141

1 BY MR. HENRY:
2 Q I'll ask again, Dr. Begault, because that wasn't
3 responsive to my question.
4 In your declaration is there anywhere where you
5 actually identified algorithmic disclosure for the
6 functions recited in the asserted patents that appears in
7 the asserted patents other than what you point to in
8 paragraph 16 of your declaration?
9 MR. ELLIOTT: Objection, argumentative and form,
10 including argumentative.
11 THE WITNESS: I have to give you the same answer, that
12 in paragraph 15 I feel that the processor terms that are
13 given here are indicative of algorithmic structures.
14 BY MR. HENRY:
15 Q What do you mean by they're indicative of
16 algorithmic structures, Dr. Begault?
17 **A As a solid example, process sound to -- process**
18 **sound to generate binaural sound is indicative to me as a**
19 **PHOSITA for certain algorithmic procedures by which that**
20 **sound might be rendered.**
21 Q What algorithmic procedures, Dr. Begault?
22 **A Well, we mentioned convolution in 16. We've**
23 **discussed that -- excuse me. The literature commonly**
24 **available as of the disclosure date, is well-known to a**
25 **POSITA as a way to implement these algorithmic structures**

142

1 **that we're discussing, like processing sound to generate**
2 **binaural sound.**
3 THE STENOGRAPHIC REPORTER: I'm sorry. It sounded
4 like you're saying POSITA with a P and then PHOSITA with
5 an F. Which one is it?
6 THE WITNESS: So I apologize. The word that is used
7 in the declaration is P-H-O-S-I-T-A, and I've been
8 pronouncing it POSITA, because in a prior case I was
9 involved with, that's what it was called. And then
10 another case I was involved in, it was called a POSA. I
11 might in the future just start calling it a person of
12 skill in the art, and with everybody's understanding that
13 I also mean what a PHOSITA, P-H-O-S-I-T-A, is.
14 Is that acceptable to you, Mr. Henry?
15 BY MR. HENRY:
16 Q I know what you're talking about. So I'm fine.
17 **A Okay.**
18 **Is that acceptable to you, Kyle.**
19 MR. ELLIOTT: Yes.
20 THE WITNESS: Good. Okay. So I will try to say
21 person of skill in the art. And if I slip, and I say
22 PHOSITA, or et cetera, et cetera, Court Reporter, you'll
23 know I'm spelling that P-H-O-S-I-T-A.
24 BY MR. HENRY:
25 Q Dr. Begault, let me ask you this. In

143

1 paragraph 16, do you cite any disclosures from any of the
2 asserted patents?
3 **A In paragraph 16?**
4 Q That's right.
5 **A You can see that there's an absence of any**
6 **citation.**
7 Q Okay. And in paragraph 15, you have some
8 citations to the asserted patents, and here I'm including
9 the citations that you corrected via errata served today.
10 Okay.
11 **A Correct.**
12 Q Okay. Outside of the citations that you provided
13 in paragraph 15 as corrected by your errata, did you in
14 any place in your declaration, other than paragraph 15,
15 cite any other disclosures from the asserted patents?
16 **A Give me a second here.**
17 **Well, I believe paragraph 14 could be seen in**
18 **that view because we're talking about DSP transformation**
19 **involving HRTF filtering. So there we're talking about**
20 **hardware structures that might be used.**
21 Q Sorry, Dr. Begault. I -- is it your testimony
22 that paragraph 14 has citations to any disclosures from
23 the asserted patents? That's my question.
24 **A Oh, I understand.**
25 **So let's see. 14. I don't have specific**

144

1 **citations.**
2 Q Do you have any citations to the asserted patents
3 in any paragraph in your declaration other than
4 paragraph 15?
5 **A One moment.**
6 **I think paragraph 15 and 16 are the main ones**
7 **within the topic area you're asking me about.**
8 Q Well, we already covered that paragraph 16
9 doesn't have citations in it, Dr. Begault. So I'm going
10 to ask you again.
11 Does -- do you anywhere in your declaration other
12 than paragraph 15, cite any disclosures from any of the
13 asserted patents?
14 **A Not specifically.**
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: Oh, sorry.
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: Sorry. You want to restate your
19 objection? I'm sorry.
20 MR. ELLIOTT: No, you can go forward and answer.
21 THE WITNESS: Paragraph 15 is the only place where you
22 will find specific references to a particular line number
23 and column number, et cetera.
24 BY MR. HENRY:
25 Q Okay. Dr. Begault, let's -- we're going to put

145

1 another document into the chat now.
2 **A Okay.**
3 Q And this is going to be Begault Exhibit 3.
4 (Whereupon Deposition Exhibit 3 was
5 marked for identification.)
6 BY MR. HENRY:
7 Q And the file name for this one, the PDF file
8 name, is US 9226090.
9 **A I am waiting for it to arrive.**
10 Q Yeah, and once it's circulated, just let me know
11 when you've had a chance to download it locally so you
12 have it and can open it and view it.
13 **A Still not seeing it.**
14 **Oh, it has arrived. Okay. I have Exhibit 3**
15 **open.**
16 Q Great. Dr. Begault, what is the document that's
17 been designated Begault Exhibit 3?
18 **A It is United States Patent 9,226,090 B, as in**
19 **boy, 1.**
20 Q If I refer to it as the '090 Patent, will you
21 know what I'm talking about?
22 **A As per our earlier agreement.**
23 Q Do you know which claims of this patent are
24 asserted in this case?
25 **A Oh, off the top of my head, I don't remember the**

146

1 **specific numbers.**
2 Q Remember any of them?
3 **A I don't remember any specific numbers.**
4 Q Do you know what claim terms about which you
5 opined in your May 3rd, 2023, declaration are recited in
6 the claims of the '090 Patent?
7 **A If I looked at my declaration, then I would be**
8 **able to recall that. May I?**
9 Q Sure.
10 **A Okay. I'm going to give you a five-minute**
11 **warning for a bathroom break. But in the meantime, the**
12 **'090, you asked me which... the specifications or claims?**
13 Q Which terms that you offered opinions about are
14 recited in the claims of the '090 Patent?
15 **A Adjust the binaural voice, and yeah, that's it.**
16 Q Why don't we look at claim 15, Dr. Begault.
17 THE STENOGRAPHIC REPORTER: Doctor, you said adjust or
18 just the binaural voice.
19 THE WITNESS: Adjust.
20 THE STENOGRAPHIC REPORTER: Thank you, that's what I
21 thought.
22 THE WITNESS: I'm going to take a three-minute break.
23 Can we do that?
24 MR. HENRY: Sure, we can go off the record. No
25 problem.

147

1 THE WITNESS: Okay. Three minutes. I'll be right
2 back.
3 MR. HENRY: Well, let's take ten. So we'll be --
4 MR. ELLIOTT: Ten? Ten, wow. Okay.
5 MR. HENRY: Or five, whatever. I don't care. Ten is
6 fine. We'll be back in ten.
7 THE VIDEOGRAPHER: The time is 1341. We're going off
8 the record.
9 (Recess taken.)
10 THE VIDEOGRAPHER: The time is 1358. We are back on
11 the record.
12 BY MR. HENRY:
13 Q Okay. Dr. Begault, let's look at claim 15 of the
14 '090 Patent, which is Exhibit 3.
15 **A Very good. I am there.**
16 Q Okay. This is one of the claims about which you
17 opined in your declaration, right?
18 **A That is correct.**
19 Q I'd like to look at the last limitation of the
20 claim which begins with the language, A processor that
21 executes the instructions. Do you see that limitation?
22 **A I do.**
23 Q And that limitation, the last limitation of claim
24 15 recites, a processor that executes the instructions to
25 adjust the binaural voice of the second person during the

148

1 electronic phone call in order to position the sound
2 localization point of the binaural voice to a location
3 that is away from and proximate to the first person,
4 wherein the second localization point represents an origin
5 of the binaural voice of the second person to the first
6 person. Right?
7 **A Except where you said second localization point,**
8 **you meant to say sound localization point, but otherwise,**
9 **you're correct.**
10 Q All right. Thanks.
11 And when you read this term, do you understand
12 the term to mean that there is a processor that's
13 programmed in some way to achieve or perform the function
14 that's recited in the rest of this limitation?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: I see a statement that says a processor
17 that executes the instructions.
18 BY MR. HENRY:
19 Q So then perform or achieve the function that's
20 recited after that, right?
21 **A Yes, that's correct.**
22 Q Okay. And do I understand correctly that in your
23 view, a person of skill in the art would have known how to
24 implement the system or method performing the processing
25 recited in the last limitation of claim 15 because a

149

1 person of skill would have been able to resort to known
2 audio DSP structures within the art and common industry
3 programming techniques or software libraries for audio
4 processing?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: I believe you more or less read my
7 declaration literally. And so, yes, that is my
8 assertation.
9 BY MR. HENRY:
10 Q And is it your opinion that a person of skill
11 would have known how to do that before 2014?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: Yes, it would my opinion somebody might
14 know that before 2014.
15 BY MR. HENRY:
16 Q What software libraries were available before
17 2014 that a skilled artisan could have used to adjust the
18 binaural voice of a person during an electronic phone call
19 to position an SLP to a location that's away from and
20 proximate to a listener?
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: Well, an earlier version would have
23 been -- or I'm sorry. An early example would have been
24 the Convolvotron, 1987 or '88.
25

150

1 BY MR. HENRY:
2 Q Okay. Do you know of another example?
3 **A I can think of different hardware that existed**
4 **that could be configured to accomplish this same task,**
5 **yes.**
6 Q Like what?
7 **A Well, different spatial audio processors. There**
8 **was one made by Roland, for instance. That Roland, I**
9 **think it's called an S360. There were a number of**
10 **convolution engines out there, for instance, or**
11 **processors, and by the time you get to -- what dates**
12 **you're talking about? Prior to 2014? Yeah, by -- after**
13 **20 -- I don't know the exact date, but as one progresses**
14 **from the 1990s up to 2014, there's multiple hardware,**
15 **software processes to accomplish these things.**
16 Q And you mentioned the Convolvotron and the S360
17 by Roland. Was -- can you identify any others?
18 MR. ELLIOTT: Objection to form.
19 THE WITNESS: Well, you could have used, for instance,
20 Max/MSP by Cycling '74, which is a software-based system.
21 BY MR. HENRY:
22 Q And --
23 **A And --**
24 Q Oh, sorry. I was asking for clarification. You
25 said Max, are you referring to computer, M-a-c-s, or are

151

1 you referring Max, M-a-x?
2 **A M-a-x. It's a software program that allows**
3 **real-time signal processing.**
4 Q And I'm sorry. Could you identify any others
5 that could be used before 2014 to perform a -- recite a
6 function of claim 15?
7 MR. ELLIOTT: Objection --
8 THE WITNESS: Go ahead, Kyle.
9 MR. ELLIOTT: Objection to form.
10 You can go ahead.
11 THE WITNESS: Well, again, if we're talking about a
12 processor that executes instructions to adjust the
13 position of a binaural voice to a new location, I believe
14 there were several software libraries out there, that
15 would allow you to do that.
16 BY MR. HENRY:
17 Q Can you identify one?
18 **A Sure, so another one is called Slab, S-l-a-b, and**
19 **that was a software distributed by NASA at one point. It**
20 **was basically a software version of a Convolvotron. And I**
21 **think the gaming industry probably had many solutions**
22 **prior to 2014, for doing this kind of manipulation that's**
23 **outlined here.**
24 **I don't know if specific software libraries -- I**
25 **can't remember the name of it, but there was projects for**

152

1 **implementing 3D audio into software libraries at that time**
2 **too for program mers. And, again, the name is escaping**
3 **me, but there were a number of projects that had been**
4 **going on for more than ten years for sure.**
5 Q For more than ten years before 2014?
6 **A Yeah, I think they -- yeah, could be a 20-year**
7 **legacy. I'm not sure of the exact date. And it was for**
8 **doing things like implementing 3D audio processing, as**
9 **part of game developer kits or software. But I can't**
10 **recall the exact names of them or the efforts.**
11 Q Do you know of Unity?
12 **A I've heard of it. I never had a personal**
13 **experience with Unity.**
14 Q Can you identify by name any of the solutions
15 from the gaming industry from prior to 2014 that you
16 believe could do the kind of SLP manipulation that's
17 recited in 15?
18 MR. ELLIOTT: Objection to form.
19 THE WITNESS: Again, not by name. I'm not super
20 familiar with the world of gaming. But there was -- I
21 might have even given a talk to this group. I don't
22 recall. But something along the lines of standardizing 3D
23 audio manipulation and presentation and processing in
24 standard software libraries if I'm recalling correctly.
25 That's as specific as I can give you.

153

1 BY MR. HENRY:
2 Q You don't recall the group that you gave a talk
3 to?
4 **A No. I can't even recall if I actually gave a**
5 **talk to that group or if I was just invited to go, even if**
6 **I did go. I just heard a lot about it, and there was a**
7 **lot of interest in the time. And I know that that was...**
8 **oh, maybe at least 15 years ago.**
9 **And I think it's evolved, and it might still**
10 **exist.**
11 Q What audio DSP structures from before 2014 are
12 you aware of that could accomplish or perform the function
13 recited in the limitation of claim 15 that we're talking
14 about?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: Well, the same.
17 BY MR. HENRY:
18 Q Do they all use DSPs for their spatialized audio
19 processing?
20 **A Some might use software DSP based on the native**
21 **CPU. Some might use an external DSP. Some of the earlier**
22 **versions I know did.**
23 Q Do you distinguish between a digital signal
24 processor and digital signal processing?
25 MR. ELLIOTT: Objection to form.

154

1 THE WITNESS: I don't know if I necessarily would in
2 the terms that you used. One's a noun and one's a verb, I
3 think.
4 BY MR. HENRY:
5 Q Now, you can look, I'm going to ask you about
6 paragraph 15 of your declaration, which talks about all
7 the processor terms, not just the limitation that we're
8 looking at in the '090 Patent.
9 **A Sure.**
10 Q Okay. Is it fair to say that you believe that
11 persons of skill in the art would have known before 2014
12 how to use audio DSP structures or common industry
13 programming techniques or software libraries for audio
14 processing to implement systems performing all of the
15 functions recited in the processor terms that you address
16 in paragraph 15 of your declaration?
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: Yes, as stated in my declaration.
19 BY MR. HENRY:
20 Q If you look back at the -- and sorry to jump, but
21 if you look back at paragraph 15 of -- strike that.
22 Looking at claim 15 of the '090 Patent.
23 **A Yes.**
24 Q If you're looking at that limitation we were
25 discussing, that begins, The processor that executes the

155

1 instructions, how would a person of ordinary skill in the
2 art know if something is a processor as that term is used
3 in this claim versus not being a processor as claimed in
4 claim 15?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: Can you rephrase your question? It
7 seemed oddly put.
8 BY MR. HENRY:
9 Q Sure. Yeah, no worries. I'm trying to -- I'll
10 come at it a different way.
11 To determine -- if you're looking at a system
12 with a processor and you want to try to figure out if it's
13 practicing what's recited in this limitation, in your
14 view, do you have to assess how that processor is
15 implemented?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: Again, I'm a little fuzzy on what you
18 are asking. So, yeah, I'm sorry. I kind of lost you.
19 BY MR. HENRY:
20 Q No problem.
21 **A I mean, we were talking about a processor --**
22 Q Yeah, we'll try another one.
23 If you just look at a processor -- you just look
24 at any processor?
25 **A Yes.**

156

1 Q You don't yet look at how it is -- what it's
2 programmed to perform. Can you make a determination of
3 whether or not that processor meets the limitation of
4 claim 15 that we're talking about?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: So I look at a processor, and what don't
7 I know about the processor in your assumption, your
8 hypothetical?
9 BY MR. HENRY:
10 Q You don't know what it's yet programmed to
11 perform or do.
12 **A So... if I'm looking -- oh. So is your**
13 **question -- can I rephrase it? Is your question if I look**
14 **at a, quote/unquote, processor, how do I know it can**
15 **perform the actions shown here?**
16 Q It's -- it's a little different. I'm saying if
17 someone gives you a system and you determine that the
18 system uses a processor, right, are you with me?
19 **A So far.**
20 Q Okay. How would you determine if the processor
21 then after that, is capable -- not capable, actually
22 executes the instructions to adjust the binaural voice as
23 recited in this claim?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: Well, you would know from examining

157

1 software. You would -- and I guess, you're adding the
2 limitation that we can't actually test it with a signal.
3 BY MR. HENRY:
4 Q No, you could. I'm just asking you if you would
5 have to look at what the processor is programmed to do in
6 order to determine if the processor you're evaluating
7 executes the instructions to adjust the binaural voice as
8 recited in claim 15?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: I would know the result of the
11 processor, if I tested it with a signal. If I were
12 looking at the software for that processor, then I would
13 know how it was doing it. And I would have a reasonable
14 expectation of what it's output might be.
15 BY MR. HENRY:
16 Q If you just bought an off-the-shelf processor
17 without any programming, would it execute instructions to
18 adjust the binaural voice as claimed in claim 15 of the
19 '090 Patent?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: Well, processors usually execute
22 instructions. Right? So the execution of those
23 instructions are informing the processor, for instance,
24 where to place (indecipherable utterance) a sound. And so
25 this limitation here calls out --

158

1 THE STENOGRAPHIC REPORTER: I'm sorry. Doctor, I
2 didn't understand what you said. You said the processor,
3 for instance, where to place what?
4 THE WITNESS: Let's start again.
5 THE STENOGRAPHIC REPORTER: Okay. You said so the
6 execution of those instructions are informing the
7 processor, for instance, where to. And it sounded like
8 you said place. But I couldn't understand what you said.
9 THE WITNESS: Place is right. Where to place the
10 sound localization point to a different position.
11 THE STENOGRAPHIC REPORTER: Thank you.
12 BY MR. HENRY:
13 Q Okay. We agree processors can execute
14 instructions. I think that's pretty straightforward.
15 What I'm asking is, if you just bought a
16 processor, an off-the-shelf processor, right, would it be
17 able to adjust the binaural voice of a second person
18 during an electronic phone call to position an SLP to a
19 different location without any programming?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: So some of the examples I gave you
22 earlier, would adjust the position of a binaural sound
23 because the design of the device was specifically to
24 accomplish that. So it could be through the turning of a
25 knob or writing an instruction.

159

1 If your processor, let's say, were a computer,
2 and you were writing an algorithm to take advantage of a
3 built-in library that did signal processing for you, then
4 that would be another way to accomplish the goal. So it
5 kind of, it's a very general -- when you say a processor,
6 we could be talking about many different things.
7 BY MR. HENRY:
8 Q Sure. The examples that you give, you referred
9 to devices that were designed to adjust SLPs as recited
10 here and then software libraries that were designed to
11 have that capability, right?
12 **A Well, that's true. But you could also have**
13 **something that's very generic that is basically a sound**
14 **processing library, or even a digital signal processing**
15 **library for which a PHOSITA would come and say, Okay, I**
16 **want to manipulate the actions through instructions of**
17 **this particular processor to accomplish the goal that I**
18 **want to do.**
19 Q And then how would they go about affecting that
20 manipulation?
21 **A By executing instructions.**
22 Q Would they have to write and develop the software
23 having the correct instructions?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: Maybe and maybe not. Depends if it was

160

1 the extent of the libraries that are available.
2 BY MR. HENRY:
3 Q Because some libraries already might have the
4 design to adjust an SLP as recited?
5 **A It is true that some sound developer programs --**
6 **or should I say sound developer environments allow**
7 **manipulation of the spatial attributes of sound.**
8 Q Through their programs -- through their
9 programming, right?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: Well, programming can mean a lot of
12 different things. It could mean a series of instructions
13 to move the sound. And it's a very high level like that.
14 It could be of the level of you need to design the
15 convolution algorithms, but there are available filtering
16 methods by which to do that.
17 BY MR. HENRY:
18 Q Do you write code, Dr. Begault?
19 **A I am a total hack. I don't write in anything**
20 **that a coder would consider viable. But I do process**
21 **sound using Max MSP, for instance. So I do binaural and**
22 **3D audio experiments using that program. What else have I**
23 **programmed lately?**
24 **And then I have specialized software written for**
25 **me for my psychoacoustic experiments where I interact with**

161

1 **it on a programming level to make certain stimuli occur.**
2 THE STENOGRAPHIC REPORTER: Sorry. What was your
3 original question? Was it do you code or something? It
4 was garbled, your question --
5 MR. HENRY: Do you write code, I think was my
6 question.
7 THE STENOGRAPHIC REPORTER: Thank you.
8 MR. HENRY: Yeah, no worries.
9 THE WITNESS: That was why you question, do you write
10 code.
11 BY MR. HENRY:
12 Q Thank you, Dr. Begault.
13 **A Yeah. Now I've forgotten where we are.**
14 Q That's okay. I'll pick up.
15 The specialized software that you mentioned being
16 written for psychoacoustic experiments, who writes that,
17 you or a colleague or someone else?
18 **A Oh, no. They will -- I'll have somebody else,**
19 **like a hired programmer, write the structure, if you will.**
20 **And then I'm given hooks into that structure so that I can**
21 **then manipulate things like the spatial location of**
22 **sounds.**
23 Q And were you working on those types of
24 applications before 2014?
25 **A Well, for instance, we discussed the Ames Spatial**

162

1 **Auditory Display, and there I had to work with assembly**
2 **code to ask the program to do the convolution that I**
3 **needed to perform to do the spatial rendering with that**
4 **particular device.**
5 Q Now, Dr. Begault, if you look at the limitation
6 we're discussing in claim 15, which is the fourth
7 limitation again. Okay?
8 **A I'm with you.**
9 Q Okay. Now, would you say that any computer
10 device that performs the function of this limitation
11 adjusting the binaural voice of a second person during an
12 electronic phone call in order to position an SLP with a
13 binaural voice to a location that is away from and
14 proximate to the first person, would constitute the
15 processor that's recited by this claim?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: So what was -- the first part of your
18 question was... would any what?
19 BY MR. HENRY:
20 Q Computer device that performs the function of
21 this last limitation constitute the processor required by
22 this claim?
23 MR. ELLIOTT: Objection to form.
24 THE WITNESS: So if your question is, is a computer
25 device, could it be used as a processor, then, yes.

163

1 BY MR. HENRY:
2 Q Oh, that wasn't exactly my question. My question
3 is, the one that I asked you, would you say that any
4 computer device that performed this function would
5 constitute the processor that executes the instructions
6 recited in this claim?
7 MR. ELLIOTT: Objection to form.
8 THE WITNESS: I'm not sure how to exactly answer that.
9 It seems to me that any computing device that could
10 constitute a processor that could execute instructions
11 would be valid to enable what is stated in this particular
12 limitation.
13 BY MR. HENRY:
14 Q Can you think of a computing device that would
15 perform the function recited in this limitation and yet
16 still not be a claim 15 processor?
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: So are you asking can I think of a
19 processor that could accomplish what is put out -- or I'm
20 sorry, stated in this limitation that couldn't do what the
21 -- wait. I lost you completely on that.
22 BY MR. HENRY:
23 Q No worries. I'm happy to repeat it. Can you
24 think of a computing device that performs the function
25 recited in the last limitation of claim 15 of the '090

164

1 Patent, that doesn't qualify as the processor recited by
2 this claim?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: I can't think of anything like that. I
5 could think of a processor is engendering a computing
6 device.
7 BY MR. HENRY:
8 Q Dr. Begault, I'd like to look at column -- strike
9 that.
10 Dr. Begault, looking still at claim 15 of the
11 '090 Patent, do you see in the fourth line of the claim in
12 the first limitation where the claim recites binaural
13 voice.
14 **A Okay. So 15 and then we're talking about a**
15 **second wearable electronic device, that paragraph? That**
16 **limitation?**
17 Q Yeah.
18 **A Okay. I'm with you.**
19 Q Do you see the claim language, Binaural voice?
20 **A Yes.**
21 Q Okay. And now, I want to just go look at claim
22 1, which is a couple pages up.
23 **A Okay. I'm with you.**
24 Q All right. In the first limitation of claim 1,
25 do you see where the claim recites, Binaural sound?

165

1 **A I do.**
2 Q Do you draw any distinction between the terms
3 binaural sound and binaural voice?
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: In one sense, no, you don't need to make
6 a distinction between those things because many sounds are
7 referred to as voices.
8 BY MR. HENRY:
9 Q Yeah, didn't really ask you if you have to draw
10 it. I'm asking you if when you read those terms, do you
11 understand that there is any distinction between them or
12 not?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: Well, the distinction is the word sound
15 and voice between what you just pointed out there.
16 BY MR. HENRY:
17 Q Yeah, in your mind, are those two things
18 different or equivalent?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: They're not -- they are not necessarily
21 different, but we are talking about a second person in
22 Number 15. So that seems to be addressing as binaural
23 voice in that particular example, a speech of a person in
24 that particular example.
25 But the terms themselves might mean other things

166

1 that when it says binaural voice, it does not necessarily
2 mean a person in all context. But in this context, it
3 seems to be a speech context.
4 BY MR. HENRY:
5 Q Sure, and you can look at claim 1 and read it if
6 you want. And then I believe that you'll see, and that
7 we'll be able to agree that it also discusses a first and
8 second person talking. But go ahead and review it and let
9 me know if that's fair.
10 **A Well, looking at the first limitation, it says,**
11 **Capturing binaural sound. So that might be speech. It**
12 **might be something other than speech.**
13 Q You also see that first limitation talks about a
14 talking person and a listening person, right?
15 **A Where does it say that?**
16 Q In claim 1.
17 The first limitation recites, Capturing with an
18 electronic earphone located at a head of a talking person,
19 binaural sound that will be provided to a listening person
20 during a telephone call. You see that, right?
21 **A Oh, I do. But it doesn't necessarily mean that**
22 **it's just transmitting the binaural speech of that talking**
23 **person. It could be transmitting something else. It**
24 **could be, for instance, that talking person speaking in a**
25 **foreign language, and then a speak recognition system**

167

1 **translating that language into the -- a synthetic voice**
2 **that then would be heard by the listening person.**
3 **And so that listening person is hearing synthetic**
4 **speech.**
5 Q Dr. Begault, I just wanted to know if -- and I'm
6 not asking you if these things necessarily mean the same
7 thing or not. Just sort of how you responded last time.
8 In your view, are the terms binaural sound and
9 binaural voice equivalent?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: Well, I address binaural voice in my
12 declaration. And there, I said that voice could refer to
13 many different types of sound, not necessarily actual
14 speech, but synthetic speech, speech-like sounds, auditory
15 icons, signals, any number of types of sounds that convey
16 meaning.
17 BY MR. HENRY:
18 Q Are the terms binaural sound and binaural voice
19 equivalent in your view?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: They can be, as I said.
22 BY MR. HENRY:
23 Q Are they always?
24 MR. ELLIOTT: Same objection.
25 THE WITNESS: It depends on the context.

168

1 BY MR. HENRY:
2 Q Sitting here today, can you identify for me any
3 binaural sound that in your view is not a binaural voice?
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: Not necessarily.
6 BY MR. HENRY:
7 Q Because I don't know what you mean by that
8 qualification necessarily, which you keep injecting, I'm
9 just going to give you the opportunity now.
10 If you are able to identify any binaural sound
11 that in your view is not a binaural voice, I ask you to do
12 that now.
13 **A A sound that is an unintentional noncommunicative**
14 **sound, such as, let's say, electronic noise that**
15 **inadvertently went into a system, I wouldn't think of that**
16 **as a binaural voice. I would think of that as a binaural**
17 **distortion. That would be a type of binaural sound**
18 **because it's not communicating.**
19 **Whereas when we use the term binaural voice,**
20 **we're talking about the communication using sound, and**
21 **that infers some sort of vocabulary, either in terms of**
22 **auditory icons, of speech or synthetic speech. So I gave**
23 **you an example where there is a sound that's inadvertent**
24 **and is like a form of distortion or noise.**
25 Q Beyond that example, can you identify for me any

169

1 other binaural sound that in your view, would not be a
2 binaural voice?
3 **A Any sound that is not a form of communication --**
4 **or intentional communication, I should say.**
5 Q What is an intentional communication?
6 **A A communication where there's an intention for a**
7 **sound to be heard by another party.**
8 Q So any sound that is not an inadvertent noise
9 that you characterize as a distortion is in your view a
10 binaural voice?
11 MR. ELLIOTT: Objection to form.
12 THE WITNESS: As I said, the word voice can confer
13 many forms of aural communication. If aural communication
14 is not involved, in other words, a message being
15 transmitted from one place to another, then it could be
16 thought of as a form of noise or distortion or inadvertent
17 type of signal. So I'll use that as my categorization for
18 something that is not a binaural voice.
19 BY MR. HENRY:
20 Q A message, a binaural message? Isn't that a
21 binaural voice?
22 **A No, that's not what I said.**
23 Q Okay.
24 **A I said that a binaural voice means a communicated**
25 **message, aural -- well, acoustic message.**

170

1 Q In trying to understand the distinction you're
2 drawing between things that could be binaural sounds but
3 not binaural voices, is it just any binaural sound that
4 has meaning, is what you would call binaural voice?
5 **A Meaning in the context of communication.**
6 Q So any binaural sound with meaning in the context
7 of communication is a binaural voice in your view?
8 **A People skilled in the art, POSA, have understood**
9 **that 3D audio and binaural rendering of different types of**
10 **sound, speech or nonspeech, or hybrids of the two are**
11 **effective means of communication and have been frequently**
12 **implemented as such. I don't rule out the possibility**
13 **that a binaural sound such as an inadvertent noise that is**
14 **heard spatially couldn't occur.**
15 **But if that occurred, I'm disqualifying it as a**
16 **binaural voice because voice infers communication.**
17 Q Can you give me an example of a binaural sound
18 that would be an inadvertent noise?
19 **A Sure.**
20 Q That wouldn't be binaural voice?
21 **A Sure. 60-cycle (indecipherable utterance) hum.**
22 THE STENOGRAPHIC REPORTER: I'm sorry, Doctor. Could
23 you repeat that?
24 THE WITNESS: 60-cycle hum.
25 THE STENOGRAPHIC REPORTER: H-u-m, hum?

171

1 THE WITNESS: H-u-m, hum.
2 BY MR. HENRY:
3 Q What is a 60-cycle hum, Dr. Begault?
4 **A That is the bleed through of an American-based**
5 **alternating current system into an audio system. So if**
6 **you go home and turn up your audio system really loud, you**
7 might here (indicating.) And that could be accentuated by
8 things like dimmer lights and things of that sort. And
9 I'm sure you've encountered in Zoom, inadvertent noises
10 and stuff that have come in. If Zoom had a binaural
11 capability, then some of those sounds, those noises might
12 be placed in 3D audio space.
13 Those, I would not consider a binaural voice
14 because those sounds are not an intentional communication
15 from one party to another.
16 Q Does Zoom have binaural capabilities?
17 **A I don't think so. I've never heard of it.**
18 Q Does it capture binaural sound or voice?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: Not that I'm aware of.
21 BY MR. HENRY:
22 Q Why not?
23 MR. ELLIOTT: Objection to form.
24 THE WITNESS: I can't -- I don't know the operations
25 or motivations or engineering staff of Zoom.

172

1 BY MR. HENRY:
2 Q Why is it that you believe that Zoom does not
3 capture binaural sound or binaural voice?
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: Only through direct experience using a
6 single microphone and listening to monaural sound over my
7 headset. I could be mistaken. There could be something
8 out there that does something beyond my own experience.
9 As I say, I do not follow product development on the part
10 of Zoom.
11 BY MR. HENRY:
12 Q Yeah, and that's fine. I'm not asking you about
13 Zoom's product lines beyond what we're using today.
14 Let's just then talk about today. Why is it that
15 what we're using today, in your view, doesn't capture
16 binaural sound or binaural voice?
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: It doesn't capture that because it's
19 using a single channel communication.
20 BY MR. HENRY:
21 Q All right. We're going to put another exhibit in
22 the chat, Dr. Begault. And this one is going to be the
23 file name US9282196.
24 (Whereupon Deposition Exhibit 4 was
25 marked for identification.)

173

1 BY MR. HENRY:
2 Q And this will be Begault Exhibit 4.
3 **A I'll let you know when I see it.**
4 Q Thank you.
5 THE TECHNICIAN: It's uploading now.
6 THE WITNESS: Okay. There it is.
7 Okay. I have the Exhibit Number 4 up and ready
8 to discuss.
9 BY MR. HENRY:
10 Q Dr. Begault, what do you recognize Begault
11 Exhibit 4 to be?
12 **A United States Patent 9,282,196-B1.**
13 Q Do you know which claims from the '196 Patent are
14 asserted in this case?
15 **A I don't know off the top of my head, which claims**
16 **are being asserted in this particular matter.**
17 Q Let's look at claim 1 of the '196 Patent.
18 **A Did you intend to give me a yellow highlighted**
19 **version?**
20 Q I did not.
21 **A I'm happy to use it.**
22 Q Yeah, I think it's fine. These aren't even my
23 highlights. But if it doesn't bother you, we'll just keep
24 going if that's all right.
25 **A That's fine by me.**

174

1 Q All right. Looking at claim 1.
2 **A Yes.**
3 Q You see that the preamble of claim 1 reads, A
4 method executed by one or more electronic devices in an
5 electronic system that move a sound localization point,
6 SLP, of a voice of a computer program during a voice
7 exchange between the computer program and a user, the
8 method comprising?
9 **A I see that.**
10 Q What do you understand a voice exchange to be?
11 **A I would -- voice communication.**
12 Q Does an exchange require voice communication
13 between two parties?
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: If the party could constitute a computer
16 or any device capable of recognizing speech or sound and
17 another device capable of recognizing speech or sound.
18 BY MR. HENRY:
19 Q And the preamble here talks about a voice of a
20 computer program, and a user on the other side, right?
21 **A It does. I presume the user is human.**
22 Q All right. In the next limitation, do you see
23 the language, Handheld portable electronic device?
24 **A Stand by.**
25 **Yes.**

175

1 Q What, in your view, is a handheld portable
2 electronic device?
3 **A Obvious meaning. I suppose an example might be a**
4 **cellular telephone. What do they call those these days?**
5 **Not the thing with the giant antenna, but an iPhone, for**
6 **instance, or an Android.**
7 Q So you would agree that a smartphone is a
8 handheld portable electronic device?
9 **A That was the word I was looking for, yes, a**
10 **smartphone.**
11 Q Do you see before handheld portable electronic
12 device the, limitation, cites providing through an
13 electronic earphone, do you see that language?
14 **A I do.**
15 Q And it goes on to say that you provide through an
16 electronic earphone binaural sound to the user during the
17 voice exchange?
18 **A Yes, I do.**
19 Q How long have people of skill in the industry
20 been providing binaural sound to listeners through
21 earphones?
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: Oh, I don't know the first date of that.
24 But, of course, stereo, by the development of any
25 headphone system that could monitor two microphones, would

176

1 be the origin of that.
2 BY MR. HENRY:
3 Q Were people in the industry providing binaural
4 sound to listeners through earphones before 2014?
5 **A Yes.**
6 Q I want to look at claim 15.
7 **A Yes.**
8 Q And this is one of the claims that you opined
9 about in your declaration, right?
10 **A Let me confirm that.**
11 Q Sure?
12 **A Yes.**
13 Q And it's one of the -- the last limitation is one
14 of the processor terms that you addressed, right?
15 **A That's correct, yes.**
16 Q Okay. And when you read this last limitation, do
17 you understand the term to mean that there's a processor
18 that's programmed to achieve the functions that are
19 recited in the rest of this limitation?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: I read that there's a processor that's
22 executing instructions.
23 BY MR. HENRY:
24 Q Okay.
25 **A And it accomplishes the things that are listed**

Meta Platforms, Inc.
Exhibit 1095
Page 045

177

after that phrase.
Q And those things are receiving a command, moving the SLP in response to a command, and providing binaural sound at the second location for an SLP?
MR. ELLIOTT: Objection to form.
THE WITNESS: More or less.
BY MR. HENRY:
Q And I'll -- do I understand correctly that in your view, a person of skill would have known how to implement a system or method performing each of the functions recited in the last limitation of claim 15 of the '196 Patent before 2014 because a person of skill would have been able to resort to known audio DSP structures within the art and common industry programming techniques or software libraries for audio processing?
MR. ELLIOTT: Objection; form.
THE WITNESS: I believe you paraphrased my declaration correctly.
BY MR. HENRY:
Q And do you agree then, that people in your view, people of skill would have been able to use known audio DSP structures and common industry programming techniques or software libraries to perform the functions recited in the last limitation of claim 15 before 2014?
MR. ELLIOTT: Objection to form.

178

THE WITNESS: Yes, I think that would have been possible.
BY MR. HENRY:
Q What software libraries or audio DSP structures were available before 2014 to persons of skill in the art to achieve or perform the functions recited in the last limitation of claim 15 of the '196 Patent?
MR. ELLIOTT: Objection to form.
THE WITNESS: Looking only at the limitation of a processor that executes instructions; is that correct?
BY MR. HENRY:
Q Yeah. The last limitation of claim 15 is the one we're discussing.
A Right. Right. Right. So let me take a quick look here.
So -- let's see here. So I gave an answer previously, regarding available software and hardware systems that could be configured to accomplish very similar tasks earlier in my deposition here. And so I would just restate those things.
Q In your view, those would be able to accomplish or perform the functions recited in claim 15 of the '196 Patent as well?
A Yes.
MR. ELLIOTT: Objection to form.

179

THE WITNESS: Sorry -- right, yes.
BY MR. HENRY:
Q Can you think of a computing device that would perform the functions of the last limitation of claim 15 of the '196 Patent but not be a processor as recited in this claim?
MR. ELLIOTT: Objection to form.
THE WITNESS: No, I can't think of something that wouldn't be a processor necessarily.
BY MR. HENRY:
Q Let's look at claim 19 of the '196 Patent.
A Yes.
Q Okay. You offer an opinion about this claim as well in your declaration, right?
A Let me confirm that.
Yes.
Q Is it fair to say that in your view, before 2014, a person of skill in the art would have known how to implement a system or method performing the functions recited in claim 19 by resorting to known audio DSP structures within the art and common industry programming techniques or software libraries for audio processing?
MR. ELLIOTT: Objection to form.
THE WITNESS: Yes.

180

BY MR. HENRY:
Q What audio DSP structures within the art and software libraries were available before 2015 that a person of skill could have used to perform the functions recited in claim 19 of the '196 Patent?
A What comes to mind immediately are programs that perform something called auralization, which is the simulation of room acoustic cues. And those room acoustic cues are based on basically spatializing audio reflections. And so an example, I believe, was CATT-Acoustic, C-a-t-t, Acoustic had those capabilities.
Q Does any other example come to mind?
A That's the first one that comes to mind. But I think there were other examples as well.
Q Can you identify any others today?
A I believe that some of the examples I gave you earlier, such as Slab or maybe even the Convolvotron. I'm not sure in later implementations as 3D audio, you know, was maturing, these capabilities became featured more and more.
Q You address auralization in your 1994 textbook, right?
A I did, yes.
Q And I said 1994 because you said that earlier, but I have a version of your textbook with a copyright

181

1 date of 2000. Was it a republication?
2 **A Yes. After the original publisher gave up the**
3 **copyright, I decided to republish it as a NASA Technical**
4 **Memorandum, give away the text. It's more or less the**
5 **same. I think I corrected a few typos, and a lot of the**
6 **pictures and things like that came out much worse. So...**
7 **I recommend the book. Go to the book. It's -- I think**
8 **you could still get a copy for a dollar on Amazon. And**
9 **then I think you can get one for $100 too.**
10 Q All right. I'll buy the former.
11 **A Yes, you should.**
12 Q Dr. Begault, was that -- was your textbook
13 publicly available before 2014?
14 **A Yes.**
15 Q Okay. All right. Let's...
16 **A Technically speaking, it wasn't a textbook. It**
17 **was a reference book, because a textbook, I expect to have**
18 **exercises or be designed around a curriculum. So just for**
19 **that little academic clarification.**
20 Q I'm happy to call it a reference book. Your
21 reference book was publicly available before 2014?
22 **A Yes, it was.**
23 THE STENOGRAPHIC REPORTER: Counsel, if this is a good
24 breaking point, can we take a ten-minute break?
25 MR. HENRY: Happy to go off the record. That's fine.

182

1 THE VIDEOGRAPHER: The time is 2:57. We're going off
2 the record.
3 (Recess taken.)
4 THE VIDEOGRAPHER: The time is 1510. We are back on
5 the record.
6 THE WITNESS: Test, 2, 3, can you hear me?
7 BY MR. HENRY:
8 Q Oh, sorry, test, 2, 3. I didn't know what you
9 said. Yes, I can hear you.
10 **A Oh, sorry.**
11 Q All right. We're going to circulate another
12 document now. It's going to be Exhibit 5. The file
13 name of Begault Exhibit 5, the file name for this one is
14 _US9674628.
15 (Whereupon Deposition Exhibit 5 was
16 marked for identification.)
17 BY MR. HENRY:
18 Q Dr. Begault, let me know when you have it open
19 and available to you.
20 THE TECHNICIAN: Should be in the chat right now.
21 THE WITNESS: I have the document open. I assume I
22 can close the other document?
23 BY MR. HENRY:
24 Q You can leave them all open. In case we go back,
25 it's just quicker. I don't have a preference, though,

183

1 but...
2 **A Okay. All right. I am on Exhibit 5.**
3 Q And what do you recognize Exhibit 5 to be?
4 **A United States Patent 9,674,628 B1.**
5 Q Do you know which claims of the '628 Patent are
6 asserted in this case?
7 **A I don't know exactly which claims are asserted,**
8 **no.**
9 Q Let's look at claim 9, the '628 Patent, please.
10 Let me know when you're there.
11 **A Okay. Almost. All right. I am at claim 9.**
12 Q And this is a claim that you offered an opinion
13 on in your May 3rd, 2023, declaration, right?
14 **A Yes.**
15 Q Now, let's look at the first limitation after the
16 preamble, do you see the limitation that begins,
17 Processing during the telephone call?
18 **A I see it.**
19 Q Now, that's one of the processor terms that you
20 address in your declaration, right?
21 **A That is true.**
22 Q Okay. Now, look at claim 16 as well, from the
23 '628 Patent.
24 **A I'm sorry. Claim what?**
25 Q 16.

184

1 It starts at the bottom of column 45 --
2 **A Oh, I see it, a nontransitory. Yes, I see it**
3 **now.**
4 Q And do you see the second limitation of that
5 claim, Similarly cites processing during the telephone
6 call, and then it continues?
7 **A Yes.**
8 Q That's another processor term that you addressed
9 in your declaration, right?
10 **A That is true, yes.**
11 Q Okay. Now, do I understand correctly from your
12 declaration that in your view, before 2014, persons of
13 skill in the art would have known how to implement systems
14 performing the functions recited in the limitations of
15 claim 9 and claim 16 that we just reviewed because a
16 person of skill would have been able to resort to known
17 audio DSP audio structures within the art and common
18 industry programming techniques or software libraries for
19 audio processing?
20 MR. ELLIOTT: Objection to form.
21 THE WITNESS: I believe you have essentially
22 paraphrased my declaration.
23 BY MR. HENRY:
24 Q Do you believe that persons of skill in the art
25 would have known how to implement a system performing the

185

1 functions recited in the limitations of claim 9 and 16 of
2 the '628 Patent before 2014 based on known audio DSP
3 structures within the art and common industry programming
4 techniques and software libraries?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: I believe that they would, particularly
7 with the limitations that we're discussing that begin with
8 the word processing.
9 BY MR. HENRY:
10 Q What software libraries or audio DSP structures
11 were available before 2014 to allow persons of skill in
12 the art to implement systems that were able to perform
13 those functions?
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: I would give you the same answer I gave
16 you regarding the other processor terms that we discussed
17 with relationship to the two other patents we discussed
18 earlier. Which I do not have the numbers handy. I think
19 it was '090, and I don't remember the other one.
20 BY MR. HENRY:
21 Q '196, right?
22 **A Yes, that's right.**
23 Q Okay. Looking at claim 9, in the first
24 limitation again.
25 **A Yes.**

186

1 Q Can you think of a computing device that would
2 perform the function of processing a voice of a calling
3 party with HRTFs so the voice of the calling party
4 localizes to the called party as binaural sound and SLP
5 that is 1 meter to 2 meters away from the called party and
6 yet still not be a processor as recited by claim 9?
7 MR. ELLIOTT: Objection to form.
8 THE WITNESS: I'm sorry. I think that a processor
9 would be involved to cause this effect that's called out
10 here in this to occur. And I can't think of a -- well,
11 wait. What was your question? Sorry.
12 BY MR. HENRY:
13 Q Can you think of a computing device that would
14 perform the recited function but not be a processor as
15 claim 9 recites?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: I can't think of one off the top of my
18 head, no.
19 BY MR. HENRY:
20 Q Looking at the second limitation of claim 16, my
21 question is similar. With respect to that limitation, can
22 you think of a computing device that would perform the
23 function recited in that limitation but not be a
24 processor?
25 MR. ELLIOTT: Objection to form.

187

1 THE WITNESS: No. I would state that computing
2 devices are processors or could be implemented as
3 processors.
4 BY MR. HENRY:
5 Q All right. We're going to circulate another
6 document, Dr. Begault. This one's going to be Begault
7 Exhibit 6.
8 (Whereupon Deposition Exhibit 6 was
9 marked for identification.)
10 BY MR. HENRY:
11 Q And it is _US10917737.
12 THE TECHNICIAN: Stand by, please. (Indicating.)
13 Uploading now.
14 THE WITNESS: Okay. Okay. I have it.
15 BY MR. HENRY:
16 Q Dr. Begault, what do you recognize Begault
17 Exhibit 6 to be?
18 **A United States Patent 10,917,737 B2.**
19 Q Do you know which claims of the '737 Patent are
20 asserted in this case?
21 **A I don't know exactly.**
22 Q Let's look at claim 1, please. Let me know when
23 you're there.
24 **A I will do that. I am at claim 1.**
25 Q Great. Do you see the first limitation recites,

188

1 Tracking with a wearable electronic device, WED, worn on a
2 head of a user, movement of a handheld portable electronic
3 device, HPED, held in the hand of the user, and continues
4 from there?
5 **A I see that.**
6 Q What's your understanding of what a wearable
7 electronic device, WED, is?
8 MR. ELLIOTT: Objection to form. Beyond the scope.
9 THE WITNESS: Well, I suppose I would give you the
10 obvious statement here, it's a device worn on the head of
11 a user. That's my understanding. I just -- I would have
12 to paraphrase that. I wouldn't know.
13 BY MR. HENRY:
14 Q Totally fine.
15 What's the -- would a head-mounted display be a
16 wearable electronic device worn on the head of a user in
17 your view?
18 **A Yes, it's an example of one.**
19 Q Would handheld controllers be an example of
20 handheld portable electronic devices?
21 **A Yes.**
22 Q Before 2014, were people using head-mounted
23 displays to track handheld controllers?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: Restate your question?

189

1 BY MR. HENRY:
2 Q Sure.
3 Before 2014, were people using head-mounted
4 displays to track handheld controllers?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: I don't believe people use head-mounted
7 displays to track the handheld controller. That's the
8 first time I've heard of that.
9 BY MR. HENRY:
10 Q What did they use?
11 **A For what?**
12 Q Tracking handheld controllers.
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: Well, it would be some sort of device
15 with a transmitter and a receiver. Could have been
16 optical. Could have been magnetic. Something to track
17 the hand. And it probably would be interfaced to some
18 sort of processor or computer.
19 BY MR. HENRY:
20 Q And were those types of units used in conjunction
21 with and on head-mounted displays before 2014?
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: I would agree with in conjunction with.
24 I wouldn't agree with the other part of your phrase, on, I
25 think was the word.

190

1 BY MR. HENRY:
2 Q You're not aware of any head-mounted display for
3 virtual reality, for example, that could track with its
4 components handheld controllers before 2014?
5 MR. ELLIOTT: Objection to form.
6 THE WITNESS: I'm not aware of the head track -- or
7 sorry, the head-mounted display itself tracking the hand
8 controller.
9 BY MR. HENRY:
10 Q What component of a virtual reality apparatus
11 that a human can wear on their head do you believe is a
12 head-mounted display?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: A stereo visual display.
15 BY MR. HENRY:
16 Q Are you talking about just the lenses of an HMD
17 or more than that?
18 MR. ELLIOTT: Objection to form.
19 THE WITNESS: That's an example.
20 BY MR. HENRY:
21 Q You know that there were head-worn virtual
22 reality devices that were capable of tracking handheld
23 controllers before 2014, right?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: No, I disagreed with that. I wasn't

191

1 ever aware of the head tracking device -- I'm sorry, the
2 head-mounted device tracking the hand.
3 THE STENOGRAPHIC REPORTER: Doctor, I do have a
4 question. A couple answers ago, did you say I would or I
5 wouldn't agree with in conjunction with? I wouldn't or
6 would agree with the other part of your phrase, on, I
7 think is the word? It's a bit hard to hear and
8 distinguish if you're saying would or wouldn't. So I just
9 wanted to clarify that.
10 THE WITNESS: Well, let me give you what I think it
11 was. I think it was would not, but then could you read
12 back the paragraph before that for me, and then we could
13 hear it in context.
14 THE STENOGRAPHIC REPORTER: Yes.
15 (Record read.)
16 THE WITNESS: Oh, no, what I said was I would agree
17 with the term in conjunction with. I would not agree with
18 the word on.
19 THE STENOGRAPHIC REPORTER: Perfect, thank you so
20 much.
21 BY MR. HENRY:
22 Q Dr. Begault, you talked about the Polhemus device
23 on the Convolvotron being on the headband of that device,
24 right?
25 **A That's correct.**

192

1 Q And that, headband presumably, would be worn on a
2 user's head, right?
3 **A Yes. Connected to the headphone strap.**
4 Q And that device was used for tracking gestures of
5 a data glove, right?
6 **A No. The Polhemus transmitter on the head was**
7 **used to track the position of the head. A separate**
8 **Polhemus transmitter is used on the glove.**
9 Q So --
10 **A So the head tracker -- the head tracking -- I'm**
11 **sorry. The head-mounted device is independent as a unit**
12 **from the data glove in that system.**
13 Q Are you aware that there were handheld
14 controllers that could communicate via infrared or
15 trackers in head-worn virtual reality apparatuses before
16 2014?
17 **A I was aware of optical tracking systems in**
18 **general.**
19 Q And were you aware that optical tracking systems
20 were used in virtual reality apparatuses to track handheld
21 controllers before 2014?
22 MR. ELLIOTT: Objection to form.
23 THE WITNESS: Yes.
24 BY MR. HENRY:
25 Q And were you aware that that tracking was

193

1 facilitated by a head-worn virtual reality apparatus?
2 MR. ELLIOTT: Objection to form.
3 THE WITNESS: My understanding is that the optical
4 systems for handheld controllers are separate streams of
5 information from the tracking of the head. So there might
6 be a central processing unit that takes in the information
7 from the two devices, but where I'm having difficulty is
8 that the head-mounted display is not in itself
9 communicating with the hand or vice versa.
10 They're communicating with the computer.
11 BY MR. HENRY:
12 Q Fair. But you're aware of head-worn virtual
13 reality apparatuses that had, for example, a camera on
14 them to sense handheld controller movement before 2014,
15 right?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: I'm not aware specifically of where the
18 cameras were in optical systems to track hand position.
19 My impression was that they were located -- what was the
20 name of that system? I can't remember the name of the
21 system that I'm thinking about. But typically the
22 handheld controller was sensed at a distance from the
23 person, not from their head, is my understanding.
24 BY MR. HENRY:
25 Q What do you mean by that, the sensor for the

194

1 handheld controllers was positioned elsewhere or the
2 sensor was positioned on the head? I'm not sure what you
3 mean.
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: If we are understanding each other,
6 which I'm not sure we are, my impression of the way that
7 the optical controllers worked was that there is a central
8 receiving point that would be receiving information from
9 some sort of transmission or light or magnetic field from
10 the head, that would be independent from the transmission
11 from a handheld device, and that those would be
12 assimilated at a central location away from a user, as
13 opposed to on their head.
14 BY MR. HENRY:
15 Q You're not aware of any systems existing before
16 2014 that would assimilate that information in the
17 head-mounted display?
18 MR. ELLIOTT: Objection to form.
19 THE WITNESS: Not in the head-mounted display itself.
20 I would think of it being assimilated in an external
21 processor.
22 BY MR. HENRY:
23 Q Are you aware of any head-mounted displays that
24 had internal processors for that assimilation before 2014?
25 MR. ELLIOTT: Objection to form.

195

1 THE WITNESS: I think that's the same question, and I
2 will give you the same answer.
3 BY MR. HENRY:
4 Q Which is?
5 **A No.**
6 Q Look at... actually, what methods of tracking
7 handheld controllers were known to people in the industry
8 before 2014?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: I can think of optical and magnetic.
11 BY MR. HENRY:
12 Q What actions could people perform with handheld
13 controllers in virtual reality environments before 2014?
14 MR. ELLIOTT: Objection to form.
15 THE WITNESS: I believe that one could perform
16 pointing, gestures, maybe gaming.
17 BY MR. HENRY:
18 Q Before 2014, was it known that people in virtual
19 reality environments could point their handheld
20 controllers at virtual objects to select them?
21 MR. ELLIOTT: Objection to form, speculation.
22 THE WITNESS: Yes.
23 BY MR. HENRY:
24 Q Before 2014, was it known that people in virtual
25 reality environments could point their controllers at

196

1 virtual objects to select them and move them?
2 MR. ELLIOTT: Objection to form.
3 THE WITNESS: Yes.
4 BY MR. HENRY:
5 Q Before 2014, was it known that people in virtual
6 reality environments could point their controllers at
7 virtual objects to select them to move them, and then a
8 virtual object's sound would move with it?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: I believe so, yes.
11 BY MR. HENRY:
12 Q Let's look at the fourth limitation of claim 1 of
13 the '737 Patent, please. Which begins, Processing by a
14 processor.
15 **A So this is claim 1, and we are looking at the**
16 **fourth limitation; is that correct?**
17 Q That's right.
18 **A 1, 2, 3, 4, yes. Okay.**
19 Q Okay. This is one of the processor terms that
20 you addressed in your declaration, right?
21 **A That's correct.**
22 Q Do you believe that before 2014 persons of skill
23 in the art would have known how to implement a system
24 performing the function recited in that limitation of
25 claim 1 by resorting to known audio DSP structures within

197

1 the art and common industry programming techniques or
2 software libraries?
3 MR. ELLIOTT: Objection to form.
4 THE WITNESS: Yes. Oh, yes.
5 BY MR. HENRY:
6 Q And what software libraries or audio DSP
7 structures were available before 2014 that a person of
8 skill could have used to perform the function recited in
9 the fourth limitation of claim 1 of the '737 Patent?
10 **A It would be my same answers as I gave you for the**
11 **prior patents that we've been discussing.**
12 Q Looking at that fourth limitation of claim 1 of
13 the '737 Patent, can you think of a computing device that
14 would perform the function recited in that limitation and
15 yet not be a processor as recited in claim 1?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: No. I really can't, given my
18 understanding of what the processor is doing.
19 BY MR. HENRY:
20 Q Can you look at claim 14, please, of the '737
21 Patent?
22 **A Yes.**
23 Q Okay. And the second limitation of claim 14 is a
24 lengthy one. But I want to invite your attention to the
25 clause that begins, Includes a processor that processes.

198

1 Do you see that?
2 **A I do.**
3 Q And that is the beginning of another term that
4 you addressed in your declaration as one of the processor
5 terms, right?
6 **A Yes. That's true.**
7 Q Now, did you believe that before 2014, persons of
8 skill in the art would have known how to implement the
9 system performing that function by resorting to known
10 audio DSP structures within the art and common industry
11 programming techniques at software libraries?
12 **A Yes, I do.**
13 Q Now, what audio DSP structures and software
14 libraries were available before 2014 that a person of
15 skill could have relied on to perform the function recited
16 in claim 14 of the '737 Patent?
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: Well, you were focusing on the part of
19 the clause that begins, Process of sound with head-related
20 transfer functions, which is what I addressed in my claim
21 terms. And so with that proviso, it would be the same
22 answer as I provided earlier.
23 BY MR. HENRY:
24 Q As you provided when I asked you that question
25 for the other patents?

199

1 **A With similar wording, yes.**
2 Q Can you think of a computing device that would
3 perform the following function recited in the language,
4 Includes a processor that processes sound with
5 head-related transfer functions, HRTFs, so sound
6 externally localizes as binaural sound that would do that
7 but not qualify as a processor as recited in claim 14 of
8 the '737 Patent?
9 MR. ELLIOTT: Objection to form.
10 THE WITNESS: No, I can't think of anything.
11 BY MR. HENRY:
12 Q We're going to circulate another exhibit now,
13 which will be Exhibit 7. And this one is going to be _ --
14 the file name for this is _US11290836.
15 (Whereupon Deposition Exhibit 7 was
16 marked for identification.)
17 THE TECHNICIAN: Stand by, Counsel. (Indicating.)
18 Should be in the chat now.
19 THE WITNESS: Okay. All right. I am open to the
20 document, Exhibit 7.
21 BY MR. HENRY:
22 Q Dr. Begault, what do you recognize the document
23 that's been marked Begault Exhibit 7 to be?
24 **A Patent -- United States Patent 11,290,836 B2.**
25 Q Dr. Begault, do you know which claims of the '836

200

1 Patent are asserted in this case?
2 **A I do not know off the top of my head.**
3 Q Let's look at claim 8 of the '836 Patent, please,
4 Dr. Begault. Let me know when you're there.
5 **A I am there.**
6 Q Okay. I'd like you to read the second limitation
7 of claim 8. It's a relatively lengthy one. And then my
8 question for you, which I'll give you now so you know, is
9 does that limitation recite two of the processor terms
10 that you addressed in your declaration?
11 **A Okay. Stand by.**
12 **Yes.**
13 Q The first is the term that begins, One or more
14 processors that process sound for the image to generate
15 binaural sound that has a sound localization point, SLP,
16 with a coordinate location that occurs at a far field
17 distance located behind the image and along a line of
18 sight from the user, right?
19 **A I see that.**
20 Q Okay. And the second processor term in the
21 second limitation of claim 8 that you addressed is wherein
22 the one or more processors include a digital signal
23 processor, DSP, that processes the sound for the image
24 with far-field head-related transfer functions, HRTFs,
25 right?

201

1 **A Yes, I see that.**
2 Q Do you believe that before 2014, persons of skill
3 in the art would have known how to implement systems
4 performing the functions recited in those terms by
5 resorting to known audio DSP structures within the art and
6 common industry programming techniques and software
7 libraries?
8 MR. ELLIOTT: Objection to form.
9 THE WITNESS: Yes.
10 BY MR. HENRY:
11 Q And what known audio DSP structures and software
12 libraries were available to persons of skill before 2014
13 that, in your view, could have been used to perform the
14 functions recited in the claim terms in the second
15 limitation of claim 8 that you called the processor terms
16 of that claim?
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: I would state the same answer as I have
19 for the prior patents.
20 BY MR. HENRY:
21 Q Can you think of any computing devices that would
22 perform the functions recited in the processor terms in
23 the second limitation of claim 8 of the '836 Patent but
24 not be the processor or the digital signal processor
25 recited in that limitation?

202

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: I want to make sure I understand. So
3 this refers to the use of a digital signal processor
4 that -- and it also refers to one or more processors. And
5 your question is, can I think of anything other than a
6 digital signal processor and other processors that would
7 accomplish these functions?
8 BY MR. HENRY:
9 Q No, my question for you is, can you think of any
10 computing device that would accomplish those functions
11 that would not constitute a digital signal processor as
12 recited in claim 8?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: I don't believe I can.
15 BY MR. HENRY:
16 Q We're going to put another exhibit in the chat
17 now, Dr. Begault. It's going to be Exhibit 8. And this
18 one is going to have the PDF file name _10368179.
19 (Whereupon Deposition Exhibit 8 was
20 marked for identification.)
21 THE TECHNICIAN: Stand by, please. (Indicating.)
22 THE WITNESS: Okay. I have it.
23 BY MR. HENRY:
24 Q Dr. Begault, what do you recognize the document
25 that's been marked Begault Exhibit 8 to be?

203

1 **A United States Patent 10,368,179 B1.**
2 Q Dr. Begault, do you know what claims have been
3 asserted from the '179 Patent in this case?
4 **A No, I don't know off the top of my head.**
5 Q Let's look at claim 14, please, of the '179
6 Patent.
7 **A I am at claim 14.**
8 Q Now, I'd like to look at the third limitation
9 that begins with the word processing. Are you there?
10 **A Yes.**
11 Q Okay. And the third limitation of claim 14
12 reads, Processing by a digital signal processor, DSP,
13 sound with the HRTFs to generate binaural sound that
14 externally localizes in empty space in the virtual image
15 in the environment. Do you see that?
16 **A I do.**
17 Q Do you believe that before 2014, persons of skill
18 would have known how to implement systems performing the
19 function recited in that limitation by resorting to known
20 audio DSP structures within the art and common industry
21 programming techniques and software libraries?
22 **A I do.**
23 Q What known audio DSP structures and software
24 libraries could a person of skill have resorted to before
25 2014 to use to perform the function recited in the third

204

1 limitation of claim 14 of the '179 Patent?
2 MR. ELLIOTT: Objection to form.
3 THE WITNESS: Same answer as given for the other
4 patents for similar material.
5 BY MR. HENRY:
6 Q Can you think of any computing device that would
7 perform the function of processing sound with HRTFs to
8 generate binaural sound that externally localizes an empty
9 space from a virtual image in an environment that, in your
10 opinion, would not be a digital signal processor, DSP, as
11 recited by claim 14 of the '179 Patent?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: I believe your question was about a
14 computing device. Did I hear that correctly? So I could
15 think of how this might be implemented not with a physical
16 digital signal processor but by a CPU or an ASIC or some
17 other hardware solution.
18 BY MR. HENRY:
19 Q And would you consider a CPU or an ASIC
20 implementing the function recited in the third limitation
21 of claim 14 of the '179 Patent to not be a digital signal
22 processor as recited in claim 14?
23 **A It would depend if we're talking about a physical**
24 **object or a software implementation. I mean, if we can --**
25 **sometimes digital signal processor, or DSP, can refer to**

205

1 **software algorithm or a software process. And sometimes**
2 **it can refer to a specific chip.**
3 **So that clarification applies to all of the**
4 **patents that we've discussed so far.**
5 Q Can you think of any computing device -- strike
6 that.
7 Under what circumstances would a CPU or ASIC that
8 performs the recited function of claim 14 of the '179
9 Patent not be a digital signal processor in your view?
10 MR. ELLIOTT: Objection to form.
11 THE WITNESS: I can't think of one off the top of my
12 head if I understand your question correctly.
13 BY MR. HENRY:
14 Q Can you think of any circumstances under which
15 any other computing device that performs the function
16 recited in that third limitation of claim 14 of the '179
17 Patent would not be a digital signal processor as recited
18 in claim 14?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: So let me paraphrase. Is your question,
21 can I think of a computing device that could not
22 accomplish digital signal processing?
23 BY MR. HENRY:
24 Q No, that's not my question.
25 We talked about CPUs and ASICs already. Now

206

1 putting those aside, my question is can you think of any
2 other computing device that would perform the function of
3 the third limitation of claim 14 of the '179 Patent, but
4 that in your view, would not constitute a digital signal
5 processor as recited in claim 14?
6 **A No, I can't think of one.**
7 Q Do you see in -- still in claim 14, but the first
8 limitation after the preamble recites, Storing
9 head-related transfer functions, HRTFs, in memory?
10 **A I see that.**
11 Q Before 2014, were people of skill in the art
12 storing HRTFs in memory?
13 **A Yes, they were.**
14 Q Before 2014, were people of skill in the art
15 storing HRTFs in cache memory?
16 **A I believe so.**
17 Q Do you know if before 2014, head-mounted displays
18 had memory in them?
19 **A I don't know.**
20 Q I'd like to look at the last limitation of claim
21 14 now that begins with, Alerting. Are you there?
22 **A I see it.**
23 Q Okay. Your work in the industry before 2014,
24 involved work on alerts, in some circumstances, right?
25 MR. ELLIOTT: Objection to form.

207

1 THE WITNESS: I -- I've worked in, not properly in
2 industry, but worked for government in the area of alerts.
3 BY MR. HENRY:
4 Q And you've published papers on using spatialized
5 3D audio as alerts, right?
6 **A This is correct.**
7 Q Before 2014, right?
8 MR. ELLIOTT: Objection to form.
9 THE WITNESS: Yes.
10 BY MR. HENRY:
11 Q What types of alerts were known to people in the
12 industry that were spatialized audio alerts before 2014?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: What type of alerts? I think it was
15 fairly wide variety of different alerts. There were
16 auditory icons that were symbolic sounds that were
17 sometimes used. Plane tones. I experimented with caution
18 and warning alerts on aircraft.
19 BY MR. HENRY:
20 Q Were verbal instructions used as alerts before
21 2014?
22 **A Yes.**
23 Q Now, what about -- what about a situation where
24 you're walking into a virtual wall, were crashing sounds
25 used in that situation as a type of alert?

208

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: I don't know if it would be technically
3 an alert. Maybe it was an alert. Maybe it could be some
4 sort of environment simulation not intended to alert.
5 When you say alert, I'm thinking specifically of alarms or
6 things meant to improve one's interaction with a computing
7 device.
8 BY MR. HENRY:
9 Q Fair enough.
10 But the crashing sound when people walked into
11 virtual walls as a form of feedback was known before 2014,
12 right?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: That sounds very familiar.
15 BY MR. HENRY:
16 Q You actually discuss that in your reference book,
17 right?
18 **A I don't recall that example, but I'm sure I did.**
19 **Because I recall the example.**
20 Q Was it known before 2014, that you could switch
21 the nature of sound being heard by a user as a form of
22 alert, for example, switching from monaural sound to
23 binaural sound or stereo sound?
24 MR. ELLIOTT: Objection to form, irrelevant.
25 THE WITNESS: There are systems prior to 2014, that

209

1 could switch sounds from -- well, using different types of
2 spatial display, yes.
3 BY MR. HENRY:
4 Q And could those systems switch sounds from
5 binaural audio to stereo audio or monaural audio as a form
6 of alert?
7 MR. ELLIOTT: Objection to form.
8 THE WITNESS: Yes.
9 BY MR. HENRY:
10 Q Are you familiar with chaperon systems or
11 redirected walking?
12 **A No, not specifically.**
13 Q Do you have any sense of what I mean when I ask
14 about chaperon systems?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: I could speculate.
17 BY MR. HENRY:
18 Q I mean systems that helped users stay within a
19 certain area in a virtual environment. Does that help?
20 **A I was thinking about guidance systems for the**
21 **blind. There have been virtual audio systems used to help**
22 **blind folks or visually challenged folks navigate through**
23 **cityscapes for instance.**
24 Q Interesting.
25 In general environments?

210

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: If the person was completely unsighted,
3 then it would just be audio.
4 BY MR. HENRY:
5 Q All right. I didn't understand what you meant by
6 helping people navigate through a cityscape.
7 Was it actually an audio system to help you walk
8 through a city?
9 **A Yes. There would be beacons.**
10 Q In a real city, not in a virtual setting. Is
11 that what you're referring to?
12 MR. ELLIOTT: Objection to form, irrelevant.
13 THE WITNESS: Yeah, there have been systems like that
14 that have been tested.
15 BY MR. HENRY:
16 Q Have there been system that in which spatial
17 audio was used as a navigation aid in a virtual
18 environment before 2014?
19 **A I'm pretty sure there was.**
20 Q Even though your focus wasn't on digital elements
21 of virtual environments, were you familiar with any
22 systems that existed before 2014 where virtual boundaries,
23 images were presented to people to keep them within a set
24 virtual environment space?
25 MR. ELLIOTT: Objection to form. Calling for further

211

1 speculation.
2 THE WITNESS: I'm sorry. What were these boundaries?
3 How were they --
4 BY MR. HENRY:
5 Q The image of a fence, for example --
6 **A Oh, yes, I've heard of that.**
7 Q And you heard of that before 2014?
8 **A Yes. Yes. I've also heard about beacon systems**
9 **in virtual reality.**
10 Q Those were known to you and others before 2014?
11 MR. ELLIOTT: Objection to form.
12 THE WITNESS: That's correct.
13 BY MR. HENRY:
14 Q Do you know what -- have you heard about -- have
15 you heard the term redirected walking before I asked you
16 that question?
17 **A No.**
18 Q We are going to put in the chat now, Begault
19 Exhibit 9, which is going to be _US 10448184 for the PDF
20 file name.
21 (Whereupon Deposition Exhibit 9 was
22 marked for identification.)
23 THE TECHNICIAN: Stand by. (Indicating.)
24 THE WITNESS: Okay. It arrived. Give me a moment to
25 open it.

212

1 BY MR. HENRY:
2 Q Of course.
3 **A Okay. It is open, Begault Exhibit 9.**
4 Q And, Dr. Begault, what do you recognize Begault
5 Exhibit 9 to be?
6 **A United States Patent 10,448,184 B1.**
7 Q Dr. Begault, do you know which claims of the '184
8 Patent are asserted in this case?
9 **A Not off the top of my head.**
10 Q Let's look at claim 14, please, Dr. Begault.
11 **A Okay.**
12 **Okay. I am there.**
13 Q And I'd like to look at the third limitation of
14 that claim, which reads, Processing by a digital signal
15 processor, DSP, sound with the HRTFs to generate binaural
16 sound that externally localizes to the user at the virtual
17 image in the environment. Do you see that?
18 **A I do.**
19 MR. ELLIOTT: Pardon me, claim 7?
20 MR. HENRY: No. Claim 14.
21 MR. ELLIOTT: 14, thank you.
22 MR. HENRY: Sure.
23 BY MR. HENRY:
24 Q Dr. Begault, this third limitation of claim 14 of
25 the '184 Patent is one that you addressed in your

213

1 declaration, right?
2 **A That is correct.**
3 Q It's one of the processor terms that you
4 addressed?
5 **A It is.**
6 Q And do you believe that before 2014, persons of
7 skill in the industry would have known how to implement a
8 system performing the function recited in the third
9 limitation of claim 14 of the '184 Patent by resorting to
10 known audio DSP structures and common industry programming
11 techniques and software libraries?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: I -- I do.
14 BY MR. HENRY:
15 Q What known audio DSP structures and software
16 libraries were available before 2014, that a person of
17 skill could use to perform the function recited in claim
18 14 of the '184 Patent?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: I'll refer to my same answer that I gave
21 for similar phrasing of these processor terms, with
22 relationship to the other patents that we discussed
23 earlier.
24 BY MR. HENRY:
25 Q Can you think of a computing device that would

214

1 perform the function recited in the third limitation of
2 claim 14, but that in your opinion, would not be a digital
3 signal processor as recited in claim 14?
4 MR. ELLIOTT: Objection to form.
5 THE WITNESS: Again, the limitation says processing by
6 a digital signal processor. So by definition, this is
7 processing by a DSP.
8 BY MR. HENRY:
9 Q And can you think of any computing device, be it
10 CPU, ASIC or any other computing device, that would
11 perform the function recited in the third limitation of
12 claim 14 of the '184 Patent, but that in your view, would
13 not constitute a digital signal processor as recited by
14 that claim?
15 **A No. That seems contradictory. I can't think of**
16 **something that isn't a digital signal processor that**
17 **functions as a digital signal processor.**
18 Q So you can't identify for me any -- sitting here
19 today, any computing device that in your view, could
20 process sound with HRTFs to generate binaural sound that
21 externally localizes to a user at a virtual image in an
22 environment that, in your opinion, would not be a digital
23 signal processor?
24 MR. ELLIOTT: Objection to form.
25 THE WITNESS: Again, if digital signal processing is

215

1 involved, then per this limitation, the processing has to
2 involve digital signal processing.
3 BY MR. HENRY:
4 Q So if you are able, identify for me any computing
5 device that could perform the recited function in the
6 third limitation of claim 14 of the '184 Patent, but that
7 in your view, is not a digital signal processor.
8 MR. ELLIOTT: Objection to form.
9 THE WITNESS: Well, it depends on our definition of
10 digital signal processor, if we want to talk about a CPU
11 doing an implementation of digital signal processing as
12 distinct from a digital signal processor, then there's an
13 example. But otherwise, if we're talking generically
14 about the idea of digital signal processing being done by
15 an ASIC, being done by software, being done by a
16 specialized chip, et cetera, et cetera, et cetera, these
17 different ways of accomplishing the processing could all
18 be used to accomplish the limitation as stated.
19 BY MR. HENRY:
20 Q Is there a way that a CPU can do an
21 implementation of digital signal processing that is
22 distinct from a digital signal processor in your view?
23 **A They would be distinct in the way that they would**
24 **handle memory and probably in other ways too, maybe the**
25 **way that things are addressed as well.**

216

1 Q CPUs are different than digital signal processors
2 in your view?
3 **A Well, they can perform exactly the same function.**
4 Q Are CPUs digital signal processors?
5 **A The CPU can mimic a digital signal processor's**
6 **function.**
7 Q Is a CPU a digital signal processor?
8 **A That depends if you define a digital signal**
9 **processor as an external chip or if you consider a digital**
10 **signal processor an algorithm that sits in the CPU.**
11 Q Well, I'm asking you, Dr. Begault, because you
12 remember, you opined on what a digital signal processor is
13 in this case, right?
14 **A At what point?**
15 Q In your declaration.
16 **A Would you like to point me to what you're**
17 **referring to?**
18 Q Sure.
19 You have a section on digital signal processor in
20 paragraph 14 of your declaration.
21 **A Okay. Yes, I see it.**
22 Q So we can agree that you've offered opinions on
23 what the term digital signal processor means in this case,
24 right?
25 **A Yes. And paralleling what I gave you as an**

217

answer a couple minutes ago.
Q Okay. So based on -- applying your understanding of what a digital signal processor is, do you draw any distinction between CPUs and digital signal processors?
MR. ELLIOTT: Objection to form.
THE WITNESS: I draw distinction in the means of -- or the way that the processing might be implemented, a POSITA -- I'm sorry, a person of skill in the art would know that different approach might be required to program a digital signal processor that was a dedicated digital signal processor as an external chip, for instance, than they would to program a convolution process, let's say, on a CPU.
There might be different approaches with the same end result.
BY MR. HENRY:
Q Can we agree that CPUs are different than digital signal processors?
A Well, not necessarily, because again, CPUs, central processing unit, can have several threads designed in the way that the architecture is designed, and various threads can be assigned to work specifically to mimic what a hardware DSP chip would do.
Q If we're looking at the third limitation of claim 14, Dr. Begault, are you with me?

218

A I'm with you.
Q Okay. Claim 14 of the '184 Patent, just to be clear. Right?
A I'm looking at it at the top of column 48, yes.
Q If you had a CPU that processed sound with HRTFs to generate binaural sound that externally localizes to the user at the virtual image in the environment, in your opinion, would that CPU be a digital signal processor, DSP, as required by claim 14 of the '184 Patent?
MR. ELLIOTT: Objection to form.
THE WITNESS: It could be. It's possible to mimic within a CPU the function of a hardware DSP.
BY MR. HENRY:
Q Well, I'm asking you if you had a CPU there that performed that function in claim 14 of the '184 Patent specifically, would you consider that to be a digital signal processor, DSP?
MR. ELLIOTT: Objection to form, asked and answered, argumentative, badgering the witness.
THE WITNESS: The CPU would have, as part of its structure or the way that the CPU is comprised with its various threads, a portion of it that would be a digital signal processor.
BY MR. HENRY:
Q Can you identify any computing device that would

219

perform the recited function of claim 14 of the '184 Patent, but that you would consider to not need a digital signal processor?
MR. ELLIOTT: Objection to form.
THE WITNESS: All I can imagine is a computing device that lack -- if I'm understanding your question correctly, I could imagine hypothetically a computing device that lacked the computational power to execute the signal processing required by the limitation.
BY MR. HENRY:
Q But that device then would not be able to perform that function, right?
MR. ELLIOTT: Objection to form.
THE WITNESS: I gave you an answer there that I could imagine hypothetically, a computing device that would be incapable of performing the digital signal processing due to, I suppose memory limitations or speed limitations of that CPU, like an older -- very old computer.
BY MR. HENRY:
Q So can you identify for me any computing device that is capable of performing the recited function in claim 14 of the '184 Patent that you would believe is not a digital signal processor as claim 14 recites?
MR. ELLIOTT: Objection to form.
THE WITNESS: Well, I answered you earlier. I can

220

imagine a computing device that does not have the capability to implement digital signal processing due to lack of memory or speed.
BY MR. HENRY:
Q And I just asked you if there's any computing device that has the capacity of performing this recited function that you --
A Oh, that was your -- oh, sorry.
Q Yeah, that was my question.
-- that you would consider to not be a digital signal processor.
MR. ELLIOTT: Objection to form.
THE WITNESS: So read that question again?
BY MR. HENRY:
Q Sure.
Can you identify for me any computing device that has the capacity to perform the recited function in claim 14 of the '184 Patent that you would consider to not be a digital signal processor?
MR. ELLIOTT: Objection to form.
THE WITNESS: If it -- if there was a computing device that had the capability but did not have the digital signal processing implemented in it, that would be an example.

221

1 BY MR. HENRY:
2 Q Can you give me any other example of a computing
3 device that you believe wouldn't qualify as a digital
4 signal processor as recited in claim 14 of the '184
5 Patent?
6 MR. ELLIOTT: Objection to form.
7 THE WITNESS: No. I've given you some examples.
8 MR. HENRY: Let's take a break. Let's go off the
9 record.
10 MR. ELLIOTT: That's fine.
11 THE WITNESS: How long?
12 THE VIDEOGRAPHER: The time is 1614. We're going off
13 the record.
14 (Recess taken.)
15 THE VIDEOGRAPHER: The time is 1621. We are back on
16 the record.
17 BY MR. HENRY:
18 Q All right. Dr. Begault, we are going to
19 circulate another exhibit now. It will be Begault
20 Exhibit 10.
21 (Whereupon Deposition Exhibit 10 was
22 marked for identification.)
23 BY MR. HENRY:
24 Q And the file name for this one is 2023 04 12,
25 parentheses, 83-14 Exhibit 3.

222

1 THE TECHNICIAN: Stand by, Counsel. (Indicating.)
2 It's uploading right now.
3 MR. HENRY: Thank you.
4 THE TECHNICIAN: And it should be ready now.
5 THE WITNESS: Okay. I have it. Give me a moment to
6 open it.
7 MR. ELLIOTT: It's not wanting to open for me. There
8 we go.
9 THE WITNESS: It's rather large. All right.
10 Exhibit 3, 243 pages. And this appears to be Exhibit 10
11 and a copy of my reference book in the NASA version from
12 April 2000.
13 BY MR. HENRY:
14 Q Now, so just for, because there's that -- there's
15 a cover page that says Exhibit 3 on this, right, which is
16 what you were referring to, Dr. Begault.
17 **A Yes. It says Exhibit -- I'm sorry.**
18 Q That's fine.
19 **A It says Exhibit 3 on page 1. But on the bottom**
20 **right-hand corner, it says, Exhibit Begault-10.**
21 Q That's right. This is Begault Exhibit 10.
22 And you see that this is a copy of your reference
23 book that we discussed earlier, right?
24 **A That's correct.**
25 Q Okay. And the title of that book is, 3-D sound

223

1 for Virtual Reality and Multimedia, right?
2 **A That's correct.**
3 Q And this version of your book is dated
4 April 2000. Do you see that?
5 **A Yes.**
6 Q Okay.
7 **A Where do you see April? Oh, down there at the**
8 **bottom. Yes, I see it. Yes.**
9 Q And this was -- this book was publicly available
10 before 2014?
11 **A It was available in 1994.**
12 Q Well, not this 2000 version, right, but this
13 version was available before 2014, right?
14 **A Oh, yes. The year 2000 was before the year 2014.**
15 Q And your reference book was publicly available in
16 2000?
17 **A And also available in 1994.**
18 Q Thank you.
19 I'd like to scroll down to page 4, but it's PDF
20 17, if you want to navigate that way.
21 **A Okay. Page -- with the subtitle,**
22 **Source-medium-receiver Model.**
23 Q That's right. We're on the same page.
24 Now, Dr. Begault, in that section, do you see the
25 third sentence that reads, Note that spatial auditory

224

1 images are not confined to two-ear or binaural hearing.
2 One-ear hearing can provide spatial cues as proven by
3 experience with telephone conversations?
4 **A I do.**
5 Q Is it possible for a person using a telephone to
6 perceive sound as though it originates from a location
7 external to the person on the phone?
8 MR. ELLIOTT: Objection to form.
9 THE WITNESS: Restate your question, please, so I can
10 answer it accurately.
11 BY MR. HENRY:
12 Q Sure.
13 Is it possible for a person using a telephone to
14 perceive sound as though it originates from a location
15 external to a person on the phone?
16 MR. ELLIOTT: Objection to form.
17 THE WITNESS: So when you say a person on the phone,
18 you mean, as an example, I'm holding up a Western Electric
19 telephone handset to my ear, and I'm listening to somebody
20 talk to me. Okay. And then your question is, is it
21 possible to hear that person spatially that's
22 communicating to me over that phone handset?
23 BY MR. HENRY:
24 Q Sure. We can start there.
25 Is it possible?

Meta Platforms, Inc.
Exhibit 1095
Page 057

225

1 **A Yeah.**
2 Q Okay.
3 **A The example I was thinking about here -- I'm**
4 **sorry. I'll just give you an example here. When I wrote**
5 **this, I was thinking about, for instance, you could hear**
6 **somebody in the background on a single-ear telephone,**
7 **old-fashioned telephone, and you could hear somebody**
8 **talking close to you. And so you would have a distance**
9 **cue that you could hear with one ear.**
10 Q Got it. Thank you for that explanation.
11 Okay. You see in the same page on the last
12 paragraph, the paragraph that begins, While the source,
13 are you there?
14 **A Yes.**
15 Q Okay. And do you see the sentence that reads,
16 Natural spatial hearing seldom involves the single source,
17 whereas virtual spatial hearing with a 3-D sound system
18 involves the positioning of each of a number of sources
19 individually?
20 **A Yes, I see that sentence.**
21 Q What does it mean -- what did you mean when you
22 wrote, Virtual spatial hearing with a 3-D sound system
23 involves the positioning of each of a number of sources
24 individually?
25 **A Well, I'll try to paraphrase that for you.**

226

1 **That -- are you concerned with the second part of the**
2 **sentence, or how does it differ from the first part of the**
3 **sentence.**
4 Q You can tell me what you meant by the sentence.
5 That's fine. I just want to know what you meant by that
6 sentence.
7 **A Oh, well, I meant that if you use a 3-D sound**
8 **system, oftentimes a number of sound sources are**
9 **positioned to different locations. They don't have to be,**
10 **but virtual spatial hearing with a 3-D sound system**
11 **typically did involve or does involve in positioning a**
12 **number of sources. We might even just position a single**
13 **source, actually.**
14 Q And whether you're positioning one source or
15 positioning multiple sources, who does that positioning?
16 **A Well, that could be an algorithm. That could be**
17 **a person interacting with an algorithm.**
18 Q Oh, I meant if this is -- maybe I was
19 misunderstanding, but this is sort of in virtual reality,
20 right?
21 **A Well, I was speaking here about virtual spatial**
22 **hearing with a 3-D sound system.**
23 Q Oh, so virtual environment. All right. So if
24 you're in a virtual environment and you're positioning
25 sound sources at one or more locations, is it the listener

227

1 who's doing that, the designer of the environment? Who's
2 doing the positioning?
3 **A Well --**
4 MR. ELLIOTT: Objection.
5 THE WITNESS: In the context of this sentence, it was
6 the -- it's the prescriptive aspect. What a sound
7 designer might do with a 3D audio system. You're doing
8 the positioning. It's a different matter about how I
9 would hear those positions.
10 BY MR. HENRY:
11 Q Understood.
12 So this was prescriptive and directed towards the
13 designer of the environment for the user's subsequent
14 listening. Is that fair?
15 **A Yes. I was saying -- when I said it involves the**
16 **positioning, I was talking about the prescriptive portion**
17 **of the 3D audio system. When I talk about virtual spatial**
18 **hearing with the 3D audio system, that's talking about the**
19 **result. So I can prescribe, for instance, that I want you**
20 **to hear a sound in front of you. You may hear the sound**
21 **behind you because sound sources, as we hear them, can be**
22 **in different locations than the sound position we**
23 **prescribed. Which was one of my problems with defense's**
24 **claim construction for HRTF.**
25 Q I understand.

228

1 So if there's a -- you can't guarantee that I
2 will not experience a reversal error, for example, right?
3 **A Absolutely true --**
4 MR. ELLIOTT: Objection to form and irrelevant.
5 THE WITNESS: I probably can't guarantee anything for
6 you.
7 BY MR. HENRY:
8 Q Sure. Sure.
9 I didn't think that was a problematic question.
10 But -- strike that.
11 But what you're referring to in the sentence that
12 we're talking about is actually a, you know, prescription
13 of locations for sound sources, and then subsequently
14 whether a listener perceives them to be in those locations
15 is a different matter; is that fair?
16 **A I think that's fair.**
17 MR. ELLIOTT: Objection to form.
18 THE WITNESS: Sorry.
19 I believe that's fair.
20 BY MR. HENRY:
21 Q Thank you.
22 If you go to page 8 of your reference book, let
23 me know when you're there.
24 **A I am there.**
25 Q And I'd like to look at the paragraph that starts

229

1 with, Virtual reality and multimedia systems and then has
2 the enumerated 1, 2, 3, just to orient you. Okay?
3 **A Yes.**
4 Q Okay. And you see where you wrote, A hardware
5 component definition of a virtual reality system usually
6 involves the following elements, and then you listed the
7 three subparagraphs?
8 **A Yes.**
9 Q Okay. Some of the elements that you identified
10 as being usually involved in a virtual reality system in
11 your reference book included head-mounted displays,
12 headphones, and force feedback devices, right?
13 **A That is --**
14 MR. ELLIOTT: Objection -- objection to form, scope,
15 irrelevant.
16 THE WITNESS: That is what I wrote.
17 BY MR. HENRY:
18 Q And at the time you wrote that, did virtual
19 reality systems usually involve those elements?
20 MR. ELLIOTT: Objection to form, scope, irrelevant.
21 THE WITNESS: They were typically defined that way.
22 Some were more successful than others at actually
23 implementing all these things.
24 BY MR. HENRY:
25 Q Okay. And you also wrote in your reference book

230

1 that virtual reality system usually involves sensors,
2 hardware such as magnetic or mechanical position trackers
3 six-degrees-of-freedom trackball, speech analyzers, and
4 data gloves. Do you see that?
5 **A Yes, I do.**
6 Q At the time you wrote this reference book, did
7 virtual reality systems usually involve those components?
8 MR. ELLIOTT: Objection; form, scope, and irrelevant.
9 THE WITNESS: They involved them either by intention
10 or by actual implementation.
11 BY MR. HENRY:
12 Q What is a -- actually, you mentioned earlier on
13 six-degree-of-freedom capability, and I see that -- I see
14 language here six-degrees-of-freedom trackballs. What is
15 six degrees of freedom referring to?
16 MR. ELLIOTT: Objection to form and irrelevant.
17 THE WITNESS: Well, three degrees of freedom might be,
18 for instance, tracking the head in terms of the pitch,
19 yaw, and roll, and then we can add another three degrees
20 of freedom in terms of the XY position of the human
21 themselves.
22 THE STENOGRAPHIC REPORTER: I'm sorry, Doctor. It
23 sounded like you said John roll. What did you say?
24 THE WITNESS: Pitch, yaw, y-a-w, and roll, r-o-l-l.
25 THE STENOGRAPHIC REPORTER: Thank you.

231

1 MR. HENRY: It's actually pitch, if that didn't come
2 through with a P.
3 THE STENOGRAPHIC REPORTER: Thank you.
4 THE WITNESS: And those kind of rolls taste terrible.
5 BY MR. HENRY:
6 Q All right. What is a sixth-degree-of-freedom
7 trackball?
8 MR. ELLIOTT: Objection to form, irrelevant.
9 THE WITNESS: It's been a long time since I've thought
10 about this six-degree-of-freedom trackball. I know that I
11 saw one that was claimed to be that. I believe it was a
12 mouse-like device that you could rotate the trackball to
13 indicate pitch, yaw, and roll, and then the stand that
14 that trackball was mounted on could also be moved.
15 BY MR. HENRY:
16 Q And the XYZ coordinates to be six?
17 **A Yeah. And I'm trying to picture it. It's been**
18 **so many years since I've seen a sixth-degree-of-freedom**
19 **trackball. They didn't exactly take off.**
20 Q I was going to say, if it -- holding it, moving
21 it in the Z direction seems a little bit odd.
22 **A Yes.**
23 Q Okay. All right. Let's see.
24 Was the Polhemus tracking system we've discussed
25 previously a six-degree-of-freedom system?

232

1 MR. ELLIOTT: Objection to form and irrelevant.
2 THE WITNESS: Yes. I think it could be configured to
3 work that way, but I think you needed an extra sensor or
4 something like that. So it could be configured that way.
5 A lot of times it was just used as a
6 three-degree-of-freedom device.
7 BY MR. HENRY:
8 Q If you had pitch, yaw, and roll, usually what
9 additional sensor would you need to give you the ability
10 to move in the X, Y, and Z directions for six degree of
11 freedom with the Polhemus?
12 MR. ELLIOTT: Objection to form, irrelevant.
13 THE WITNESS: You're really testing my memory here,
14 but I believe that at least an extra receiver was needed.
15 I don't know if a separate transmitter was needed. And
16 that was the earliest generation of Polhemus, or as we
17 call them, Polhemi. That's P-o-l-h-e-m-i. I don't
18 know -- and I can't recall the capabilities of later
19 systems.
20 They might have made it so that multiple trackers
21 and, you know, transmitters and receivers could be
22 operated from the same external hardware device.
23 BY MR. HENRY:
24 Q Thank you.
25 And can you look at page 13, please.

Meta Platforms, Inc.
Exhibit 1095
Page 059

233

1 **A Page 13.**
2 Q Yeah. And you see the header, So what is 3-D
3 sound good for?
4 **A Yes.**
5 Q And the last paragraph -- strike that.
6 The first sentence of the paragraph at the bottom
7 of page 13 of your reference book reads, 3-D sound can
8 contribute to the sense of immersivity in a 3-D
9 environment. Do you see that?
10 **A I do.**
11 Q Do you agree with that statement?
12 MR. ELLIOTT: Objection to form and irrelevant.
13 THE WITNESS: My opinion has not changed about that.
14 BY MR. HENRY:
15 Q And the next sentence reads in part, One might be
16 able to work more effectively within a VR environment if
17 actions were accompanied by appropriate sounds that
18 seemingly emit from their proper locations. Do you see
19 that?
20 **A (Indecipherable utterance.)**
21 MR. ELLIOTT: Objection to form and irrelevant.
22 BY MR. HENRY:
23 Q Did you answer, Dr. Begault? If it did, it
24 didn't come through.
25 **A Oh, I'm sorry, I -- what was your question? Do I**

234

1 **agree with that statement?**
2 Q Do you see that statement?
3 **A I see that statement, yes.**
4 Q Do you agree with that?
5 MR. ELLIOTT: Objection to form and irrelevant.
6 THE WITNESS: I'll agree -- yes, I agree with that
7 statement. I'd like to emphasize the words might, as in
8 might be able. There could be situations where one might
9 be able to work more effectively if sounds did not emit
10 from their, quote/unquote, proper locations.
11 I think this was a reference to people using
12 monaural sound, let's say, but with digital graphics. It
13 didn't conceive of the advantage of having maybe
14 separation locations for sound and virtual images, in this
15 sentence at least.
16 BY MR. HENRY:
17 Q Do you agree that it might be helpful for users
18 in a VR environment if actions are accompanied by
19 appropriate sounds seemingly emitting from their proper
20 locations?
21 MR. ELLIOTT: Objection to form and irrelevant.
22 THE WITNESS: It may and it may not. It depends on
23 the particular context, what one is trying to accomplish.
24 BY MR. HENRY:
25 Q And before 2014, people in the industry would

235

1 know that in some context, it might help, and in some
2 context it might not; is that fair?
3 MR. ELLIOTT: Objection irrelevant and form.
4 THE WITNESS: I don't know the answer to that
5 question.
6 BY MR. HENRY:
7 Q And you believed before 2014 and wrote in your
8 reference book that in certain circumstances, it could
9 help if sounds seemingly emit from their proper locations
10 in VR environments, right?
11 MR. ELLIOTT: Objection to form, also irrelevant.
12 THE WITNESS: Well, if you go to the topic, What is
13 3-D sound good for, that was being contrasted with non-3-D
14 sound, which typically was monaural sound, et cetera. So
15 the context for this sentence was what -- why go to the
16 trouble, at that time in particular, to implement 3-D
17 sound, what would be the advantages of doing so.
18 And so one possibility would be that you might be
19 able to work more effectively within the environment if
20 sounds came from their proper locations. However, even
21 during the time this was written, for instance, the Ames
22 Spatial Auditory Display, I had implemented systems where
23 sounds didn't come from a, quote/unquote, proper location.
24 It came from locations meant to optimize performance, for
25 instance, or to improve the user experience.

236

1 BY MR. HENRY:
2 Q What would be an advantage of having a sound
3 seemingly emit from its, as you said here, proper
4 location?
5 **A What would be the --**
6 MR. ELLIOTT: Objection. Objection to form.
7 Objection --
8 BY MR. HENRY:
9 Q What would be an advantage --
10 MR. ELLIOTT: Objection; irrelevant.
11 THE WITNESS: An advantage of sound being emitted from
12 the same location from a, quote/unquote, proper location?
13 BY MR. HENRY:
14 Q Yes.
15 **A What would be the advantage, in other words --**
16 Q What would be the advantage?
17 **A I believe one of the advantages could be for**
18 **the -- how could I put this -- the synthesis of the**
19 **auditory object with the visual object in one location.**
20 **So if that were important, for instance, if you had a**
21 **moving object and the sound came from the same direction**
22 **as the moving object, then that sense of motion could be**
23 **improved. As opposed to only seeing a truck pass by,**
24 **let's say, but hearing it monaural.**
25 Q And that was an advantage that you were aware of

237

1 before 2014; is that fair?
2 MR. ELLIOTT: Objection to form and irrelevant.
3 THE WITNESS: Was I rare of the advantage I wrote
4 about in 1994? Yes, I was.
5 BY MR. HENRY:
6 Q And actually, if you flip down to the next page,
7 page 14 of your reference book, do you see where you wrote
8 in the first sentence of the first full paragraph, Sound
9 provides an important channel of feedback that either can
10 be helpfully redundant to a visual cue or can provide
11 feedback for actions in situations that are out of field
12 of view of the listener?
13 **A Correct.**
14 Q In what -- you were just describing with the
15 truck moving and sort of sound -- associated sound moving
16 with it, is that what you're referring to here as a
17 redundant visual cue?
18 MR. ELLIOTT: Objection to form and irrelevant.
19 THE WITNESS: Oh, I think I was referring to that in
20 part, let me think here. I believe I was focusing in this
21 paragraph, on the topic sentence of situational awareness.
22 So here, I was thinking about high-stress human
23 interfaces, like a pilot or something of that sort.
24 For instance, if you picture a cockpit display or
25 something in a space shuttle at the time, different

238

1 warning devices could be lit from different locations.
2 And so helpfully redundant to a visual cue meant that you
3 could direct your eyes to the location of the alert --
4 visual alert, which frequently was associated with a
5 button for instance.
6 BY MR. HENRY:
7 Q And was -- were you discussing visual cues in
8 reality or in a virtual environment setting here?
9 MR. ELLIOTT: Objection to form, irrelevant.
10 THE WITNESS: Both.
11 BY MR. HENRY:
12 Q And so then the audio cue would be redundant with
13 the visual cue in its location?
14 MR. ELLIOTT: Objection to form and irrelevant.
15 THE WITNESS: Well, not always. So, for instance, in
16 a traffic collision avoidant system, I actually used
17 exaggerated audio cues relative to the actual position of
18 the visual cue, which was an aircraft outside the window
19 that you were going to crash into.
20 The reason we used exaggerated cues was because
21 it was better for performance to get people to look in the
22 general direction of where that potential hazard might be.
23 So it turned out that visual acquisition of target
24 information was actually better served by exaggerating
25 or -- yeah, exaggerating the position of the audio cue.

239

1 BY MR. HENRY:
2 Q And in what direction were you exaggerating the
3 position of the audio cue, to the right of the visual cue,
4 left to the visual cue, behind the visual cue, which
5 direction?
6 MR. ELLIOTT: Objection to form, compound, scope, and
7 irrelevant.
8 THE WITNESS: In the example I'm citing, if the
9 aircraft were, say, 30 degrees to the left, relative to
10 the frontal view of a pilot, we would actually move it
11 to -- I can't remember, 45 degrees or 60 degrees. So
12 there was some ratio, 1 and a half, 150 percent of the
13 angular position, et cetera.
14 BY MR. HENRY:
15 Q What are individualized or personal HRTFs?
16 **A Generally speaking, that would be either a**
17 **measurement made on a human with the microphones located**
18 **at some position in their ear canal. So that would be my**
19 **personal HRTFs could be measured in that way, along with**
20 **we haven't discussed the signal processing to eliminate**
21 **the influence of the measurement system. But we'll leave**
22 **that aside.**
23 **It could also be the selection that some people**
24 **have done of HRTFs according to kind of a shoe size**
25 **estimation. In other words, some HRTFs you might select**

240

1 **from different sound examples, and so some systems create,**
2 **quote/unquote, personalized HRTFs that aren't necessarily**
3 **your own, but the best match to your own.**
4 **And then finally there are synthetic HRTFs that**
5 **could be derived from, for instance, holding an iPhone or**
6 **similar handheld device up to your ear and moving your**
7 **head.**
8 Q And what are non-individualized or generalized
9 HRTFs?
10 **A Well, that would include, for instance, your**
11 **example of a KEMAR dummy head. It would include**
12 **measurements made on anything that is not you. So of**
13 **course, I was describing an overlap there because you**
14 **could have personalized HRTFs that are derived from**
15 **something that is not individualized. So if you want to**
16 **make the strictest definition of a personalized HRTF, it's**
17 **that the measurement was done on me.**
18 **But, again, there are sort of best-fit HRTF, and**
19 **then there's other approaches that people have done too,**
20 **for instance, compensating just for the ITD and not for**
21 **the HRTF.**
22 Q And in your reference book, you discussed both
23 individualized and non-individualized HRTFs, right?
24 **A I do.**
25 Q And in spatialized audio systems predating 2014,

241

1 people were using both individualized and
2 non-individualized HRTFs, right?
3 MR. ELLIOTT: Objection to form and irrelevant.
4 THE WITNESS: Your question was people were using
5 individualized and non-individualized HRTFs?
6 BY MR. HENRY:
7 Q I'll rephrase.
8 **A No, no, that's fine if that's the question.**
9 Q I'll strike the question. I'll rephrase it for
10 you.
11 **A Okay.**
12 Q In spatialized audio systems predating 2014, did
13 people of skill in the industry know that you could use
14 non-individualized HRTFs?
15 MR. ELLIOTT: Objection to form and irrelevant.
16 THE WITNESS: Yes.
17 BY MR. HENRY:
18 Q Okay. Before 2014, did people of skill in the
19 industry know that you could use in spatialized audio
20 systems individualized HRTFs?
21 MR. ELLIOTT: Objection to form and irrelevant.
22 THE WITNESS: Yes.
23 BY MR. HENRY:
24 Q If you could go to page 69 of your reference
25 book, which is PDF 80, if it's easier to navigate that

242

1 way.
2 THE TECHNICIAN: Stand by.
3 THE WITNESS: 69, did you say?
4 BY MR. HENRY:
5 Q Page 69.
6 **A Yes.**
7 THE TECHNICIAN: Stand by.
8 THE WITNESS: Okay. Page 69. I'm on page 69.
9 BY MR. HENRY:
10 Q It's the top of -- just so we're looking at the
11 same thing, do you see Chapter 3 at the top?
12 **A I do.**
13 Q Okay. And then you see the header, 3-D sound
14 distance and reverberation?
15 **A I do.**
16 Q The first sentence under that reads, The
17 inclusion of distance and environmental context within a
18 3D audio system is almost imperative for maintaining a
19 sense of realism among virtual acoustic objects, right?
20 MR. ELLIOTT: Objection to form and irrelevant.
21 THE WITNESS: Yes, that was my statement there, yes.
22 BY MR. HENRY:
23 Q And you agree with that statement?
24 MR. ELLIOTT: Objection to form and irrelevant.
25 THE WITNESS: Yes. If we're trying to make a

243

1 realistic representation of the environmental context,
2 and -- yeah, so this would be certainly an improvement for
3 a simulation to include those things.
4 BY MR. HENRY:
5 Q You agree that -- can we agree that reverberation
6 is key for the effective simulation of distance in the
7 perception of environmental context?
8 MR. ELLIOTT: Objection to form and irrelevant.
9 THE WITNESS: Except for some exotic cases, I might be
10 able to think of the environmental context as cued by
11 reverberation.
12 BY MR. HENRY:
13 Q Do you see the sentence right after what we just
14 covered, where you wrote, In fact, the same physical cue,
15 reverberation, is key for the effective simulation of
16 distance and the perception of an environmental context,
17 right?
18 MR. ELLIOTT: Objection to form and irrelevant.
19 THE WITNESS: Yes. I see that.
20 BY MR. HENRY:
21 Q Do you agree with that statement?
22 MR. ELLIOTT: Objection to form and irrelevant.
23 THE WITNESS: Yes.
24 BY MR. HENRY:
25 Q I'd like you to --

244

1 **A You can simulate -- let me clarify, that you can**
2 **simulate distance, but you can't simulate the**
3 **environmental context and distance together without**
4 **reverberation.**
5 THE STENOGRAPHIC REPORTER: Hi, Counsel. I need to
6 plug in my sound system. Can we take a really quick
7 break? I just need to re-plug it in.
8 MR. HENRY: Sure, of course.
9 Let's go off the record.
10 THE VIDEOGRAPHER: The time is 1657. We're going off
11 the record.
12 (Recess taken.)
13 THE VIDEOGRAPHER: The time is 1658. We're back on
14 the record.
15 BY MR. HENRY:
16 Q Dr. Begault, I'd like to look at page 95 of your
17 book, PDF 106.
18 **A Page 95. Chapter 4.**
19 Q Great. Do you see the number paragraph Number 1?
20 **A I do.**
21 Q Do you see the first two sentences there, You
22 pose questions?
23 **A Yes.**
24 Q Okay. And then the sentence after that, the
25 third sentence reads, In virtual reality and multimedia

245

1 applications, most sounds are somehow connected to visual
2 events requiring decisions as to how representative they
3 need to be. Do you see that?
4 **A I do.**
5 MR. ELLIOTT: Objection to form. Objection to form
6 and irrelevant.
7 BY MR. HENRY:
8 Q Do you agree with that statement?
9 MR. ELLIOTT: Objection to form and irrelevant.
10 THE WITNESS: Yeah, I agree with that statement. I
11 mean, in the context of the audio guru on a design team
12 for an application in most cases.
13 BY MR. HENRY:
14 Q What is interpolation, Dr. Begault?
15 MR. ELLIOTT: Objection to form and irrelevant.
16 THE WITNESS: Mathematically, it's the -- an
17 intermediate value between two other values, but in the
18 context of 3-D sound, if one has measured positions and
19 one was to simulate a position that is not at a measured
20 position, then one would use the technique of
21 interpolation to achieve an intermediate spectral
22 modification of the sound.
23 BY MR. HENRY:
24 Q Are there different methods of interpolation?
25 MR. ELLIOTT: Objection to form and irrelevant.

246

1 THE WITNESS: Yes there are.
2 BY MR. HENRY:
3 Q What are some of those, Dr. Begault?
4 MR. ELLIOTT: Objection to form and irrelevant.
5 THE WITNESS: One form of interpolation is simply
6 cross fading between prerecorded 3D-audio sounds, which
7 was done early on. There are a couple of techniques that
8 are bandied about in the literature for determining the
9 best way to interpolate between measured HRTFs, and some
10 of those depend on linear interpolation.
11 Some of those involve spherical coordinate
12 interpolation. And then there are people these days more
13 recently who record so many positions, that interpolation
14 is almost unnecessary, or it can be done in the
15 old-fashioned way with the cross fading.
16 BY MR. HENRY:
17 Q And you mentioned linear interpolation and
18 spherical interpolation in that response. Were there any
19 other methods of interpolating between measured HRTF
20 positions?
21 MR. ELLIOTT: Objection to form, irrelevant.
22 THE WITNESS: Simple cross fading.
23 BY MR. HENRY:
24 Q Any other methods?
25 **A Those are the three I'm most familiar with.**

247

1 **Sometimes different methods are used to interpolate the**
2 **interaural time delay separately from the magnitude**
3 **transfer function.**
4 Q When you say separate from the magnitude transfer
5 function, what transfer function are you referring to when
6 you say magnitude transfer function?
7 MR. ELLIOTT: Objection to form and irrelevant.
8 THE WITNESS: The spectral component of the HRTF,
9 absent in its time delay component (indecipherable
10 utterance.)
11 BY MR. HENRY:
12 Q Thank you.
13 THE STENOGRAPHIC REPORTER: I'm sorry. Can you repeat
14 that answer, please?
15 THE WITNESS: The spectral, s-p-e-c-t-r-a-l,
16 component, separate from the time delay component.
17 THE STENOGRAPHIC REPORTER: Thank you.
18 THE WITNESS: Yeah.
19 BY MR. HENRY:
20 Q If you look at page 167, which is PDF 177, if you
21 want to navigate it that way.
22 **A 167?**
23 Q That's right.
24 **A Yes.**
25 Q Do you see the heading, Head-tracked 3D audio for

248

1 virtual environments?
2 **A I do.**
3 Q The first sentence under that heading on page 167
4 of your reference book reads, In virtual reality, the key
5 to immersivity is directly tied to the success of the
6 interface in providing realistic information at the
7 effectors and the degree to which sensors are able to
8 track human interaction. Do you see that?
9 MR. ELLIOTT: Objection to form and irrelevant.
10 THE WITNESS: I see that.
11 BY MR. HENRY:
12 Q Do you agree with that statement?
13 MR. ELLIOTT: Objection to form and irrelevant.
14 THE WITNESS: Yes. There's some other keys to
15 immersivity. So I don't want to say that this is the
16 exclusive list of things. I think in my writing style
17 there, I was saying that one of the key elements.
18 BY MR. HENRY:
19 Q And the sentence after the one that we just read
20 on page 167 reads, For this reason, head-tracked virtual
21 acoustic systems represent the best approach to
22 implementing sound so that sound sources can remain fixed
23 in virtual space independent of head movement, as they are
24 in natural spatial hearing.
25 Do you see that?

249

1 MR. ELLIOTT: Objection to form and irrelevant.
2 THE WITNESS: I do.
3 BY MR. HENRY:
4 Q Do you agree with that statement?
5 MR. ELLIOTT: Objection to form and irrelevant.
6 THE WITNESS: Well, 35 years plus experience -- or how
7 many years has it been since I wrote this? I can't do the
8 math. Close to 40; is that right? No. But anyway --
9 BY MR. HENRY:
10 Q This is 2023. So --
11 A Yeah, dang it. Okay.
12 Q A little bit more.
13 A Yeah, yeah, yeah, okay. All right. So point is
14 that I can, with that based off my experience,
15 head-tracking virtual acoustic systems were very idealized
16 at that time. I think what we have found is that in some
17 applications, it's better not to use head tracking. I
18 think there's some recent Apple headphone, like the ones
19 I'm wearing now, that can include head tracking.
20 And some people find it very disturbing to have
21 the world moving in quasi-realistic fashion. Another
22 thing that we found over the last almost 40 years is the
23 effect of latency. And if the processors can't keep up
24 with moving your head, then you can get something called
25 virtual environment sickness.

250

1 BY MR. HENRY:
2 Q When you wrote your reference book, it was known,
3 though, that head-track virtual acoustic systems could
4 keep a sound source fixed in a location in virtual space
5 independent of head movement, right?
6 MR. ELLIOTT: Objection to form and irrelevant.
7 THE WITNESS: Yes. With the proviso of latency that I
8 just gave you there, but yes, that was a very exciting
9 discovery in the 80s.
10 BY MR. HENRY:
11 Q And actually, if you look down below it, under
12 the heading, Crystal River Engineering, it seems you
13 described the Convolvotron as one of the first head-track
14 virtual audio systems. Do you see that?
15 MR. ELLIOTT: Objection to form, irrelevant.
16 THE WITNESS: Yes, that's a true statement.
17 BY MR. HENRY:
18 Q And Convolvotron, described in -- as described in
19 your reference book, used spatialization functions run
20 through software or other routines, right?
21 MR. ELLIOTT: Objection to form and irrelevant.
22 THE WITNESS: I think it says that somewhere.
23 BY MR. HENRY:
24 Q Okay. Well, even without that, Convolvotron used
25 spatialized audio, right?

251

1 MR. ELLIOTT: Objection to form and irrelevant.
2 THE WITNESS: Yes.
3 BY MR. HENRY:
4 Q And processed HRTFs?
5 MR. ELLIOTT: Objection to form and irrelevant.
6 THE WITNESS: It used -- it implemented the
7 head-related transfer function for sources.
8 BY MR. HENRY:
9 Q If you turn to page 168, do you see the paragraph
10 under the image, not the caption, but the paragraph below
11 the image?
12 A These impulse responses?
13 Q Yeah.
14 A Yeah.
15 Q And that goes on to say, These impulse responses
16 are convolved, and then continues from therein, correct?
17 MR. ELLIOTT: Objection to form and irrelevant.
18 THE WITNESS: Correct.
19 BY MR. HENRY:
20 Q So the -- is it fair to say that Convolvotron was
21 using convolution processes with HRTFs?
22 MR. ELLIOTT: Objection to form and irrelevant.
23 THE WITNESS: Yes.
24 BY MR. HENRY:
25 Q If you go to the next page 169, and the bottom

252

1 paragraph on that page that begins, The Convolvotron
2 hardware, are you there?
3 A I'm there.
4 Q Okay. And then in that paragraph, it talks about
5 the Convolvotron using DSPs, right?
6 MR. ELLIOTT: Objection to form and irrelevant.
7 THE WITNESS: Let's see. DSPs is mentioned
8 specifically in the sentence beginning, The convolution
9 engine.
10 BY MR. HENRY:
11 Q Yeah, and that sentence reads, The convolution
12 engine is a custom-made board that contains four INMOS
13 A-100 cascadable DSPs, and then continues from there,
14 right?
15 MR. ELLIOTT: Objection to form and irrelevant.
16 THE WITNESS: Yes.
17 BY MR. HENRY:
18 Q So do I understand from that then, that
19 Convolvotron was using DSPs for its sound processing?
20 MR. ELLIOTT: Objection to form and irrelevant.
21 THE WITNESS: It was using a DSP hardware chip that
22 was mounted to this custom-made board.
23 BY MR. HENRY:
24 Q And using that DSP chip for sound processing,
25 right?

253

1 MR. ELLIOTT: Objection to form and irrelevant.
2 THE WITNESS: Yes. So it was using those DSPs for
3 sound processing.
4 BY MR. HENRY:
5 Q On the bottom of page 170, your reference book
6 discusses something called, Focal Point. Do you see that?
7 **A I do.**
8 Q And in the second paragraph, the first sentence
9 reads, Gehring later entered the virtual reality market
10 with a low-cost device known as the Focal Point system, a
11 head-tracked virtual acoustic display for either the
12 Macintosh or the PC. Do you see that?
13 MR. ELLIOTT: Objection to form and irrelevant.
14 THE WITNESS: Yes.
15 BY MR. HENRY:
16 Q Okay. And then -- actually, I'll just ask you,
17 before 2014, did people of skill in the industry know that
18 you could use DSPs with Macs for sound processing?
19 **A Yes.**
20 Q Did they know you could use DSPs with Macs for
21 processing spatialized audio?
22 **A (Indecipherable utterance.)**
23 MR. ELLIOTT: Objection to form. Objection to form
24 and irrelevant.
25 And, Mr. Henry, can we take a break? And also I

254

1 just want to launch a general objection in the record that
2 we have wasted hours of time turning this into a prior art
3 deposition, wherein its purpose is claim construction.
4 MR. HENRY: We can take a break if you need a break.
5 That's fine. I'm happy to go off the record, as I said
6 before, but there is a pending question. So we're going
7 to get an answer to my question before we break --
8 MR. ELLIOTT: Oh, I apologize.
9 MR. HENRY: That's fine.
10 And your objection was noted for the record. We
11 don't have to quibble about it now. But I disagree
12 including because you have been objecting to things that
13 were specifically discussed in defendant's expert's claim
14 construction declaration as irrelevant. Which -- and
15 also, it's a deposition. So your relevance objections
16 are, you know, likely improper. And you know that.
17 But, yeah, sure. Let's get an answer to the
18 pending question.
19 MR. ELLIOTT: That's fine.
20 MR. HENRY: And then we can take a break if you'd
21 like, and then we will reconvene.
22 BY MR. HENRY:
23 Q So let me just restate my question for you,
24 Dr. Begault. Before 2014, did people of skill in the
25 industry know you could use DSPs with Macs to process

255

1 spatialized audio?
2 **A Yes.**
3 MR. HENRY: Okay. Let's go off the record.
4 THE WITNESS: How long?
5 MR. HENRY: We'll go off the record, and then we'll
6 discuss.
7 THE VIDEOGRAPHER: The time is 1714. We're going off
8 the record.
9 (Recess taken.)
10 THE VIDEOGRAPHER: The time is 1727. We're back on
11 the record.
12 BY MR. HENRY:
13 Q Dr. Begault, I want to look at your report, which
14 is Exhibit 1. You still have that, your declaration?
15 **A Yes.**
16 Q Now, your declaration, not counting your CV, is
17 eight pages long, right?
18 **A I haven't counted. Though, I will. Yes, I see**
19 **eight pages, and that includes, I believe, a cover**
20 **sheet -- no, does not include the cover sheet nor the**
21 **table of contents.**
22 Q 17 paragraphs, right?
23 **A I haven't counted those paragraphs, but I will**
24 **believe you that there's 17 paragraphs. Yes, it appears**
25 **there are 17 paragraphs.**

256

1 Q And on page 8 of your declaration, that's your
2 signature?
3 **A Yes, it is.**
4 Q Do you know what a means-plus-function term is?
5 **A No, not exactly.**
6 Q Do you have any understanding of what a
7 means-plus-function term is?
8 **A Not that I -- no, I'll say no. I don't really**
9 **have a full understanding of it.**
10 Q In your declaration, Dr. Begault, do you cite any
11 patents, articles, publications, or documents other than
12 the asserted patents?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: I don't believe I included any citations
15 to other documents other than the patents.
16 BY MR. HENRY:
17 Q Dr. Begault, I may have question for you
18 following your counsel's questions, but if not, I don't
19 have any further questions for you right now. So thank
20 you for your time.
21 **A Thank you.**
22 **EXAMINATION**
23 **BY MR. ELLIOTT:**
24 Q All right. Dr. Begault, you remember the series
25 of questioning by Mr. Henry where you were asked about

257

1 computing devices that perform the processing steps and
2 were asked if these were not processors, do you remember
3 that line of questioning?
4 MR. HENRY: Object to form, ambiguous.
5 THE WITNESS: Yes. I remember that line of
6 questioning, that was over the series of patents that we
7 looked at.
8 BY MR. ELLIOTT:
9 Q Mm-hmm. Can a processor that performed those
10 processing steps that claims also be a software processor?
11 **A Yes.**
12 MR. HENRY: Object to form.
13 THE WITNESS: Sorry, sorry. I'll stop --
14 BY MR. ELLIOTT:
15 Q Go ahead and pause like you did before so
16 Mr. Henry can get his objections down as well.
17 **A Yes.**
18 Q So those steps can be performed by software; is
19 that correct?
20 **A Yes, they can.**
21 Q And that's true of each one of those processing
22 limitations that you went through with Mr. Henry?
23 **A I believe so, yes.**
24 Q If I can please direct you to the '090 Patent?
25 **A Okay.**

258

1 Q And I apologize. I don't remember which exhibit
2 that turned out to be.
3 Do you know, Mr. Henry?
4 MR. HENRY: Exhibit 3.
5 MR. ELLIOTT: Thank you.
6 THE WITNESS: All right. I'm at the '090 Patent, yes.
7 BY MR. ELLIOTT:
8 Q Okay. If you would, go to column 4, lines about
9 38 to 41.
10 **A Column 4, lines 38 through 41. I am there.**
11 Q Paragraph beginning, Further yet, why don't you
12 go ahead and read that, and then once you've read it, tell
13 me if that gives you a definition of proximate.
14 MR. HENRY: Objection to form, outside the scope. Not
15 cited in his declaration to be clear.
16 THE WITNESS: Okay. I've read it.
17 BY MR. ELLIOTT:
18 Q And does that give you an indication of what the
19 patent means by proximate?
20 MR. HENRY: Same objections.
21 THE WITNESS: Yes. That's consistent with my
22 testimony earlier.
23 BY MR. ELLIOTT:
24 Q And what definition does it give here?
25 MR. HENRY: Same objections and mischaracterizes

259

1 Dr. Begault's testimony.
2 THE WITNESS: It says, From the point of view of the
3 listener can be proximate to the listener, such as in the
4 same room -- which is consistent with my prior
5 testimony -- Or far away from the listener, such as
6 several kilometers away.
7 BY MR. ELLIOTT:
8 Q All right. Then if you would, turn to column
9 11 -- or excuse me, sorry. Column 9 first.
10 **A Column 9.**
11 Q And look at the paragraph, would be about
12 Line 22, beginning with, The sound localization point.
13 **A Yes.**
14 Q And then the middle of the paragraph, probably
15 around Line 25, you want to read the end of that
16 paragraph, and let me know when you're finished?
17 **A Okay.**
18 **Yes, I've finished.**
19 Q Okay. Does this language give you a definition
20 of proximate within the patent?
21 MR. HENRY: Objection to form, beyond the scope, not
22 in Dr. Begault's declaration. It's a clear attempt to
23 supplement his opinions on the improper redirect.
24 THE WITNESS: This statement here is wholly consistent
25 with my earlier testimony about speech levels, and it has

260

1 to do with a second individual being proximate, such as
2 both individuals being in the same room together.
3 BY MR. ELLIOTT:
4 Q And then column 11, Line 46.
5 **A Yes, I am there.**
6 Q And go ahead and read from Line 46 down through
7 the end of that paragraph, the paragraph beginning, Sound
8 adjustments are made.
9 **A Okay. From Line 44.**
10 **Yes, I've read it.**
11 Q And does this also give you an instance in
12 respect where there is a definition of proximate?
13 MR. HENRY: Objection to form, beyond the scope, not
14 in Dr. Begault's declaration. Again, another clear
15 attempt to supplement Dr. Begault's opinions with improper
16 redirect.
17 THE WITNESS: Yes, again, this statement is wholly
18 consistent with my earlier testimony. And one moment...
19 It's also wholly consistent with my declaration
20 paragraph 10.
21 BY MR. ELLIOTT:
22 Q And does this -- what definition does this give
23 for proximate?
24 MR. HENRY: Same objections.
25 THE WITNESS: Let's see. It gives us a definition of

261

1 proximate, as... if the listener were standing or sitting
2 next to the talker or otherwise physically located at or
3 proximate to the virtual microphone point. And it's as if
4 the listener and talker were talking to each other --
5 well, I think I already stated it.
6 BY MR. ELLIOTT:
7 Q Then column 15, Line 12, you have a sentence --
8 **A Yes.**
9 Q The sentence beginning, The HPED.
10 **A Yes.**
11 Q Go ahead and read that down through about
12 Line 17.
13 **A Yes, I see it.**
14 Q Does this also give a definition of proximate in
15 the specification of the patent?
16 MR. HENRY: Objection to form, beyond the scope. Not
17 in Dr. Begault's declaration. Another clear attempt to
18 supplement Dr. Begault's opinions with improper redirect.
19 THE WITNESS: Yes. This states a definition of
20 proximate -- or an example of proximate, I should say,
21 between 1 to 3 feet from the face or mouth of a person,
22 again, wholly consistent with my declaration paragraph 10.
23 And also, wholly consistent with my earlier testimony with
24 regards to speech levels.
25

262

1 BY MR. ELLIOTT:
2 Q Okay. If I can take you back to column 11.
3 **A Yes.**
4 Q And take a look at the paragraph towards the top
5 of column 11, beginning with Figure 5. And read those two
6 paragraphs there.
7 **A Okay.**
8 **Okay. I read it.**
9 Q Okay. And is -- are the terms electric call --
10 or excuse me, electronic call used in that particular
11 paragraph there?
12 MR. HENRY: Objection to form, beyond the scope. Not
13 in Dr. Begault's declaration. Yet another clear attempt
14 to supplement Dr. Begault's opinions with improper
15 redirect.
16 THE WITNESS: I see the term or phrase electronic
17 call.
18 BY MR. ELLIOTT:
19 Q And then if you would, still in column 11, read
20 the last partial paragraph. No need to carry over into
21 column 12.
22 **A Okay.**
23 **Yes.**
24 Q And do you see the terms electronic telephone
25 call and telephone call in that partial paragraph?

263

1 MR. HENRY: Objection to form, beyond the scope. Not
2 in Dr. Begault's declaration. Another clear attempt to
3 supplement Dr. Begault's opinions with improper redirect.
4 THE WITNESS: I see electronic telephone call. And
5 what was the other phrase?
6 BY MR. ELLIOTT:
7 Q Telephone call.
8 MR. HENRY: Same objections.
9 THE WITNESS: Yes, I see both phrases in this same
10 paragraph, the same discussion of an example.
11 BY MR. ELLIOTT:
12 Q Okay. And so in reference to Figure 5, are the
13 terms electronic call, electronic telephone call, and
14 telephone call used interchangeably in this column 11?
15 MR. HENRY: Objection to form, beyond the scope. Not
16 in Dr. Begault's declaration. Another clear attempt to
17 supplement Dr. Begault's opinions with improper redirect,
18 improper leading.
19 THE WITNESS: Yes. I see these terms used
20 interchangeably with regards to Figure 5. Specifically, I
21 see the words electronic call, electronic telephone call,
22 and -- where's the third one -- telephone call.
23 And these are reflected in my declaration.
24 BY MR. ELLIOTT:
25 Q At one point in time, you were -- you had given

264

1 some testimony on DB, decibels, and I believe your -- you
2 said at some point in there -- correct me if I'm wrong,
3 but I think you said you haven't reviewed the patents
4 carefully?
5 **A That's correct. I don't -- would not say I've**
6 **had a careful review of the patents.**
7 Q Okay. Do you mean you haven't reviewed them
8 carefully to see if DB references are in the patents?
9 **A That's correct. I don't -- I can't say that**
10 **they're not.**
11 Q Also, Mr. Henry took you through a series of
12 things being distant. I think we went around the world
13 and into outer space --
14 **A We certainly did.**
15 Q Are any of these being distant from you relevant
16 to a distance, as that term is used in the patent?
17 MR. HENRY: Objection to form.
18 THE WITNESS: Based on my initial review of these
19 patents, I saw no references to planetary distances or
20 distances such as Paris, Tokyo, or some of the other
21 examples that were cited.
22 BY MR. ELLIOTT:
23 Q We've used the word phone a lot today. Is the
24 definition of phone a static item over time?
25 MR. HENRY: Objection to form, beyond the scope --

265

1 THE WITNESS: No.
2 MR. HENRY: -- improper supplement of Dr. Begault's
3 opinions.
4 THE WITNESS: No. Well, the root of the word phone is
5 sound. And it's manifested itself in many different ways.
6 BY MR. ELLIOTT:
7 Q What do you think the definition of a phone would
8 be in 1965?
9 MR. HENRY: Objection to form, beyond the scope.
10 Improper attempt to supplement Dr. Begault's declaration.
11 THE WITNESS: It's -- in my earlier testimony, I gave
12 an example of a Western Electric landline telephone which
13 were widely used by the Bell System in the United States.
14 BY MR. ELLIOTT:
15 Q And what do you think the definition of phone
16 would be in 1985?
17 MR. HENRY: Same objections.
18 THE WITNESS: Well, we have a whole variety of ways of
19 communicating. Speech or even other types of signals, by
20 1985, I believe it was possible to do some primitive voice
21 communication over computers. I don't know if that's our
22 era of wireless telephones, if those were yet available at
23 the time, but I think they were with the big, long
24 antennas. And so that might have been considered a phone.
25

266

1 BY MR. ELLIOTT:
2 Q What about the definition of a phone in 2014?
3 MR. HENRY: Same objections.
4 THE WITNESS: We could include systems such as Zoom,
5 that we're using now or other Voice over Internet Protocol
6 types of communication systems, where a communication
7 signal is transmitted between two parties electronically.
8 We have smart phones, any number of different hardware
9 implementations, even emergency systems on cars and -- can
10 talk to you. And sometimes there's a human, and sometimes
11 there's not a human that is communicating.
12 BY MR. ELLIOTT:
13 Q Is a walkie-talkie just a specialized type of
14 phone?
15 MR. HENRY: Same objections.
16 THE WITNESS: Yeah, there's a lot of similarity to a
17 walkie-talkie and a cellular telephone, in that both are
18 using radio signals to transmit speech signals from one
19 location to another.
20 BY MR. ELLIOTT:
21 Q I'm sorry to shift topics back to kind of where I
22 began, but the definitions that we found for proximate in
23 the specification, the '090 Patent, there were four of
24 them. Would that be considered a plethora as cited in
25 your declaration?

267

1 MR. HENRY: Same objections and mischaracterizes
2 Dr. Begault's testimony.
3 THE WITNESS: I think that would constitute a
4 plethora. I mean, I don't have a single number, and I
5 think I testified earlier that I was using that term as
6 equivalent to the idea of many, which I can also define as
7 more than one.
8 MR. ELLIOTT: Okay. I've got no more questions for
9 him, Mr. Henry.
10 FURTHER EXAMINATION
11 BY MR. HENRY:
12 Q Okay. Dr. Begault, can you please go to column
13 4, lines 38 to 41 of the '090 Patent, which is Begault
14 Exhibit 3?
15 **A Sure. Column 4. And which lines?**
16 Q Lines 38 to 41.
17 **A 38 through 41. Yes.**
18 Q Do you remember Mr. Elliott asked you questions
19 about those?
20 **A I remember he asked me questions about this**
21 **section of the patent.**
22 Q Yeah, did I ask you a question about that section
23 of the patent today?
24 **A I don't recall.**
25 Q Did you cite column 4, lines 38 to 41 in your

268

1 declaration?
2 **A Not specifically.**
3 Q Go to column 9, lines 22 to 29, please.
4 **A Column 9, lines 22 through 29, yes.**
5 Q Do you remember Mr. Elliott asking you questions
6 about that section of the '090 Patent?
7 **A Yes.**
8 Q Did I invite your attention to that section of
9 the '090 Patent today?
10 **A No, not directly.**
11 Q Did you cite column 9, lines 22 to 29 in your
12 May 3rd, 2023, declaration?
13 **A Not specifically. But we discussed in this**
14 **declaration, the concept of proximate.**
15 Q Did you cite lines -- did you cite column 9,
16 lines 22 to the 29 from the '090 Patent in your
17 declaration?
18 **A No, I did not.**
19 Q Please go to column 11, lines 44 to 51, please.
20 **A 44 through 51. Yes, I am there.**
21 Q Do you remember Mr. Elliott asking you questions
22 about that section of the '090 Patent today?
23 **A Yes, I do.**
24 Q Did I ask you any questions about that section of
25 the '090 Patent today?

269

1 A **Only in the sense that you were asking me about**
2 **the word proximate.**
3 Q Did I invite your attention to column 11, lines
4 44 to 51 today?
5 A **You've made no such invitation.**
6 Q Did you cite column 11, lines 44 to 51 in your
7 May 3rd, 2023 declaration?
8 A **No, I did not.**
9 Q Please go up to column 11, lines 9 to 17.
10 A **Lines 9 through 17.**
11 Q Do you remember Mr. Elliott asking you questions
12 about that section of the '090 Patent?
13 A **Let's see.**
14 **Yes. I do.**
15 Q Did I invite your attention to column 11, lines 9
16 to 17 at any point in time today during my questioning?
17 A **Not directly, no.**
18 Q Did you cite column 9, lines -- strike that.
19 Did you cite column 11, lines 9 through 17 in
20 your May 3rd, 2023, expert declaration?
21 A **No, I did not cite it in this particular**
22 **declaration.**
23 Q Did you cite it in any other declaration served
24 in this case?
25 A **None that exist so far.**

270

1 Q Are you actively preparing another declaration?
2 MR. ELLIOTT: Objection; calls for work product.
3 You can answer that question, though.
4 THE WITNESS: I am not actively doing other --
5 anything on this case other than responding to your
6 questions in this deposition.
7 BY MR. HENRY:
8 Q Are you preparing another declaration for this
9 case?
10 MR. ELLIOTT: Objection; calls for work product.
11 You can answer that question.
12 THE WITNESS: I am currently not preparing any other
13 declaration.
14 BY MR. HENRY:
15 Q Do you plan to prepare another declaration
16 relating to issues about claim construction in this case?
17 MR. ELLIOTT: Objection; again, work product.
18 Yeah, you can go ahead and answer.
19 THE WITNESS: I would be prepared to do so if asked by
20 counsel.
21 BY MR. HENRY:
22 Q Have you been asked to prepare another
23 declaration in this case relating to claim construction?
24 MR. ELLIOTT: Objection; work product.
25 You can go ahead and answer.

271

1 THE WITNESS: Wasn't that the exact question you just
2 asked?
3 BY MR. HENRY:
4 Q No.
5 A **Then I don't understand.**
6 Q I'll repeat --
7 A **I thought you repeated your question.**
8 Q I did not.
9 Have you been asked to prepare another
10 declaration in this case relating to claim construction?
11 A **No, I have not been asked at this point.**
12 Q Please go to column 11, lines 52 to 67, please,
13 of the '090 Patent?
14 A **I am there.**
15 Q Do you remember Mr. Elliott asking you questions
16 about that?
17 A **Yes.**
18 Q Did I invite your attention to column 11, lines
19 52 to 67 during my questioning today?
20 A **No, you did not.**
21 Q Did you cite in your May 3rd, 2023, declaration
22 column 11, lines 52 to 67 of the '090 Patent?
23 A **Not directly.**
24 Q Please go to column 15 of the '090 Patent, lines
25 12 to 17.

272

1 A **Okay. I am there.**
2 Q Do you remember Mr. Elliott asking you questions
3 about that section of the '090 Patent?
4 A **I do.**
5 Q Did I invite your attention to column 15, lines
6 12 to 17 during my questioning today?
7 A **No. You only directed my attention to the**
8 **concept of proximate.**
9 Q Did you cite column 15, lines 12 to 17 in your
10 May 3rd, 2023, declaration?
11 A **No, I did not.**
12 Q In your May 3rd, 2023, declaration, did you offer
13 an opinion about the definition of phone or telephone in
14 the year 1965?
15 A **No, I don't think I directly addressed that.**
16 Q In your May 3rd, 2023 declaration, did you offer
17 an opinion about the definition of phone or telephone in
18 the year 1985?
19 A **No, I don't believe I did.**
20 Q In your May 3rd, 2023 declaration, did you offer
21 an opinion about the definition of phone or telephone in
22 the year 2014?
23 A **Yes, I did. Essentially, I spoke about the terms**
24 **being equivalent and their interchangeability in the**
25 **specifications.**

273

1 Q What was the definition for phone or telephone
2 that you offered in your May 3rd, 2023 declaration for the
3 year 2014?
4 **A It's -- I used the definition of describing the**
5 **use of any type of medium to enable communication between**
6 **two or more locations over some sort of electronic**
7 **network.**
8 Q And there, you're referring to your
9 interpretation of the terms electronic call, electronic
10 phone call, and telephone call in paragraph 8 of your
11 declaration, right?
12 MR. ELLIOTT: Objection to form.
13 THE WITNESS: I'm referring to my analysis of the call
14 terms in the patents at issue.
15 BY MR. HENRY:
16 Q And what are those call terms?
17 **A Electronic call, electronic phone call, and**
18 **telephone call.**
19 Q Okay. Are those -- in that paragraph 8 of your
20 May 3rd, 2023, declaration, do you state what a definition
21 for the term telephone would be in the year 2014?
22 **A I do not specifically call out the word telephone**
23 **individually. I use the word telephone call. Phrase, not**
24 **word, phrase. The phrase telephone call.**
25 Q So is it fair to say in your declaration, you

274

1 didn't actually define the term telephone?
2 **A Well, no. That's not fair.**
3 Q Okay. Show me the definition of telephone in
4 your declaration.
5 **A Well, when I refer to an electronic call,**
6 **electronic phone call, and telephone call, that's the**
7 **function of what a telephone does. Which is something**
8 **that allows communication between two or more locations.**
9 **So clearly, the function of the noun telephone is**
10 **associated with the word call. And so therefore, it is**
11 **defined.**
12 Q Please point me to the language in paragraph 8 of
13 your declaration that you contend defines the term
14 telephone as it would be understood in the year 2014.
15 MR. ELLIOTT: Objection to form, argumentative,
16 badgering the witness. Asked and answered.
17 THE WITNESS: Electronic call, electronic phone call,
18 and telephone call are equivalent. The terms used -- are
19 used interchangeably in the specification to describe the
20 use of any type of medium. Any type of medium includes
21 phone, because we are talking about an electronic phone
22 call, or a telephone call with the understanding that the
23 root of the word phone is sound, and the root of the words
24 tele is distant.
25

275

1 BY MR. HENRY:
2 Q So do you equate the word telephone to any type
3 of medium?
4 MR. ELLIOTT: Objection; asked and answered, beyond
5 the scope of the redirect.
6 THE WITNESS: No. You can read in my declaration that
7 I constrain that type of medium that enables communication
8 between two or more locations using some sort of
9 electronic network.
10 BY MR. HENRY:
11 Q We talked about a train earlier. Do you believe
12 a train is a telephone?
13 MR. ELLIOTT: Objection to form.
14 THE WITNESS: No.
15 BY MR. HENRY:
16 Q Do you believe a boat is a telephone?
17 **A No.**
18 Q Do you believe an airplane is a telephone?
19 MR. ELLIOTT: Objection to form.
20 THE WITNESS: No. These examples fall outside of my
21 definition.
22 BY MR. HENRY:
23 Q You believe a computer is a telephone, though?
24 **A It can be used --**
25 **Sorry. Go ahead.**

276

1 MR. ELLIOTT: Objection to form.
2 THE WITNESS: A computer can be used as a telephone.
3 BY MR. HENRY:
4 Q So is it your opinion that a computer is a
5 telephone?
6 MR. ELLIOTT: Mr. Henry, we've been through this
7 testimony previously today, and he's provided those
8 answers. To me, this is just wasting further time on
9 testimony he's already given.
10 So I'll enter my objection to form, but also, you
11 know, further object to additional waste of time going
12 down this duplicate line of questioning. That is also of
13 the redirect.
14 MR. HENRY: It's a brazen objection to lodge after the
15 improper redirect that you just conducted.
16 MR. ELLIOTT: No --
17 BY MR. HENRY:
18 Q Dr. Begault, would you answer my question?
19 MR. ELLIOTT: There's nothing improper about the
20 redirect I just conducted. You asked him about citations,
21 if they were there. You asked him what a plethora was, I
22 walked him through the base for his opinion.
23 MR. HENRY: The record will speak for itself.
24 MR. ELLIOTT: It will. It will. I agree with that.
25

277

1 BY MR. HENRY:
2 Q Dr. Begault, is a computer a telephone?
3 **A A computer can function as a telephone.**
4 Q Okay.
5 **A It can also function as other things**
6 **simultaneously. It can enable communication between two**
7 **or more locations using an electronic network.**
8 Q Can a train do that with its radios?
9 **A The radios are a component of a train that could**
10 **be -- I'm sorry. Let me start over.**
11 **The telephone communication system that might be**
12 **present on a locomotive can be used to enable voice**
13 **communication between two or more locations.**
14 Q Dr. Begault, have you seen a Meta Quest headset?
15 MR. ELLIOTT: Objection; scope.
16 THE WITNESS: No.
17 MR. HENRY: No further questions.
18 MR. ELLIOTT: Just one other question.
19 FURTHER EXAMINATION
20 BY MR. ELLIOTT:
21 Q Did you give testimony under Mr. Henry's
22 questioning earlier today discussing what the definition
23 of phone might be?
24 **A I'm sorry. Can you repeat your question? I'm**
25 **sorry. I missed the first part.**

278

1 Q Did you give testimony earlier today when
2 Mr. Henry was first questioning you, discussing what the
3 definition of phone might be?
4 MR. HENRY: Objection to form.
5 THE WITNESS: Yes. I think we iterated several
6 examples likes boats and trains and things of that sort.
7 MR. ELLIOTT: No further questions.
8 MR. HENRY: One more question.
9 FURTHER EXAMINATION
10 BY MR. HENRY:
11 Q Just so I can confirm your opinion.
12 In your view is it true, Dr. Begault, that any
13 device, any device capable of electronic voice
14 communication between two parties is a telephone?
15 MR. ELLIOTT: Objection to form.
16 THE WITNESS: I'll answer this way. I thought that my
17 watch would never be able to function as a telephone and
18 it was only something that Dick Tracy had, and now I can
19 make phone calls on my watch.
20 BY MR. HENRY:
21 Q That's not responsive, Dr. Begault.
22 MR. ELLIOTT: Objection --
23 BY MR. HENRY:
24 Q Do I understand correctly that it's in your
25 opinion, any device capable of electronic voice

279

1 communication between two parties is a telephone?
2 MR. ELLIOTT: Objection; argumentative, form.
3 THE WITNESS: It can function like a telephone, if it
4 is capable of adhering to the definition that I laid out
5 in my declaration.
6 BY MR. HENRY:
7 Q Can you identify any device capable of voice
8 communication -- electronic voice communication between
9 two parties that is not a telephone --
10 MR. ELLIOTT: Objection --
11 Sorry, Mr. Henry.
12 Objection to form.
13 THE STENOGRAPHIC REPORTER: I didn't hear your full
14 question, Mr. Henry.
15 MR. HENRY: Sure.
16 BY MR. HENRY:
17 Q Dr. Begault, if you are able, I'd like you to at
18 this time identify any device that is capable of
19 electronic voice communication between two parties that
20 you would say is not a telephone.
21 MR. ELLIOTT: Objection to form.
22 THE WITNESS: Again, any device that could enable
23 voice communication between two parties can function as a
24 telephone.
25

280

1 BY MR. HENRY:
2 Q I'll give you one more opportunity. If you are
3 able to identify any device falling outside of the scope
4 of what you have articulated a number of times, please do
5 so now.
6 MR. ELLIOTT: Objection to form.
7 THE WITNESS: No. Because the definition I have given
8 you states that any device capable of functioning as a
9 telephone can be considered a telephone so long as it's
10 done electronically.
11 MR. HENRY: I have no further questions.
12 MR. ELLIOTT: No further questions here.
13 THE STENOGRAPHIC REPORTER: Okay. Before we go off,
14 Mr. Elliott, we did confirm off the record, you want the
15 rough draft and regular final, correct?
16 MR. ELLIOTT: Yes, that's correct, please.
17 THE STENOGRAPHIC REPORTER: And, Mr. Henry, we have
18 your standing order, thank you.
19 MR. HENRY: Thank you.
20 THE VIDEOGRAPHER: This marks the end of the
21 deposition of Durand Begault, PhD. The time is 1803. We
22 are off the record.
23 (WHEREUPON THE DEPOSITION WAS
24 CONCLUDED AT 6:03 P.M. PACIFIC
25 STANDARD TIME.)

281

Please be advised I have read the foregoing deposition, pages 1 through 283, inclusive.
I hereby state there are:

(Check one)_____ no corrections

_____ corrections per attached

_____

DURAND BEGAULT, Ph.D.

--oOo--

282

WITNESS'S CHANGES OR CORRECTIONS

NOTE: If you are adding to your testimony, print the exact words you want to add. If you are deleting from your testimony, print the exact words you want to delete. Specify with "Add" or "Delete" and sign this form.

Deposition of: DURAND BEGAULT, Ph.D.
Case Title: EIGHT KHZ V. META
Date of Deposition: MAY 22, 2023

I,_____have
the following corrections to make to my deposition:
PageLine Change/Add/Delete

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283

REPORTER'S CERTIFICATE

I, Christa Yan, CSR No. 14316, do hereby declare:
That, prior to being examined, the witness named in the foregoing proceeding was by me duly sworn pursuant to Section 30(f)(1) of the Federal Rules of Civil Procedure, and the proceeding is a true record of the testimony given by the witness as accurately as possible. That said proceeding was taken down by me stenographically at the time therein named and thereafter reduced to text under my direction.

_X_ That said witness was requested to review the transcript and make any changes to the transcript as a result of that review pursuant to Section 30(e) of the Federal Rules of Civil Procedure.
___ No changes have been provided by the witness during the period allowed.
___ The changes made by the witness are appended to the transcript.
___ No request was made that the transcript be reviewed pursuant to Section 30(e) of the Federal Rules of Civil Procedure.

I further declare that I have no interest in the event of the action. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.
WITNESS my hand this 26th day of May 2023.

_____
Christa Yan, CSR NO. 14316

A
a-t-m-o-s
131:15, 131:16
a-u-r-a-l
121:20, 121:23
a-weighted
93:13
ability
232:9
able
44:6, 44:8, 60:25, 81:13, 102:11, 124:4, 128:16, 146:8, 149:1, 158:17, 166:7, 168:10, 177:13, 177:21, 178:21, 184:16, 185:12, 215:4, 219:11, 233:16, 234:8, 234:9, 235:19, 243:10, 248:7, 278:17, 279:17, 280:3
above
130:2, 130:24, 138:14, 138:20
absence
107:23, 143:5
absent
247:9
absolutely
80:22, 228:3
absorption
120:4
academic
181:19
accent
7:8
accentuated
171:7
acceptable
142:14, 142:18
accompanied
233:17, 234:18
accomplish
150:4, 150:15, 153:12, 158:24, 159:4, 159:17, 163:19, 178:18, 178:21, 202:7, 202:10, 205:22, 215:18, 234:23
accomplishes
176:25
accomplishing
215:17
accordance
5:7
according
239:24
accurate
13:4, 13:17, 26:5, 98:8
accurately
13:19, 104:17, 224:10, 283:7
achieve
148:13, 148:19, 176:18, 178:6, 245:21
acoustic
35:7, 36:3, 71:22, 111:5, 111:18, 112:1, 112:4, 112:5, 112:10, 169:25, 180:8, 180:11, 242:19, 248:21, 249:15, 250:3, 253:11
acoustical
129:24, 129:25, 130:20
acoustically
111:23, 111:24
acoustics
30:1, 30:13, 31:18, 31:25, 117:7, 118:25, 119:12, 119:24, 120:6, 122:8, 122:10, 126:10
acquisition
238:23
acronym
35:21, 35:23, 62:25, 63:6, 129:9
across
132:14, 135:3
action
1:8, 283:25
actions
156:15, 159:16, 195:12, 233:17, 234:18, 237:11
actively
270:1, 270:4
actual
22:16, 32:22, 32:25, 51:21, 167:13, 230:10, 238:17
actually
32:20, 44:18, 45:1, 46:14, 52:25, 53:21, 55:19, 62:16, 73:18, 95:17, 111:25, 112:2, 120:16, 140:17, 141:5, 153:4, 156:21, 157:2, 195:6, 208:16, 210:7, 226:13, 228:12, 229:22, 230:12, 231:1, 237:6, 238:16, 238:24, 239:10, 250:11, 253:16, 274:1
add
230:19, 282:4, 282:6, 282:15
added
119:3
adding
157:1, 282:3
addition
105:7, 119:14
additional
13:8, 13:13, 54:7, 232:9, 276:11
address
56:15, 154:15, 167:11, 180:21, 183:20
addressed
56:4, 67:1, 69:21, 70:1, 176:14, 184:8, 196:20, 198:4, 198:20, 200:10, 200:21, 212:25, 213:4, 215:25, 272:15
addresses
56:10
addressing
119:1, 165:22
adhering
279:4
adjust
121:14, 146:15, 146:17, 146:19, 147:25, 149:17, 151:12, 156:22, 157:7, 157:18, 158:17, 158:22, 159:9, 160:4
adjusting
162:11
adjustment
10:4
adjustments
8:12, 260:8
administration
14:10
adobe
10:1
adopt
90:17
ads
123:15
advantage
159:2, 234:13, 236:2, 236:9, 236:11, 236:15, 236:16, 236:25,

Meta Platforms, Inc.
Exhibit 1095
Page 073

237:3
advantages
235:17, 236:17
advised
281:1
aeronautics
14:10
affect
110:8, 119:7, 119:12, 120:8, 120:12, 120:16, 122:6, 122:13, 122:19, 122:22
affected
119:21
affecting
159:19
afforded
38:5
after
136:14, 148:20, 150:12, 156:21, 177:1, 181:2, 183:15, 206:8, 243:13, 244:24, 248:19, 276:14
again
30:11, 41:21, 43:17, 43:25, 44:5, 44:10, 47:1, 47:12, 51:4, 55:8, 64:16, 69:5, 79:14, 87:20, 101:5, 104:15, 105:17, 105:24, 110:14, 115:21, 118:16, 136:2, 140:6, 140:22, 141:2, 144:10, 151:11, 152:2, 152:19, 155:17, 158:4, 162:7, 185:24, 214:5, 214:25, 217:19, 220:13, 240:18, 260:14, 260:17, 261:22, 270:17, 279:22
against
18:4
ago
23:15, 99:16, 99:17, 124:8, 153:8, 191:4, 217:1
agree
85:4, 85:18, 113:22, 114:7, 114:25, 117:11, 117:18, 158:13, 166:7, 175:7, 177:20, 189:23, 189:24, 191:5, 191:6, 191:16, 191:17, 216:22, 217:17, 233:11, 234:1, 234:4, 234:6, 234:17, 242:23, 243:5, 243:21, 245:8, 245:10, 248:12, 249:4, 276:24
agreement
37:4, 145:22
ahead
22:18, 51:11, 101:12, 111:14, 151:8, 151:10, 166:8, 257:15, 258:12, 260:6, 261:11, 270:18, 270:25, 275:25
aid
210:17
air
83:13, 83:14, 83:21, 83:22, 84:2, 84:4, 84:5
aircraft
207:18, 238:18, 239:9
airplane
80:3, 275:18
akopyan
2:24, 9:2, 11:1
al
6:4
alarms
208:5
alert
207:25, 208:3, 208:4, 208:5, 208:22, 209:6, 238:3, 238:4
alerting
206:21
alerts
206:24, 207:2, 207:5, 207:11, 207:12, 207:14, 207:15, 207:18, 207:20
algorithm
159:2, 205:1, 216:10, 226:16, 226:17
algorithmic
138:8, 138:12, 138:25, 139:8, 139:18, 139:23, 140:3, 140:9, 140:18, 141:5, 141:13, 141:16, 141:19, 141:21, 141:25
algorithms
160:15
all
6:10, 9:2, 9:21, 10:6, 11:1, 11:10, 11:22, 13:12, 16:11, 18:23, 22:21, 26:4, 36:6, 39:21, 39:24, 44:17, 47:4, 50:12, 57:6, 74:3, 74:17, 83:18, 83:25, 84:8, 84:18, 85:18, 85:22, 92:14, 95:12, 96:16, 99:18, 100:1, 108:2, 113:13, 120:7, 124:5, 124:13, 128:15, 129:22, 130:18, 133:1, 133:5, 134:9, 134:24, 135:3, 135:10, 138:23, 140:14, 148:10, 153:18, 154:6, 154:14, 164:24, 166:2, 172:21, 173:24, 174:1, 174:22, 181:10, 181:15, 182:11, 182:24, 183:2, 183:11, 187:5, 199:19, 205:3, 210:5, 215:17, 219:5, 221:18, 222:9, 226:23, 229:23, 231:6, 231:23, 249:13, 256:24, 258:6, 259:8
allow
10:4, 134:15, 151:15, 160:6, 185:11
allowed
48:13, 283:17
allows
79:5, 151:2, 274:8
almost
183:11, 242:18, 246:14, 249:22
along
40:12, 44:2, 98:16, 152:22, 200:17, 239:19
already
7:25, 11:25, 25:23, 39:8, 41:15, 42:4, 42:9, 69:11, 144:8, 160:3, 205:25, 261:5,

276:9
also
2:22, 7:16, 22:11, 23:1, 23:7, 23:15, 26:11, 27:9, 28:25, 31:20, 32:2, 33:10, 39:2, 42:16, 42:25, 44:4, 45:18, 45:25, 47:25, 52:17, 59:1, 59:11, 67:1, 77:11, 84:4, 96:19, 102:15, 110:20, 135:12, 135:21, 142:13, 159:12, 166:7, 166:13, 202:4, 211:8, 223:17, 229:25, 231:14, 235:11, 239:23, 253:25, 254:15, 257:10, 260:11, 260:19, 261:14, 261:23, 264:11, 267:6, 276:10, 276:12, 277:5
alternating
9:24, 171:5
although
81:12, 95:11
always
112:8, 115:25, 167:23, 238:15
amazon
181:8
ambiguous
22:8, 27:17, 79:25, 257:4
america
283:26
american-based
171:4
ames
38:18, 53:3, 53:12, 53:16, 53:24, 54:12, 54:20, 55:10, 56:22, 58:7, 161:25, 235:21
among
242:19
amount
19:13, 20:21, 103:18
analysis
273:13
analytic
127:1
analyze
32:24
analyzed
28:11, 139:10
analyzers
230:3
analyzing
50:17
anatomical
116:16
anatomy
116:15
android
175:6
anechoic
126:21, 126:25, 128:10
angular
239:13
another
11:2, 40:13, 41:19, 60:9, 60:24, 64:11, 79:13, 79:22, 81:8, 93:16, 96:20, 96:23, 110:16, 118:11, 123:8, 125:15, 142:10, 145:1, 150:2, 151:18, 155:22, 159:4, 169:7, 169:15, 171:15, 172:21, 174:17, 182:11, 184:8, 187:5, 198:3, 199:12, 202:16, 221:19, 230:19, 249:21, 260:14, 261:17, 262:13, 263:2, 263:16, 266:19, 270:1, 270:8, 270:15, 270:22, 271:9
answer
17:5, 17:25, 22:18, 23:14, 26:1, 28:12, 28:19, 28:22, 37:18, 40:18, 46:19, 53:15, 66:16, 72:1, 72:3, 74:23, 76:23, 76:24, 77:17, 83:25, 84:8, 85:22, 86:4, 86:6, 88:5, 89:21, 92:7, 98:8, 104:17, 115:11, 124:25, 132:3, 133:4, 139:4, 141:11, 144:20, 163:8, 178:16, 185:15, 195:2, 198:22, 201:18, 204:3, 213:20, 217:1, 219:14, 224:10, 233:23, 235:4, 247:14, 254:7, 254:17, 270:3, 270:11, 270:18, 270:25, 276:18, 278:16
answered
69:11, 78:13, 92:11, 100:25, 218:18, 219:25, 274:16, 275:4
answering
28:2
answers
90:23, 104:21, 115:21, 191:4, 197:10, 276:8
antenna
175:5
antennas
265:24
anybody
12:5
anyone
11:22, 25:10, 55:22
anything
7:15, 7:19, 17:17, 23:17, 24:11, 27:21, 28:5, 28:14, 48:6, 88:24, 94:21, 95:13, 95:16, 105:17, 105:24, 117:24, 160:19, 164:4, 199:10, 202:5, 228:5, 240:12, 270:5
anyway
249:8
anywhere
84:11, 140:17, 141:4, 144:11
apart
116:14
apologies
15:20
apologize
16:5, 44:22, 93:11, 101:8, 101:13, 142:6, 254:8, 258:1
apparatus
103:17, 190:10, 193:1
apparatuses
192:15, 192:20, 193:13
appear
75:2
appearances
2:1

appeared
5:5
appearing
98:1
appears
9:13, 96:22, 140:4, 140:19, 141:6, 222:10, 255:24
appended
283:18
apple
249:18
applicable
73:11
application
127:20, 245:12
applications
14:16, 45:10, 89:16, 114:8, 115:1, 127:21, 128:22, 133:12, 161:24, 245:1, 249:17
applied
91:25, 92:11
applies
66:10, 205:3
apply
73:20, 80:18, 92:22, 109:16
applying
78:2, 217:2
appreciate
36:17
approach
217:9, 248:21
approaches
63:16, 217:14, 240:19
appropriate
50:20, 233:17, 234:19
approximate
53:5, 63:14
approximately
70:19, 71:6, 110:18
approximation
62:14, 107:4
april
4:15, 222:12, 223:4, 223:7
arbitrarily
65:9
arbitrary
51:19, 65:1, 65:5, 65:8
architect
31:24
architects
32:3
architecture
217:21
area
19:10, 22:22, 30:1, 39:9, 108:9, 110:14, 144:7, 207:2, 209:19
areas
31:16
aren't
13:8, 30:20, 74:18, 128:21, 173:22, 240:2
argumentative
78:14, 79:10, 82:25, 83:4, 83:8, 83:16, 84:6, 89:22, 137:17, 141:9, 141:10, 218:19, 274:15, 279:2
arguments
22:21, 56:2
around
17:20, 17:23, 35:10, 54:12, 54:20, 55:10, 106:19, 107:7, 126:17, 129:2, 181:18, 259:15, 264:12
arranged
116:13
arrays
34:24, 64:14, 64:15
arrival
120:18, 122:4
arrive
145:9
arrived
41:14, 145:14, 211:24
art
57:16, 73:13, 73:17, 79:23, 139:5, 139:12, 142:12, 142:21, 148:23, 149:2, 154:11, 155:2, 170:8, 177:14, 178:5, 179:18, 179:21, 180:2, 184:13, 184:17, 184:24, 185:3, 185:12, 196:23, 197:1, 198:8, 198:10, 201:3, 201:5, 203:20, 206:11, 206:14, 217:8, 254:2
article
41:17
articles
256:11
articulate
94:24
articulated
280:4
artisan
149:17
arts
29:7
asic
204:16, 204:19, 205:7, 214:10, 215:15
asics
205:25
aside
85:16, 206:1, 239:22
asked
21:20, 56:14, 56:15, 72:19, 78:13, 86:3, 92:10, 92:14, 94:14, 111:13, 130:16, 130:23, 146:12, 163:3, 198:24, 211:15, 218:18, 220:5, 256:25, 257:2, 267:18, 267:20, 270:19, 270:22, 271:2, 271:9, 271:11, 274:16, 275:4, 276:20, 276:21
asking
19:20, 19:22, 23:17, 36:20, 38:9, 38:11, 41:13, 46:12, 60:13, 72:21, 73:18, 94:18, 99:25, 113:19, 119:11, 119:23, 138:24, 139:21, 140:16, 144:7, 150:24, 155:18, 157:4, 158:15, 163:18, 165:10, 167:6, 172:12, 216:11, 218:14, 268:5, 268:21, 269:1, 269:11, 271:15, 272:2
aspect
227:6
assembly
162:1
assertation
149:8
asserted
18:3, 18:6, 18:15, 23:6, 24:14, 24:18, 27:2, 28:23,

Meta Platforms, Inc.
Exhibit 1095
Page 076

35:17, 35:24, 36:6, 95:4, 95:7, 95:17, 96:15, 97:21, 98:3, 98:11, 98:23, 136:15, 137:22, 138:8, 138:9, 138:13, 138:18, 139:1, 139:2, 139:10, 139:13, 139:23, 140:4, 140:19, 141:6, 141:7, 143:2, 143:8, 143:15, 143:23, 144:2, 144:13, 145:24, 173:14, 173:16, 183:6, 183:7, 187:20, 200:1, 203:3, 212:8, 256:12
assess
155:14
assigned
30:21, 217:22
assimilate
194:16
assimilated
194:12, 194:20
assimilation
194:24
assist
30:16
associated
35:20, 122:21, 237:15, 238:4, 274:10
associates
29:16, 29:18, 29:22, 29:25, 30:9, 30:12, 30:18, 31:20, 31:23
assume
102:9, 182:21
assumed
134:20
assumption
156:7
atmos
131:12, 131:16
attached
13:16, 281:10
attempt
23:25, 259:22, 260:15, 261:17, 262:13, 263:2, 263:16, 265:10
attending
6:11
attention
10:10, 10:15, 197:24, 268:8, 269:3, 269:15, 271:18, 272:5, 272:7
attenuation
119:16, 120:20
attorney
6:13, 22:16, 73:5
attorneys
15:3, 21:3, 21:6, 21:7, 21:11, 21:13, 21:17, 21:24, 32:21, 36:13
attributes
160:7
auditory
38:18, 39:9, 53:17, 53:24, 124:6, 124:15, 162:1, 167:14, 168:22, 207:16, 223:25, 235:22, 236:19
augment
110:21
aural
169:13, 169:25
auralization
180:7, 180:21
austin
2:5
authentication
31:2
authored
41:17, 70:11
available
141:24, 149:16, 160:1, 160:15, 178:5, 178:17, 180:3, 181:13, 181:21, 182:19, 185:11, 197:7, 198:14, 201:12, 213:16, 223:9, 223:11, 223:13, 223:15, 223:17, 265:22
average
93:3
avoidant
238:16
avoiding
128:18
aware
59:5, 60:20, 131:7, 153:12, 171:20, 190:2, 190:6, 191:1, 192:13, 192:17, 192:19, 192:25, 193:12, 193:17, 194:15, 194:23, 236:25
awareness
237:21
away
89:7, 91:7, 95:5, 96:20, 99:5, 99:9, 99:13, 99:25, 100:4, 100:9, 100:13, 100:15, 100:16, 100:18, 100:21, 100:23, 100:24, 101:1, 101:7, 101:14, 103:22, 104:3, 104:12, 104:19, 104:22, 105:7, 105:14, 105:18, 105:21, 106:1, 106:4, 107:17, 124:18, 126:23, 126:24, 127:8, 136:24, 148:3, 149:19, 162:13, 181:4, 186:5, 194:12, 259:5, 259:6

B

b-e-g-a-u-l-t
7:8
b1
173:12, 183:4, 203:1, 212:6
b2
187:18, 199:24
bachelor's
29:9
back
9:24, 39:13, 40:8, 40:20, 50:3, 50:9, 57:18, 82:6, 87:13, 113:10, 123:14, 138:3, 147:2, 147:6, 147:10, 154:20, 154:21, 182:4, 182:24, 191:12, 221:15, 244:13, 255:10, 262:2, 266:21
background
31:17, 107:19, 107:24, 109:1, 109:4, 109:8, 109:9, 109:11, 109:15, 109:18, 109:23, 110:6, 122:11, 225:6
backyard
109:25
badgering
83:10, 83:17, 84:7, 89:23, 218:19, 274:16
ball
111:12

ballpark
33:13
band
64:20
band-pass
65:7
bandied
246:8
base
276:22
based
18:8, 27:22, 28:6, 28:15, 44:3, 90:19, 96:23, 153:20, 180:9, 185:2, 217:2, 249:14, 264:18
basic
60:20
basically
34:19, 50:17, 76:6, 112:18, 113:17, 130:23, 151:20, 159:13, 180:9
basis
94:16
bathroom
146:11
beach
7:11, 82:9, 82:16, 82:20, 82:24, 83:3, 83:7, 83:15, 83:23
beacon
211:8
beacons
210:9
beam
77:18
beamforming
34:23
bear
22:2, 22:4
became
45:11, 58:3, 58:4, 180:19
because
13:9, 15:23, 25:12, 32:19, 46:3, 53:15, 58:1, 60:8, 60:23, 67:6, 74:23, 77:21, 85:10, 88:22, 91:10, 100:15, 101:21, 102:4, 102:7, 104:24, 107:19, 107:21, 107:23, 108:24, 109:2, 109:6, 109:20, 110:2, 111:13, 112:20, 119:6, 119:24, 125:14, 129:22, 130:18, 131:5, 132:6, 141:2, 142:8, 143:18, 148:25, 158:23, 160:3, 165:6, 168:7, 168:18, 170:16, 171:14, 172:18, 177:12, 180:24, 181:17, 184:15, 208:19, 216:11, 217:19, 222:14, 227:21, 238:20, 240:13, 254:12, 274:21, 280:7
become
103:20
becomes
81:15, 94:5, 112:22, 132:12
been
12:11, 12:14, 13:25, 14:23, 16:19, 19:12, 21:11, 21:14, 25:12, 26:11, 34:20, 39:8, 40:1, 40:7, 40:11, 40:13, 53:8, 57:16, 64:12, 108:10, 120:3, 124:21, 126:13, 128:3, 131:9, 134:16, 142:7, 145:17, 149:1, 149:23, 152:3, 170:11, 175:20, 177:13, 177:21, 178:1, 184:16, 189:15, 189:16, 197:11, 199:23, 201:13, 202:25, 203:2, 209:21, 210:13, 210:14, 210:16, 231:9, 231:17, 249:7, 254:12, 265:24, 270:22, 271:9, 271:11, 276:6, 283:16
before
5:3, 7:23, 8:7, 17:1, 17:8, 17:12, 21:4, 24:14, 25:13, 27:8, 27:15, 27:24, 28:8, 28:17, 32:25, 39:5, 39:16, 52:20, 70:4, 113:13, 135:9, 135:11, 135:13, 135:22, 149:11, 149:14, 149:16, 151:5, 152:5, 153:11, 154:11, 161:24, 175:11, 176:4, 177:12, 177:24, 178:5, 179:17, 180:3, 181:13, 181:21, 184:12, 185:2, 185:11, 188:22, 189:3, 189:21, 190:4, 190:23, 191:12, 192:15, 192:21, 193:14, 194:15, 194:24, 195:8, 195:13, 195:18, 195:24, 196:5, 196:22, 197:7, 198:7, 198:14, 201:2, 201:12, 203:17, 203:24, 206:11, 206:14, 206:17, 206:23, 207:7, 207:12, 207:20, 208:11, 208:20, 210:18, 210:22, 211:7, 211:10, 211:15, 213:6, 213:16, 223:10, 223:13, 223:14, 234:25, 235:7, 237:1, 241:18, 253:17, 254:6, 254:7, 254:24, 257:15, 280:13
began
266:22
begault's
259:1, 259:22, 260:14, 260:15, 261:17, 261:18, 262:13, 262:14, 263:2, 263:3, 263:16, 263:17, 265:2, 265:10, 267:2
begault-c
11:4
begin
185:7
beginning
198:3, 252:8, 258:11, 259:12, 260:7, 261:9, 262:5
begins
6:1, 147:20, 154:25, 183:16, 196:13, 197:25, 198:19, 200:13, 203:9, 206:21,

225:12, 252:1
behalf
6:16, 6:17, 6:22
behind
123:11, 125:16, 200:17, 227:21, 239:4
being
6:22, 15:15, 16:12, 27:6, 27:14, 43:12, 48:9, 57:24, 72:3, 76:11, 84:15, 85:1, 88:4, 89:12, 91:16, 99:24, 100:13, 105:7, 107:7, 125:21, 127:6, 132:7, 132:13, 133:14, 155:3, 161:15, 169:14, 173:16, 191:23, 194:20, 208:21, 215:14, 215:15, 229:10, 235:13, 236:11, 260:1, 260:2, 264:12, 264:15, 272:24, 283:3
believe
16:24, 17:16, 21:2, 21:7, 22:2, 22:4, 22:20, 23:1, 23:15, 23:24, 30:12, 35:20, 39:4, 39:24, 40:24, 41:15, 41:16, 47:22, 51:19, 51:24, 53:5, 53:6, 63:23, 75:17, 81:2, 91:23, 92:10, 93:18, 95:21, 96:1, 98:15, 126:9, 128:7, 129:9, 132:24, 135:10, 140:2, 143:17, 149:6, 151:13, 152:16, 154:10, 166:6, 172:2, 177:17, 180:10, 180:16, 184:21, 184:24, 185:6, 189:6, 190:11, 195:15, 196:10, 196:22, 198:7, 201:2, 202:14, 203:17, 204:13, 206:16, 213:6, 219:22, 221:3, 228:19, 231:11, 232:14, 236:17, 237:20, 255:19, 255:24, 256:14, 257:23, 264:1, 265:20, 272:19, 275:11, 275:16, 275:18, 275:23
believed
235:7
bell
78:6, 129:13, 265:13
below
93:23, 94:2, 94:9, 94:18, 94:22, 108:25, 109:3, 250:11, 251:10
benefit
43:4
besides
13:22, 21:17, 25:4, 30:20, 122:9, 138:25
best
19:13, 20:13, 31:12, 33:18, 33:20, 55:13, 70:10, 70:25, 111:9, 137:15, 137:18, 240:3, 246:9, 248:21
best-fit
240:18
beta
40:23
better
33:2, 238:21, 238:24, 249:17
between
10:19, 20:17, 20:21, 21:3, 25:3, 31:9, 37:9, 50:19, 57:25, 66:3, 71:12, 71:17, 72:3, 72:8, 72:12, 74:14, 76:7, 76:13, 77:13, 77:21, 77:24, 79:16, 80:20, 81:1, 81:19, 92:17, 97:14, 97:20, 100:1, 100:20, 101:6, 101:15, 102:2, 102:5, 104:2, 104:18, 105:14, 106:3, 106:8, 108:12, 114:16, 115:12, 115:14, 115:18, 116:4, 116:10, 134:16, 136:11, 153:23, 165:2, 165:6, 165:11, 165:15, 170:2, 174:7, 174:13, 217:4, 245:17, 246:6, 246:9, 246:19, 261:21, 266:7, 273:5, 274:8, 275:8, 277:6, 277:13, 278:14, 279:1, 279:8, 279:19, 279:23
beyond
13:15, 96:25, 168:25, 172:8, 172:13, 188:8, 259:21, 260:13, 261:16, 262:12, 263:1, 263:15, 264:25, 265:9, 275:4
big
265:23
billing
15:2, 15:3, 20:23
billings
16:18
binaural
57:6, 57:7, 57:13, 57:16, 57:19, 58:5, 58:7, 59:7, 59:14, 115:13, 115:14, 115:19, 115:24, 115:25, 116:5, 116:11, 116:16, 117:12, 117:19, 135:22, 138:21, 140:7, 141:18, 142:2, 146:15, 146:18, 147:25, 148:2, 148:5, 149:18, 151:13, 156:22, 157:7, 157:18, 158:17, 158:22, 160:21, 162:11, 162:13, 164:12, 164:19, 164:25, 165:3, 165:22, 166:1, 166:11, 166:19, 166:22, 167:8, 167:9, 167:11, 167:18, 168:3, 168:10, 168:11, 168:16, 168:17, 168:19, 169:1, 169:2, 169:10, 169:18, 169:20, 169:21, 169:24, 170:2, 170:3, 170:4,

Meta Platforms, Inc.
Exhibit 1095
Page 079

170:6, 170:7, 170:9, 170:13, 170:16, 170:17, 170:20, 171:10, 171:13, 171:16, 171:18, 172:3, 172:16, 175:16, 175:20, 176:3, 177:3, 186:4, 199:6, 200:15, 203:13, 204:8, 208:23, 209:5, 212:15, 214:20, 218:6, 224:1
biquad
65:17, 65:18, 66:20, 67:1
bit
15:22, 16:2, 16:4, 20:24, 22:6, 90:23, 93:16, 116:18, 116:19, 191:7, 231:21, 249:12
blasting
104:22
bleed
171:4
blind
209:21, 209:22
blue
88:15
board
252:12, 252:22
boat
79:18, 275:16
boats
79:7, 278:6
body
84:25, 85:9, 85:11, 85:17, 99:20, 100:16, 105:18, 105:25
book
125:5, 181:7, 181:17, 181:20, 181:21, 208:16, 222:11, 222:23, 222:25, 223:3, 223:9, 223:15, 228:22, 229:11, 229:25, 230:6, 233:7, 235:8, 237:7, 240:22, 241:25, 244:17, 248:4, 250:2, 250:19, 253:5
books
123:14
boom
40:14
boston
2:16, 82:15, 83:13, 83:21, 84:2
both
31:18, 42:22, 63:18, 63:19, 64:12, 65:19, 80:15, 81:13, 238:10, 240:22, 241:1, 260:2, 263:9, 266:17
bother
173:23
bottom
184:1, 222:19, 223:8, 233:6, 251:25, 253:5
bought
157:16, 158:15
boundaries
210:22, 211:2
box
51:21, 52:17
boy
41:3, 145:19
brazen
276:14
break
25:20, 50:2, 81:24, 113:13, 146:11, 146:22, 181:24, 221:8, 244:7, 253:25, 254:4, 254:7, 254:20
breaking
181:24
breaks
25:17
breathing
84:24
brian
22:2
brief
22:24, 23:1
briefly
18:19, 18:20, 23:2, 23:8, 70:14
bring
7:12
brought
7:14, 31:21
brown
88:15
building
82:13
built-in
159:3
busy
109:19
button
238:5
buy
181:10

C

c-a-t-t
180:11
c-i-p-i-c
129:8
cache
206:15
calculation
127:23
california
5:4, 5:8, 7:11, 29:4, 82:10
call
21:2, 22:15, 67:16, 69:19, 69:25, 70:1, 71:9, 71:11, 71:14, 71:16, 71:24, 72:9, 72:10, 72:22, 74:3, 74:10, 74:11, 75:11, 75:13, 75:15, 79:9, 79:22, 80:7, 80:11, 80:17, 80:21, 80:22, 81:2, 81:8, 81:11, 81:12, 81:15, 81:16, 81:21, 93:22, 94:3, 125:9, 128:18, 148:1, 149:18, 158:18, 162:12, 166:20, 170:4, 175:4, 181:20, 183:17, 184:6, 232:17, 262:9, 262:10, 262:17, 262:25, 263:4, 263:7, 263:13, 263:14, 263:21, 263:22, 273:9, 273:10, 273:13, 273:16, 273:17, 273:18, 273:22, 273:23, 273:24, 274:5, 274:6, 274:10, 274:17, 274:18, 274:22
called
6:22, 29:10, 39:7, 79:12, 121:14, 142:9, 142:10, 150:9, 151:18, 180:7, 186:4, 186:5, 186:9, 201:15, 249:24, 253:6
calling
142:11, 186:2, 186:3, 210:25
calls
45:21, 45:25,

46:17, 48:12, 51:5, 51:13, 52:15, 58:25, 79:19, 80:4, 157:25, 270:2, 270:10, 278:19
came
13:9, 39:4, 39:5, 53:6, 56:5, 57:22, 58:2, 181:6, 235:20, 235:24, 236:21
camera
193:13
cameras
193:18
can't
20:20, 26:4, 28:12, 41:23, 66:16, 98:11, 125:14, 133:4, 137:13, 151:25, 152:9, 153:4, 157:2, 164:4, 171:24, 179:8, 186:10, 186:17, 193:20, 197:17, 199:10, 205:11, 206:6, 214:15, 214:18, 228:1, 228:5, 232:18, 239:11, 244:2, 249:7, 249:23, 264:9
canal
239:18
capabilities
39:14, 171:16, 180:11, 180:19, 232:18
capability
40:25, 159:11, 171:11, 220:2, 220:22, 230:13
capable
44:12, 81:12, 133:19, 134:6, 156:21, 174:16, 174:17, 190:22, 219:21, 278:13, 278:25, 279:4, 279:7, 279:18, 280:8
capacity
220:6, 220:17
capital
43:6
caps
39:21
caption
251:10
capture
57:20, 134:22, 171:18, 172:3, 172:15, 172:18
capturing
58:4, 66:6, 127:25, 166:11, 166:17
car
121:15
care
147:5
career
34:20
careful
264:6
carefully
95:12, 264:4, 264:8
carry
262:20
cars
266:9
cascadable
252:13
case
6:5, 14:22, 16:13, 17:12, 17:21, 17:24, 18:4, 18:7, 18:16, 20:7, 20:11, 20:18, 20:21, 20:25, 21:16, 27:3, 30:17, 67:12, 69:18, 70:24, 89:15, 142:8, 142:10, 145:24, 173:14, 182:24, 183:6, 187:20, 200:1, 203:3, 212:8, 216:13, 216:23, 269:24, 270:5, 270:9, 270:16, 270:23, 271:10, 282:10
cases
15:11, 26:14, 29:22, 30:2, 30:16, 124:5, 124:13, 243:9, 245:12
categorical
132:25
categories
94:13
categorization
169:17
category
131:11
catt-acoustic
180:11
cause
5:6, 186:9
causing
49:21
caution
207:17
cease
103:4
ceiling
51:21
cellular
79:25, 175:4, 266:17
center
29:12, 29:14, 29:18, 29:19, 29:20, 30:5, 30:8, 30:15, 30:22, 31:22, 32:7, 32:14, 33:6, 38:24, 129:12
central
34:6, 193:6, 194:7, 194:12, 217:20
centrally
126:22
certain
10:16, 19:12, 19:25, 20:2, 20:4, 20:6, 30:2, 31:16, 44:15, 45:5, 70:16, 81:4, 85:9, 99:20, 103:3, 105:2, 109:1, 109:4, 122:13, 132:18, 139:18, 141:19, 161:1, 209:19, 235:8
certainly
243:2, 264:14
certificate
3:17, 283:1
certified
5:4
cetera
10:7, 12:21, 16:18, 76:5, 117:8, 127:3, 138:21, 142:22, 144:23, 215:16, 235:14, 239:13
chair
87:19, 87:21, 88:2, 88:4, 91:12, 91:16
challenged
209:22
chamber
126:21, 126:25
chance
8:23, 145:11
change
13:11, 40:15, 89:21, 120:14,

120:18, 132:9, 282:15
changed
233:13
changes
3:16, 13:22, 93:7, 97:13, 132:19, 282:1, 283:13, 283:16, 283:18
channel
115:8, 115:24, 172:19, 237:9
channels
115:11, 115:25
chaperon
209:10, 209:14
chapter
242:11, 244:18
characteristic
65:10
characteristics
69:16, 120:6
characterize
95:8, 169:9
charged
15:16, 16:12
charles
29:15, 29:21, 29:25, 30:8, 30:17, 31:19, 31:22
chat
8:2, 8:3, 8:6, 8:11, 8:13, 8:23, 9:4, 9:9, 11:2, 12:1, 12:5, 12:8, 145:1, 172:22, 182:20, 199:18, 202:16, 211:18
chatting
12:3, 12:5
check
93:19, 281:8
chip
38:6, 38:8, 205:2, 215:16, 216:9, 217:11, 217:23, 252:21, 252:24
chris
6:14, 7:2, 49:20, 49:22
christa
1:32, 5:3, 6:18, 283:2, 283:33
christopher
2:14
cipic
129:6, 129:8, 130:17, 131:3
circle
138:3
circulate
11:2, 182:11, 187:5, 199:12, 221:19
circulated
145:10
circumstances
68:24, 112:9, 205:7, 205:14, 206:24, 235:8
citation
143:6
citations
56:17, 137:25, 138:19, 143:8, 143:9, 143:12, 143:22, 144:1, 144:2, 144:9, 256:14, 276:20
cite
136:14, 136:18, 137:22, 143:1, 143:15, 144:12, 256:10, 267:25, 268:11, 268:15, 269:6, 269:18, 269:19, 269:21, 269:23, 271:21, 272:9
cited
138:12, 139:1, 258:15, 264:21, 266:24
cites
175:12, 184:5
citing
239:8
city
2:7, 210:8, 210:10
cityscape
210:6
cityscapes
209:23
civil
1:8, 283:5, 283:15, 283:22
claimed
27:6, 27:14, 155:3, 157:18, 231:11
claims
56:15, 73:21, 138:9, 138:13, 139:1, 140:4, 140:13, 145:23, 146:6, 146:12, 146:14, 147:16, 173:13, 173:15, 176:8, 183:5, 183:7, 187:19, 199:25, 203:2, 212:7, 257:10
clarendon
2:15
clarification
36:14, 150:24, 181:19, 205:3
clarifications
8:17
clarify
53:18, 68:9, 191:9, 244:1
clause
197:25, 198:19
clean
7:14, 7:16, 55:7
clear
52:6, 80:23, 84:23, 218:3, 258:15, 259:22, 260:14, 261:17, 262:13, 263:2, 263:16
clearly
36:16, 100:15, 103:16, 274:9
close
90:10, 102:10, 104:23, 106:20, 132:16, 133:9, 182:22, 225:8, 249:8
closer
109:20, 109:22, 128:19
coast
79:7, 79:12
cockpit
237:24
code
5:8, 160:18, 161:3, 161:5, 161:10, 162:2
coder
160:20
coffee
88:11, 89:20, 90:16
coincident
116:14
colleague
161:17
collect
126:18, 129:1, 129:4
collected
127:6, 128:23, 129:16, 130:17, 131:4
college
29:8
collision
238:16
collocated
124:6
column
144:23, 164:8,

184:1, 218:4, 258:8, 258:10, 259:8, 259:9, 259:10, 260:4, 261:7, 262:2, 262:5, 262:19, 262:21, 263:14, 267:12, 267:15, 267:25, 268:3, 268:4, 268:11, 268:15, 268:19, 269:3, 269:6, 269:9, 269:15, 269:18, 269:19, 271:12, 271:18, 271:22, 271:24, 272:5, 272:9
combine
12:22
come
8:6, 27:7, 27:15, 30:2, 30:4, 36:7, 45:13, 45:14, 48:5, 112:12, 113:21, 155:10, 159:15, 171:10, 180:12, 231:1, 233:24, 235:23
comes
180:6, 180:13
comic
123:14
coming
44:15, 45:6
command
177:2, 177:3
common
138:14, 139:12, 149:2, 154:12, 177:14, 177:22, 179:21, 184:17, 185:3, 197:1, 198:10, 201:6, 203:20, 213:10
commonly
141:23
communicate
79:5, 81:14, 93:15, 192:14
communicated
79:16, 169:24
communicating
12:7, 55:20, 75:21, 77:4, 78:11, 79:8, 80:3, 80:14, 81:10, 93:4, 168:18, 193:9, 193:10, 224:22, 265:19, 266:11
communication
38:12, 38:14, 71:11, 71:17, 71:22, 71:23, 72:3, 74:14, 76:4, 76:5, 77:11, 77:13, 77:21, 78:22, 79:2, 79:3, 79:24, 80:1, 80:10, 80:20, 81:1, 81:7, 81:19, 92:6, 92:15, 94:16, 96:18, 98:18, 102:5, 102:6, 107:19, 108:18, 136:11, 168:20, 169:3, 169:4, 169:5, 169:6, 169:13, 170:5, 170:7, 170:11, 170:16, 171:14, 172:19, 174:11, 174:12, 265:21, 266:6, 273:5, 274:8, 275:7, 277:6, 277:11, 277:13, 278:14, 279:1, 279:8, 279:19, 279:23
communications
76:7, 91:25, 92:1, 92:12, 92:21, 95:21, 96:11, 110:15
community
57:17
company
29:17
compensating
240:20
compiled
40:22
completely
91:5, 163:21, 210:2
component
34:8, 46:9, 46:13, 65:20, 79:3, 79:4, 80:16, 190:10, 229:5, 247:8, 247:9, 247:16, 277:9
components
40:6, 40:15, 40:19, 46:24, 52:19, 190:4, 230:7
compound
52:6, 239:6
comprised
218:21
comprising
174:8
computational
219:8
computer
43:2, 44:13, 44:15, 49:4, 49:7, 51:23, 51:25, 58:5, 75:24, 76:9, 76:11, 76:12, 76:14, 76:19, 79:4, 86:12, 86:20, 87:4, 87:5, 87:6, 150:25, 159:1, 162:9, 162:20, 162:24, 163:4, 174:6, 174:7, 174:15, 174:20, 189:18, 193:10, 219:18, 275:23, 276:2, 276:4, 277:2, 277:3
computers
75:17, 265:21
computing
129:13, 163:9, 163:14, 163:24, 164:5, 179:3, 186:1, 186:13, 186:22, 187:1, 197:13, 199:2, 201:21, 202:10, 204:6, 204:14, 205:5, 205:15, 205:21, 206:2, 208:6, 213:25, 214:9, 214:10, 214:19, 215:4, 218:25, 219:5, 219:7, 219:15, 219:20, 220:1, 220:5, 220:16, 220:21, 221:2, 257:1
conceive
234:13
concept
53:6, 58:4, 268:14, 272:8
conceptually
44:17
concerned
33:10, 129:23, 130:19, 226:1
concluded
280:24
conclusion
27:6, 27:14, 36:8
conditions
96:23, 109:1, 109:4, 109:9, 109:11, 110:1, 110:2, 122:13
conducted
276:15, 276:20

Meta Platforms, Inc.
Exhibit 1095
Page 083

conducting
75:9
conductors
78:10
confer
169:12
conference
5:3, 5:5, 107:18, 110:16
configuration
65:17, 66:20
configured
150:4, 178:18, 232:2, 232:4
confined
224:1
confirm
24:5, 176:10, 179:15, 278:11, 280:14
conjunction
189:20, 189:23, 191:5, 191:17
connected
113:24, 114:8, 114:22, 115:1, 192:3, 245:1
connection
17:6, 31:9, 87:21, 114:16, 114:19
consider
106:21, 117:24, 118:3, 118:8, 118:19, 160:20, 171:13, 204:19, 216:9, 218:16, 219:2, 220:10, 220:18
considered
117:13, 117:20, 265:24, 266:24, 280:9
considering
121:9
consistent
37:14, 258:21, 259:4, 259:24, 260:18, 260:19, 261:22, 261:23
consoles
78:11
consonants
105:2
constant
132:13, 134:21, 134:23, 135:3
constitute
131:24, 132:1, 162:14, 162:21, 163:5, 163:10, 174:15, 202:11, 206:4, 214:13, 267:3
constrain
275:7
constrained
128:9
construction
4:5, 22:11, 22:14, 22:21, 43:13, 43:15, 73:11, 119:2, 119:3, 119:20, 119:25, 227:24, 254:3, 254:14, 270:16, 270:23, 271:10
consulting
29:21, 29:24, 29:25, 31:23, 31:24, 32:2
contact
110:20
contacted
17:16
contain
34:21
contains
252:12
contend
274:13
contents
22:16, 36:9, 89:24, 255:21
context
74:24, 89:3, 100:4, 107:17, 166:2, 166:3, 167:25, 170:5, 170:6, 191:13, 227:5, 234:23, 235:1, 235:2, 235:15, 242:17, 243:1, 243:7, 243:10, 243:16, 244:3, 245:11, 245:18
contexts
100:5
continual
44:10
continue
43:14, 113:6, 113:15
continues
184:6, 188:3, 251:16, 252:13
contradictory
214:15
contrast
65:6
contrasted
235:13
contribute
233:8
control
38:23
controlled
39:7
controller
189:7, 190:8, 193:14, 193:22
controllers
188:19, 188:23, 189:4, 189:12, 190:4, 190:23, 192:14, 192:21, 193:4, 194:1, 194:7, 195:7, 195:13, 195:20, 195:25, 196:6
convenience
25:20
conversation
96:8, 107:25, 137:7
conversational
86:18, 95:18
conversations
224:3
convey
167:15
convolution
59:12, 59:18, 59:19, 59:21, 59:24, 59:25, 60:4, 60:12, 60:13, 60:17, 60:20, 61:3, 61:4, 61:6, 61:11, 61:13, 61:22, 61:23, 61:25, 62:4, 62:10, 62:16, 62:22, 63:21, 63:24, 64:1, 64:3, 64:6, 65:21, 66:4, 66:5, 66:9, 66:14, 66:21, 66:25, 67:2, 67:8, 67:17, 67:24, 68:14, 68:15, 68:20, 68:23, 69:3, 69:7, 140:24, 141:22, 150:10, 160:15, 162:2, 217:12, 251:21, 252:8, 252:11
convolve
62:8, 62:18, 69:9
convolved
60:9, 67:11, 251:16
convolvotron
39:8, 39:10, 40:3, 42:4, 46:2, 46:16, 46:20, 47:16, 48:13, 48:19, 49:11, 50:12,

51:1, 51:18, 52:7, 149:24, 150:16, 151:20, 180:17, 191:23, 250:13, 250:18, 250:24, 251:20, 252:1, 252:5, 252:19
coordinate 200:16, 246:11
coordinates 51:22, 231:16
copy 7:14, 7:16, 181:8, 222:11, 222:22
copyright 180:25, 181:3
corner 222:20
corporal 85:1, 85:17
correct 12:13, 13:7, 14:4, 15:12, 15:14, 25:9, 26:10, 29:1, 29:5, 31:1, 50:24, 52:22, 62:6, 70:3, 72:25, 82:11, 112:4, 129:9, 135:8, 135:10, 135:16, 135:18, 135:25, 137:22, 143:11, 147:18, 148:9, 148:21, 159:23, 176:15, 178:10, 191:25, 196:16, 196:21, 207:6, 211:12, 213:2, 222:24, 223:2, 237:13, 251:16, 251:18, 257:19, 264:2, 264:5, 264:9, 280:15, 280:16, 283:27
corrected 56:18, 143:9, 143:13, 181:5
corrections 3:16, 281:8, 281:10, 282:1, 282:14
correctly 12:12, 15:25, 28:2, 30:19, 66:6, 114:18, 123:23, 148:22, 152:24, 177:8, 177:18, 184:11, 204:14, 205:12, 219:6, 278:24
corrects 11:20
correspond 109:15, 123:18, 123:20, 124:20, 127:15, 130:11
corresponding 124:5, 125:15
corresponds 102:17
couldn't 80:20, 158:8, 163:20, 170:14
counsel 6:11, 9:7, 12:3, 17:18, 17:21, 25:25, 55:17, 55:18, 55:19, 55:25, 56:5, 56:13, 56:16, 181:23, 199:17, 222:1, 244:5, 270:20
counsel's 256:18
count 18:8
counted 13:2, 255:18, 255:23
counterargument 119:4
counting 255:16
couple 164:22, 191:4, 217:1, 246:7
course 45:11, 47:3, 58:1, 79:24, 175:24, 212:2, 240:13, 244:8
court 1:1, 6:4, 6:18, 43:4, 55:1, 73:19, 73:20, 113:3, 121:19, 142:22
cover 25:14, 222:15, 255:19, 255:20
covered 66:19, 144:8, 243:14
cpu 33:25, 34:5, 34:8, 34:11, 153:21, 204:16, 204:19, 205:7, 214:10, 215:10, 215:20, 216:5, 216:7, 216:10, 217:13, 218:5, 218:8, 218:12, 218:14, 218:20, 218:21, 219:18
cpus 205:25, 216:1, 216:4, 217:4, 217:17, 217:19
crash 238:19
crashing 207:24, 208:10
crazy 128:15
create 35:5, 48:13, 63:17, 68:24, 128:4, 240:1
criteria 90:13, 90:15, 90:17, 91:2, 91:6, 91:8, 91:20, 92:22, 92:24, 92:25, 105:7, 105:8, 105:11
cross 246:6, 246:15, 246:22
cross-talk 58:21
cruz 29:10
crystal 250:12
csr 1:32, 283:2, 283:33
cue 124:6, 225:9, 237:10, 237:17, 238:2, 238:12, 238:13, 238:18, 238:25, 239:3, 239:4, 243:14
cued 243:10
cues 34:21, 57:20, 108:1, 110:20, 122:21, 180:8, 180:9, 224:2, 238:7, 238:17, 238:20
cup 88:11, 88:17, 88:18, 89:3, 89:6, 89:7, 89:9, 89:15, 89:20, 89:24, 89:25, 90:20, 90:24, 99:4
cups 90:16
current 171:5

currently
29:11, 29:13, 270:12
curriculum
181:18
custom-made
252:12, 252:22
cut
113:2
cv
10:25, 12:17, 13:3, 13:5, 13:7, 13:9, 13:12, 13:16, 13:21, 14:6, 53:7, 255:16
cycle
170:21, 170:24, 171:3
cycling
150:20
cylinder
88:15

D

d-a-t-a
41:4
d-u-r-a-n-d
7:7
dang
249:11
data
41:4, 41:6, 41:9, 42:14, 42:21, 42:22, 42:23, 43:9, 43:19, 46:15, 133:10, 192:5, 192:12, 230:4
database
126:11, 128:5, 129:6, 129:14, 130:17, 131:3
databases
126:14
date
6:6, 20:11, 20:18, 41:20, 141:24, 150:13, 152:7, 175:23, 181:1, 282:11
dated
11:15, 223:3
dates
150:11
davis
129:14
day
5:1, 5:3, 8:17, 10:9, 12:2, 25:24, 109:16, 283:28
days
175:4, 246:12
db
264:1, 264:8
deaf
80:15
dealing
30:24
decades
57:18
decibel
93:19, 94:3, 94:6, 95:8, 95:13, 103:3
decibels
93:13, 93:14, 96:7, 102:9, 264:1
decide
100:12
decided
100:12, 181:3
decisions
245:2
declare
283:2, 283:24, 283:25
decouple
125:6
decoupled
125:17
decoupling
123:17, 124:9, 124:15
dedicated
217:10
defendant
22:10
defendant's
119:2, 119:19, 119:25, 254:13
defendants
1:15, 2:12, 6:15, 6:22, 18:4, 22:14, 22:20, 23:6
defense
70:15
defense's
227:23
define
21:21, 63:3, 73:23, 86:14, 87:4, 87:7, 89:4, 89:12, 90:9, 96:3, 96:5, 140:7, 216:8, 267:6, 274:1
defined
73:23, 119:5, 229:21, 274:11
defines
274:13
definitely
128:16
definition
31:13, 33:1, 61:10, 77:19, 78:2, 80:6, 88:8, 96:23, 97:3, 97:4, 97:7, 99:13, 99:17, 119:9, 121:7, 131:12, 131:18, 131:19, 131:20, 132:22, 132:23, 132:24, 214:6, 215:9, 229:5, 240:16, 258:13, 258:24, 259:19, 260:12, 260:22, 260:25, 261:14, 261:19, 264:24, 265:7, 265:15, 266:2, 272:13, 272:17, 272:21, 273:1, 273:4, 273:20, 274:3, 275:21, 277:22, 278:3, 279:4, 280:7
definitions
266:22
defraction
120:4
degraded
109:21, 110:5
degree
13:21, 29:9, 73:15, 97:15, 232:10, 248:7
degrees
29:6, 40:24, 230:15, 230:17, 230:19, 239:9, 239:11
delay
247:2, 247:9, 247:16
delete
282:6, 282:7, 282:15
deleting
282:5
demarcation
97:22, 97:25
demonstrated
38:23, 47:1, 54:2
demonstrations
44:19, 45:6, 45:9, 46:22, 54:5, 54:6
depend
87:10, 89:2, 90:8, 90:14, 132:3, 204:23, 246:10
dependent
102:15

depending
30:23, 126:24
depends
91:20, 100:3, 101:18, 103:1, 105:3, 106:11, 107:16, 118:22, 127:18, 127:20, 133:23, 134:3, 134:4, 159:25, 167:25, 215:9, 216:8, 234:22
depos
6:10, 6:19
deposed
12:11
deposition
1:22, 6:2, 6:11, 7:13, 7:23, 8:7, 8:24, 11:6, 12:19, 15:2, 15:9, 22:7, 24:21, 75:9, 75:18, 145:4, 172:24, 178:19, 182:15, 187:8, 199:15, 202:19, 211:21, 221:21, 254:3, 254:15, 270:6, 280:21, 280:23, 281:2, 282:9, 282:11, 282:14
depositions
9:16, 12:14, 12:20, 12:22, 13:13, 25:13, 36:13
derived
240:5, 240:14
describe
51:8, 64:6, 69:2, 136:10, 274:19
described
40:16, 41:9, 69:8, 85:18, 132:15, 135:6, 135:18, 135:21, 250:13, 250:18
describing
65:6, 110:13, 113:14, 237:14, 240:13, 273:4
description
35:3
descriptors
139:7
design
34:13, 38:2, 39:14, 63:25, 68:2, 68:11, 158:23, 160:4, 160:14, 245:11
designated
145:17
designed
33:24, 34:5, 34:6, 34:8, 34:10, 37:22, 38:23, 41:10, 53:17, 65:9, 159:9, 159:10, 181:18, 217:20, 217:21
designer
227:1, 227:7, 227:13
designing
31:25, 34:14, 38:4
desk
101:20, 101:22
desktop
9:18
despite
72:21
detail
120:5
details
108:4
determination
156:2
determine
92:22, 98:12, 155:11, 156:17, 156:20, 157:6
determining
105:8, 110:24, 246:8
develop
126:11, 126:13, 159:22
developed
14:12, 41:10, 44:20, 46:7, 112:17, 126:8
developer
152:9, 160:5, 160:6
developing
63:25
development
33:11, 42:7, 44:9, 47:21, 54:8, 54:11, 54:19, 55:9, 172:9, 175:24
device
38:22, 39:7, 42:24, 44:5, 52:8, 54:6, 54:8, 76:4, 76:15, 77:20, 112:17, 132:16, 158:23, 162:4, 162:10, 162:20, 162:25, 163:4, 163:9, 163:14, 163:24, 164:6, 164:15, 174:16, 174:17, 174:23, 175:2, 175:8, 175:12, 179:3, 186:1, 186:13, 186:22, 188:1, 188:3, 188:7, 188:10, 188:16, 189:14, 191:1, 191:2, 191:22, 191:23, 192:4, 192:11, 194:11, 197:13, 199:2, 202:10, 204:6, 204:14, 205:5, 205:15, 205:21, 206:2, 208:7, 213:25, 214:9, 214:10, 214:19, 215:5, 218:25, 219:5, 219:7, 219:11, 219:15, 219:20, 220:1, 220:6, 220:16, 220:21, 221:3, 231:12, 232:6, 232:22, 240:6, 253:10, 278:13, 278:25, 279:7, 279:18, 279:22, 280:3, 280:8
devices
51:8, 51:9, 159:9, 174:4, 187:2, 188:20, 190:22, 193:7, 201:21, 229:12, 238:1, 257:1
dick
278:18
dictionary
31:13
diego
29:4
differ
57:13, 226:2
difference
121:17, 121:23, 121:25, 122:2, 122:4, 133:12
differences
57:9
different
8:9, 10:7, 10:10, 27:7, 27:15, 27:23, 28:7, 28:16, 34:22, 34:25, 35:13, 36:8, 38:19, 38:22, 42:6, 43:1, 45:9, 46:23,

Meta Platforms, Inc.
Exhibit 1095
Page 087

48:15, 57:6, 59:25, 74:10, 74:13, 91:2, 91:5, 91:10, 94:15, 100:5, 110:17, 112:10, 113:21, 121:1, 122:17, 124:3, 125:11, 127:3, 128:13, 128:20, 132:14, 134:16, 134:17, 135:14, 150:3, 150:7, 155:10, 156:16, 158:10, 158:19, 159:6, 160:12, 165:18, 165:21, 167:13, 170:9, 207:15, 209:1, 215:17, 216:1, 217:9, 217:14, 217:17, 226:9, 227:8, 227:22, 228:15, 237:25, 238:1, 240:1, 245:24, 247:1, 265:5, 266:8
differently
16:19, 101:4
difficult
19:11, 53:14, 53:15, 88:5, 94:24
difficulty
193:7
digital
37:22, 38:6, 58:14, 58:20, 59:6, 59:13, 63:17, 64:10, 64:13, 64:18, 65:18, 67:9, 68:24, 135:23, 153:23, 153:24, 159:14, 200:22, 201:24, 202:3, 202:6, 202:11, 203:12, 204:10, 204:16, 204:21, 204:25, 205:9, 205:17, 205:22, 206:4, 210:20, 212:14, 214:2, 214:6, 214:13, 214:16, 214:17, 214:22, 214:25, 215:2, 215:7, 215:10, 215:11, 215:12, 215:14, 215:21, 215:22, 216:1, 216:4, 216:5, 216:7, 216:8, 216:9, 216:12, 216:19, 216:23, 217:3, 217:4, 217:10, 217:17, 218:8, 218:16, 218:22, 219:2, 219:16, 219:23, 220:2, 220:10, 220:19, 220:22, 221:3, 234:12
digitized
64:12
digits
26:21
diligence
29:23, 33:10
diminution
108:5
dimmer
171:8
direct
30:15, 172:5, 238:3, 257:24
directed
227:12, 272:7
direction
231:21, 236:21, 238:22, 239:2, 239:5, 283:10
directions
232:10
directly
22:4, 248:5, 268:10, 269:17, 271:23, 272:15
director
29:11
disagree
254:11
disagreed
190:25
disclosed
135:12, 138:18
disclosure
14:15, 140:18, 141:5, 141:24
disclosures
136:15, 143:1, 143:15, 143:22, 144:12
discovery
250:9
discuss
90:22, 95:8, 96:15, 96:18, 97:22, 140:24, 173:8, 208:16, 255:6
discussed
11:25, 67:24, 102:20, 141:23, 161:25, 185:16, 185:17, 205:4, 213:22, 222:23, 231:24, 239:20, 240:22, 254:13, 268:13
discusses
166:7, 253:6
discussing
26:19, 59:5, 59:12, 98:11, 100:11, 106:12, 142:1, 154:25, 162:6, 178:13, 185:7, 197:11, 238:7, 277:22, 278:2
discussion
17:19, 17:20, 95:21, 96:19, 99:23, 263:10
display
38:18, 40:13, 40:14, 40:23, 42:10, 49:4, 49:8, 53:3, 53:12, 53:17, 53:24, 54:12, 54:20, 55:10, 56:22, 58:7, 162:1, 188:15, 190:2, 190:7, 190:12, 190:14, 193:8, 194:17, 194:19, 209:2, 235:22, 237:24, 253:11
displays
188:23, 189:4, 189:7, 189:21, 194:23, 206:17, 229:11
dispute
69:23, 128:23, 129:1
disputes
69:18
disqualifying
170:15
distance
75:22, 77:5, 77:24, 82:16, 82:20, 82:24, 83:3, 83:7, 83:14, 83:19, 83:22, 84:1, 84:9, 84:12, 85:5, 85:19, 86:1, 86:7, 86:8, 86:18, 87:5, 88:7, 89:13, 91:17, 92:16, 92:20, 93:13, 93:17, 94:5, 97:1, 97:3, 97:4, 97:8, 97:11, 97:14, 97:19,

Meta Platforms, Inc.
Exhibit 1095
Page 088

98:19, 99:24, 100:14, 100:16, 100:20, 101:6, 101:15, 102:6, 102:17, 102:21, 103:2, 103:16, 103:19, 104:2, 104:12, 104:18, 105:14, 105:21, 106:1, 106:3, 106:8, 106:15, 106:24, 107:8, 108:11, 108:12, 109:7, 110:17, 127:8, 127:15, 128:4, 128:17, 129:2, 129:4, 129:17, 129:21, 130:12, 133:2, 133:6, 133:17, 133:18, 133:22, 134:10, 134:23, 135:3, 193:22, 200:17, 225:8, 242:14, 242:17, 243:6, 243:16, 244:2, 244:3, 264:16
distances
92:20, 95:22, 95:25, 128:9, 128:14, 132:14, 133:9, 134:17, 264:19, 264:20
distant
75:20, 84:15, 96:25, 100:4, 264:12, 264:15, 274:24
distinct
215:12, 215:22, 215:23
distinction
72:8, 79:25, 102:2, 102:7, 115:12, 115:16, 115:18, 116:4, 116:10, 165:2, 165:6, 165:11, 165:14, 170:1, 217:4, 217:6
distinctions
72:12
distinguish
100:1, 153:23, 191:8
distinguishing
12:19
distortion
168:17, 168:24, 169:9, 169:16
distortions
132:19
distribute
9:3, 9:4, 34:15
distributed
34:18, 126:10, 151:19
distribution
8:18, 8:23
district
1:1, 1:2, 6:4, 6:5
disturbing
249:20
division
1:3, 6:5
doctor
37:18, 113:1, 131:13, 134:5, 146:17, 158:1, 170:22, 191:3, 230:22
document
9:4, 9:5, 9:12, 9:19, 9:23, 10:8, 10:10, 10:18, 11:14, 22:10, 22:13, 22:17, 22:20, 23:6, 24:5, 70:15, 70:17, 70:19, 71:5, 145:1, 145:16, 182:12, 182:21, 182:22, 187:6, 199:20, 199:22, 202:24
documents
8:10, 9:22, 10:12, 12:7, 70:13, 256:11, 256:15
doing
8:11, 8:13, 9:21, 10:6, 31:12, 44:12, 46:23, 49:25, 53:11, 54:5, 54:7, 54:11, 54:19, 55:9, 64:14, 67:15, 67:23, 69:6, 98:10, 103:7, 108:2, 127:23, 133:8, 151:22, 152:8, 157:13, 197:18, 215:11, 227:1, 227:2, 227:7, 235:17, 270:4
dolby
131:12, 131:14, 131:15
dollar
181:8
domain
59:20, 61:11, 61:12, 61:13, 61:14, 61:15, 61:21, 61:23, 61:24, 62:1, 62:2, 62:8, 62:20, 62:23, 64:13, 69:16, 132:20
done
7:22, 8:7, 29:21, 39:15, 44:22, 44:24, 64:5, 112:13, 118:5, 126:4, 126:21, 215:14, 215:15, 239:24, 240:17, 240:19, 246:7, 246:14, 280:10
down
43:14, 90:23, 96:7, 223:7, 223:19, 237:6, 250:11, 257:16, 260:6, 261:11, 276:12, 283:8
download
9:17, 145:11
downloaded
9:14, 10:20
downloading
11:8
draft
280:15
draw
30:17, 72:8, 72:12, 102:2, 102:7, 108:16, 108:23, 109:2, 115:12, 115:16, 115:18, 116:4, 116:10, 165:2, 165:9, 217:3, 217:6
drawing
170:2
drink
89:6
drop
106:12
dropping
101:19, 101:22, 102:8
drops
93:14, 108:24, 109:3
drugs
26:8
dsp
38:8, 38:10, 138:21, 139:5, 139:11, 143:18, 149:2, 153:11, 153:20, 153:21,

154:12, 177:13, 177:22, 178:4, 179:20, 180:2, 184:17, 185:2, 185:10, 196:25, 197:6, 198:10, 198:13, 200:23, 201:5, 201:11, 203:12, 203:20, 203:23, 204:10, 204:25, 212:15, 213:10, 213:15, 214:7, 217:23, 218:9, 218:12, 218:17, 252:21, 252:24
dsps
153:18, 252:5, 252:7, 252:13, 252:19, 253:2, 253:18, 253:20, 254:25
due
29:23, 33:10, 105:2, 219:16, 220:2
due-diligence-type
33:21
duly
6:23, 283:4
dummy
57:20, 57:21, 116:2, 123:10, 123:11, 125:22, 126:3, 126:8, 126:11, 126:18, 126:22, 126:23, 127:3, 127:12, 127:25, 128:4, 128:24, 129:2, 129:3, 240:11
dunn
2:5, 6:16, 21:10, 21:17, 21:24, 25:6, 55:21
duplicate
276:12
durand
1:23, 4:4, 5:5, 6:2, 6:21, 7:7, 11:15, 280:21, 281:15, 282:9
during
147:25, 149:18, 158:18, 162:11, 166:20, 174:6, 175:16, 183:17, 184:5, 235:21, 269:16, 271:19, 272:6, 283:17

E

e
283:14, 283:21
each
15:24, 18:18, 18:20, 28:22, 51:9, 94:12, 177:10, 194:5, 225:18, 225:23, 257:21, 261:4
ear
116:15, 120:8, 224:19, 225:9, 239:18, 240:6
earlier
46:5, 70:14, 85:22, 86:3, 99:23, 102:21, 122:25, 124:5, 125:22, 145:22, 149:22, 153:21, 158:22, 178:19, 180:17, 180:24, 185:18, 198:22, 213:23, 219:25, 222:23, 230:12, 258:22, 259:25, 260:18, 261:23, 265:11, 267:5, 275:11, 277:22, 278:1
earliest
45:7, 232:16
early
149:23, 246:7
earned
29:6
earphone
166:18, 175:13, 175:16
earphones
175:21, 176:4
ears
112:21, 116:1, 117:6, 120:13, 120:17, 120:19, 121:25, 122:5, 122:7, 126:14, 127:2
easier
9:18, 241:25
echo
114:11
echoes
114:2
edge
107:5, 107:7, 107:16, 107:20
effect
122:16, 123:3, 123:7, 124:11, 124:21, 125:3, 125:19, 133:14, 186:9, 249:23
effective
133:8, 170:11, 243:6, 243:15
effectively
233:16, 234:9, 235:19
effectors
248:7
effects
128:18, 129:22, 129:24, 129:25, 130:18, 130:20, 134:22
effort
92:25, 93:1, 93:3, 93:6
efforts
152:10
eight
1:5, 6:3, 12:3, 17:11, 18:3, 21:25, 25:10, 255:17, 255:19, 282:10
either
8:5, 31:21, 34:20, 37:10, 62:13, 116:1, 125:18, 126:2, 132:7, 168:21, 230:9, 237:9, 239:16, 253:11
electric
78:6, 224:18, 262:9, 265:12
electrical
71:23
electronic
29:7, 69:18, 69:19, 69:25, 71:9, 71:11, 71:14, 71:16, 71:18, 71:20, 72:4, 72:6, 72:9, 72:22, 74:2, 74:3, 74:10, 74:11, 75:11, 75:13, 76:7, 77:21, 80:9, 80:19, 80:21, 81:1, 81:15, 81:19, 148:1, 149:18, 158:18, 162:12, 164:15, 166:18, 168:14, 174:4, 174:5, 174:23, 175:2, 175:8, 175:11, 175:13, 175:16, 188:1, 188:2, 188:7, 188:16, 188:20, 262:10, 262:16, 262:24, 263:4, 263:13, 263:21, 273:6, 273:9, 273:17, 274:5, 274:6, 274:17,

Meta Platforms, Inc.
Exhibit 1095
Page 090

274:21, 275:9, 277:7, 278:13, 278:25, 279:8, 279:19
electronically 74:15, 76:13, 79:16, 266:7, 280:10
electronics 126:9
elements 210:20, 229:6, 229:9, 229:19, 248:17
eliminate 239:20
else 7:19, 11:23, 23:13, 43:22, 52:3, 52:13, 55:22, 69:13, 85:2, 90:13, 91:1, 98:13, 111:9, 112:12, 117:24, 119:15, 119:17, 160:22, 161:17, 161:18, 166:23
elsewhere 194:1
email 22:3
emailed 21:23
emanates 123:7
embodiments 41:22
emergency 266:9
emit 233:18, 234:9, 235:9, 236:3
emitted 236:11
emitting 234:19
emotional 125:19
emphasize 234:7
employed 30:7
employees 30:7, 30:10, 30:17, 30:20
empty 203:14, 204:8
enable 136:11, 163:11, 273:5, 277:6, 277:12, 279:22
enables 77:20, 275:7
encasing 76:3
encountered 171:9
end 49:16, 137:21, 217:15, 259:15, 260:7, 280:20
engaged 15:11
engendering 164:5
engine 252:9, 252:12
engineering 46:9, 46:13, 171:25, 250:12
engineers 30:13
engines 150:10
enhance 125:10
enhanced 123:1
enhancement 125:19
enough 10:14, 36:23, 208:9
entail 34:13, 38:2
entailed 34:14
entails 64:7
enter 276:10
entered 253:9
entire 34:6
entirely 67:3
entitled 11:14
entranced 45:11
enumerated 229:2
environment 39:25, 48:7, 203:15, 204:9, 208:4, 209:19, 210:18, 210:24, 212:17, 214:22, 218:7, 226:23, 226:24, 227:1, 227:13, 233:9, 233:16, 234:18, 235:19, 238:8, 249:25
environmental 122:6, 122:9, 242:17, 243:1, 243:7, 243:10, 243:16, 244:3
environments 160:6, 195:13, 195:19, 195:25, 196:6, 209:25, 210:21, 235:10, 248:1
equalization 134:20
equate 275:2
equivalent 62:9, 72:20, 76:1, 79:21, 95:22, 96:12, 97:19, 98:20, 140:23, 165:18, 167:9, 167:19, 267:6, 272:24, 274:18
era 265:22
ergonomically 87:1
errata 4:6, 7:16, 8:22, 11:4, 11:14, 11:18, 56:4, 56:10, 56:17, 56:19, 143:9, 143:13
error 228:2
escaping 152:2
essence 76:17, 85:21
essentially 81:6, 84:9, 99:18, 184:21, 272:23
established 75:8
estimate 19:15, 19:18, 20:13, 55:13, 86:25
estimates 19:11
estimation 239:25
et 6:3, 10:7, 12:21, 16:18, 76:5, 117:8, 127:3, 138:21, 142:22, 144:23, 215:16, 235:14, 239:13
evaluating 94:16, 157:6
even 40:12, 46:22, 72:15, 78:16,

84:23, 94:3, 98:23, 103:14, 104:25, 121:5, 122:13, 152:21, 153:4, 153:5, 159:14, 173:22, 180:17, 210:20, 226:12, 235:20, 250:24, 265:19, 266:9
event
114:15, 283:25
events
113:24, 114:9, 115:2, 245:2
ever
17:11, 24:9, 24:14, 25:10, 33:24, 34:5, 37:22, 191:1
every
36:5, 134:12
everybody's
142:12
everyday
107:25
everyone
49:17
everything
85:2
evidence
32:25
evolution
44:11
evolved
153:9
exact
12:18, 13:24, 16:17, 22:19, 41:13, 41:20, 41:24, 53:7, 76:16, 128:8, 150:13, 152:7, 152:10, 271:1, 282:4, 282:5
exactly
14:1, 16:16, 16:19, 18:25, 23:23, 33:15, 40:1, 51:24, 57:23, 73:15, 75:6, 76:1, 77:19, 79:22, 92:7, 96:6, 96:21, 98:15, 109:14, 124:13, 163:2, 163:8, 183:7, 187:21, 216:3, 231:19, 256:5
exaggerated
238:17, 238:20
exaggerating
238:24, 238:25, 239:2
examination
6:25, 256:22, 267:10, 277:19, 278:9
examinations
3:1
examined
5:6, 283:3
examining
12:7, 156:25
example
67:15, 81:8, 91:4, 107:6, 108:10, 113:6, 113:14, 113:18, 113:19, 119:7, 122:23, 122:25, 134:11, 141:17, 149:23, 150:2, 165:23, 165:24, 168:23, 168:25, 170:17, 175:3, 180:10, 180:12, 188:18, 188:19, 190:3, 190:19, 193:13, 208:18, 208:19, 208:22, 211:5, 215:13, 220:24, 221:2, 224:18, 225:3, 225:4, 228:2, 239:8, 240:11, 261:20, 263:10, 265:12
examples
56:14, 91:9, 119:20, 137:5, 137:11, 137:25, 158:21, 159:8, 180:14, 180:16, 221:7, 240:1, 264:21, 275:20, 278:6
except
99:19, 132:14, 148:7, 243:9
exceptions
133:7
exchange
174:7, 174:10, 174:12, 175:17
exciting
250:8
excluding
58:1, 71:21
exclusion
85:8
exclusive
248:16
exclusively
69:4
excuse
141:23, 259:9, 262:10
execute
157:17, 157:21, 158:13, 163:10, 219:8
executed
174:4
executes
147:21, 147:24, 148:17, 151:12, 154:25, 156:22, 157:7, 163:5, 178:10
executing
159:21, 176:22
execution
157:22, 158:6
exercise
106:12
exercises
181:18
exhausted
65:3
exhibit
4:2, 4:3, 4:6, 4:7, 4:8, 4:9, 4:10, 4:11, 4:12, 4:13, 4:14, 8:14, 8:18, 8:21, 8:22, 8:24, 9:3, 9:6, 10:20, 10:21, 11:3, 11:6, 11:14, 11:20, 11:21, 13:6, 111:16, 116:23, 136:3, 145:3, 145:4, 145:14, 145:17, 147:14, 172:21, 172:24, 173:2, 173:7, 173:11, 182:12, 182:13, 182:15, 183:2, 183:3, 187:7, 187:8, 187:17, 199:12, 199:13, 199:15, 199:20, 199:23, 202:16, 202:17, 202:19, 202:25, 211:19, 211:21, 212:3, 212:5, 221:19, 221:20, 221:21, 221:25, 222:10, 222:15, 222:17, 222:19, 222:20, 222:21, 255:14, 258:1, 258:4, 267:14
exhibits
8:2, 8:6, 10:19
exist
41:11, 140:10, 153:10, 269:25

existed
41:16, 42:4, 42:8, 150:3, 210:22
existing
194:15
exotic
243:9
expect
181:17
expectation
157:14
experience
13:19, 13:20, 26:13, 27:22, 28:6, 28:15, 112:5, 125:9, 125:20, 133:11, 152:13, 172:5, 172:8, 224:3, 228:2, 235:25, 249:6, 249:14
experienced
84:18
experiences
12:25
experiment
113:14, 113:16
experimental
133:10
experimented
207:17
experiments
112:13, 133:8, 160:22, 160:25, 161:16
expert
15:17, 16:13, 22:24, 23:2, 23:7, 23:20, 23:21, 26:14, 31:15, 31:17, 67:6, 73:12, 269:20
expert's
254:13
expertise
30:13, 31:16, 31:18, 31:20
explain
31:8
explanation
113:16, 225:10
explore
89:16, 90:25
explored
131:9
extent
160:1
external
84:19, 85:2, 85:5, 85:23, 153:21, 194:20, 216:9, 217:11, 224:7, 224:15, 232:22
externalized
84:18, 100:19
externally
199:6, 203:14, 204:8, 212:16, 214:21, 218:6
extra
232:3, 232:14
eye
110:20
eyes
238:3

F

f)(1
283:5
f-o-s-t-e-r
41:19
face
261:21
face-to-face
92:21
faces
108:4
facilitate
48:19
facilitated
71:17, 72:4, 74:15, 193:1
facilities
38:5
fact
63:13, 72:22, 243:14
factors
110:23, 110:24, 117:5, 117:12, 117:19, 118:4, 120:7, 122:6, 122:9
fading
246:6, 246:15, 246:22
fair
23:8, 30:5, 36:23, 37:8, 40:2, 42:2, 42:5, 42:17, 43:24, 54:13, 54:21, 55:11, 103:18, 109:4, 110:3, 121:12, 128:14, 135:4, 135:5, 154:10, 166:9, 179:17, 193:12, 208:9, 227:14, 228:15, 228:16, 228:19, 235:2, 237:1, 251:20, 273:25, 274:2
fairly
129:16, 207:15
fall
275:20
falling
280:3
familiar
7:25, 10:12, 18:9, 26:14, 61:6, 63:1, 63:2, 64:7, 64:13, 126:5, 129:6, 152:20, 208:14, 209:10, 210:21, 246:25
familiarity
122:15, 122:19
fancy
120:21
fane
2:3, 6:17, 15:4
fane's
15:5
far
15:15, 15:18, 16:11, 46:6, 73:14, 88:7, 89:7, 91:7, 108:10, 121:13, 156:19, 200:16, 205:4, 259:5, 269:25
far-field
200:24
farther
96:20, 126:24, 127:8, 132:14
fashion
249:21
fault
44:23
feature
12:1, 12:3, 116:16
featured
180:19
fed
39:13, 46:5
federal
283:5, 283:15, 283:21
fee
15:16
feed
65:19, 66:10, 66:23, 67:1, 67:16, 67:23
feed-forward
64:2
feedback
63:24, 64:1, 65:19, 66:11, 67:2, 131:25, 208:11, 229:12, 237:9, 237:11
feedbacking
114:14

feedforward
69:12
feel
141:12
feet
100:20, 100:23, 101:6, 101:15, 101:24, 102:14, 103:2, 103:3, 103:17, 103:22, 104:2, 104:12, 104:13, 104:14, 104:18, 104:23, 104:25, 105:1, 105:14, 105:21, 106:4, 106:8, 106:16, 106:21, 106:25, 107:7, 107:8, 107:11, 107:17, 107:22, 108:3, 108:11, 108:12, 108:17, 109:6, 110:1, 124:18, 127:25, 261:21
fence
211:5
few
8:11, 25:14, 45:5, 70:18, 181:5
field
24:12, 128:18, 129:16, 131:7, 132:1, 132:10, 194:9, 200:16, 237:11
figure
155:12, 262:5, 263:12, 263:20
file
9:5, 14:8, 24:17, 145:7, 172:23, 182:12, 182:13, 199:14, 202:18, 211:20, 221:24
filed
14:9, 14:16, 32:23
filename
11:3
film
125:12
filter
62:21, 63:12, 63:13, 63:14, 63:25, 64:10, 65:5, 65:7, 65:8, 65:11, 65:14, 65:17, 65:18, 66:19, 66:20, 66:21, 66:24, 67:1, 67:9, 67:18, 67:22, 68:2, 68:5, 68:11, 68:12, 68:13, 68:15, 68:19, 68:24, 69:12
filtering
65:24, 143:19, 160:15
filters
63:12, 63:22, 63:25, 64:4, 64:18, 64:20, 64:21, 65:1, 66:3, 66:13, 66:17, 67:24, 69:15
final
7:8, 280:15
finally
240:4
find
9:4, 41:17, 57:18, 133:8, 144:22, 249:20
finding
90:16
fine
8:16, 10:17, 25:20, 29:7, 33:5, 37:3, 46:12, 50:4, 118:14, 142:16, 147:6, 172:12, 173:22, 173:25, 181:25, 188:14, 221:10, 222:18, 226:5, 241:8, 254:5, 254:9, 254:19
fingers
43:1, 44:2, 44:4, 85:10
finish
49:23, 113:16
finished
108:21, 108:22, 259:16, 259:18
finite
63:8
fir
63:12, 63:13, 64:3, 65:14, 66:19, 66:24, 68:2, 68:5, 68:11, 69:12
firm
6:14, 6:17, 15:17, 16:14, 16:17, 29:24, 29:25
first
8:14, 12:10, 24:1, 52:7, 54:15, 117:4, 125:2, 148:3, 148:5, 162:14, 162:17, 164:12, 164:24, 166:7, 166:10, 166:13, 166:17, 175:23, 180:13, 183:15, 185:23, 187:25, 189:8, 200:13, 206:7, 226:2, 233:6, 237:8, 242:16, 244:21, 248:3, 250:13, 253:8, 259:9, 277:25, 278:2
fisher
40:22, 41:10, 41:17, 41:18
five
71:6, 100:20, 147:5
five-minute
146:10
fix
113:5
fixed
94:5, 248:22, 250:4
fixing
11:19
flip
237:6
floating
44:7
focal
253:6, 253:10
focus
210:20
focused
34:20
focusing
115:21, 198:18, 237:20
folder
9:5
folks
39:15, 45:12, 209:22
follow
41:21, 56:6, 63:18, 108:9, 172:9
followed
10:25
following
56:8, 123:22, 125:16, 199:3, 229:6, 256:18, 282:14
follows
6:24
force
229:12
foregoing
281:2, 283:4,

283:27
foreign
166:25
forensic
29:12, 29:14, 29:18, 29:19, 29:20, 30:3, 30:4, 30:8, 30:15, 30:21, 31:1, 31:4, 31:5, 31:6, 31:10, 31:13, 31:15, 31:22, 32:7, 32:14, 33:6
forget
39:25
forgotten
161:13
formally
17:18, 17:23
format
5:7
formation
73:3
formatting
56:3
former
14:18, 181:10
forms
169:13
forte
104:23
forth
9:24, 73:18
forward
65:19, 66:10, 66:24, 67:1, 67:16, 67:23, 144:20
foster
41:19
found
9:15, 11:21, 139:2, 139:11, 139:16, 140:22, 249:16, 249:22, 266:22
four
14:7, 252:12, 266:23
fourth
162:6, 164:11, 196:12, 196:16, 197:9, 197:12
fox
63:6
france
82:20
freedom
40:24, 230:15, 230:17, 230:20, 232:11
freeway
109:19
frequencies
128:1, 132:20, 133:9, 134:18, 134:19
frequency
59:20, 61:13, 61:15, 61:21, 61:24, 62:2, 62:8, 65:8, 69:15, 132:4, 134:21
frequently
128:9, 170:11, 238:4
front
227:20
frontal
239:10
full
7:5, 46:7, 60:23, 60:25, 237:8, 256:9, 279:13
function
8:6, 12:6, 58:15, 62:2, 62:3, 62:19, 62:22, 63:15, 69:6, 97:11, 97:13, 119:5, 119:10, 148:13, 148:19, 151:6, 153:12, 162:10, 162:20, 163:4, 163:15, 163:24, 186:2, 186:14, 186:23, 196:24, 197:8, 197:14, 198:9, 198:15, 199:3, 203:19, 203:25, 204:7, 204:20, 205:8, 205:15, 206:2, 213:8, 213:17, 214:1, 214:11, 215:5, 216:3, 216:6, 218:12, 218:15, 219:1, 219:12, 219:21, 220:7, 220:17, 247:3, 247:5, 247:6, 251:7, 274:7, 274:9, 277:3, 277:5, 278:17, 279:3, 279:23
functional
139:6, 139:7
functionality
76:6, 76:16
functioning
280:8
functions
34:23, 50:23, 58:12, 58:21, 59:7, 59:13, 62:5, 62:17, 64:22, 116:20, 138:8, 138:12, 139:1, 140:3, 140:6, 140:12, 140:18, 141:6, 154:15, 176:18, 177:11, 177:23, 178:6, 178:22, 179:4, 179:19, 180:4, 184:14, 185:1, 185:13, 198:20, 199:5, 200:24, 201:4, 201:14, 201:22, 202:7, 202:10, 206:9, 214:17, 250:19
further
20:20, 210:25, 256:19, 258:11, 267:10, 276:8, 276:11, 277:17, 277:19, 278:7, 278:9, 280:11, 280:12, 283:24
future
142:11
fuzzy
155:17

G

g-r-a-a-s
126:10
gain
120:23, 121:10, 132:14
galaxy
84:11
game
152:9
games
1:13
gaming
151:21, 152:15, 152:20, 195:16
garbled
54:15, 54:24, 161:4
garbling
55:5
gave
28:19, 73:12, 81:8, 83:25, 85:22, 91:4, 99:17, 108:10, 122:23, 122:25, 153:2, 153:4, 158:21, 168:22, 178:16, 180:16, 181:2, 185:15,

197:10, 213:20, 216:25, 219:14, 250:8, 265:11
gehring
253:9
general
22:22, 35:3, 37:4, 159:5, 192:18, 209:25, 238:22, 254:1
generalized
240:8
generally
30:2, 57:24, 111:3, 239:16
generate
59:7, 117:12, 117:19, 138:20, 141:18, 142:1, 200:14, 203:13, 204:8, 212:15, 214:20, 218:6
generated
85:8, 85:11, 125:13
generating
135:22
generation
232:16
generic
159:13
generically
215:13
gestures
43:1, 43:23, 192:4, 195:16
getting
19:10, 54:24, 68:17, 93:18, 94:25, 106:20, 107:3, 107:5, 107:15, 109:7, 114:2, 135:2
giant
175:5
give
8:22, 9:13, 10:23, 12:17, 15:22, 16:2, 20:13, 20:20, 21:19, 28:19, 31:12, 33:15, 36:4, 41:13, 41:23, 42:23, 44:14, 44:23, 53:7, 70:10, 70:25, 77:17, 98:8, 111:9, 113:15, 137:16, 137:18, 137:23, 137:25, 138:20, 141:11, 143:16, 146:10, 152:25, 159:8, 168:9, 170:17, 173:18, 181:4, 185:15, 188:9, 191:10, 195:2, 200:8, 211:24, 221:2, 222:5, 225:4, 232:9, 258:18, 258:24, 259:19, 260:11, 260:22, 261:14, 277:21, 278:1, 280:2
given
36:7, 77:19, 80:7, 141:13, 152:21, 161:20, 197:17, 204:3, 221:7, 263:25, 276:9, 280:7, 283:6
gives
156:17, 258:13, 260:25
giving
37:1, 94:13, 113:17, 119:20
glen
16:23, 17:1, 17:5
glove
40:10, 40:23, 41:2, 41:6, 41:9, 42:14, 42:21, 42:22, 42:24, 43:9, 43:10, 43:19, 43:20, 43:21, 46:15, 192:5, 192:8, 192:12
gloves
230:4
go
8:12, 8:16, 9:19, 22:18, 25:16, 25:17, 36:12, 36:22, 40:8, 50:1, 50:4, 51:11, 57:10, 81:25, 101:12, 110:24, 111:14, 113:4, 144:20, 146:24, 151:8, 151:10, 153:5, 153:6, 159:19, 164:21, 166:8, 171:6, 181:7, 181:25, 182:24, 221:8, 222:8, 228:22, 235:12, 235:15, 241:24, 244:9, 251:25, 254:5, 255:3, 255:5, 257:15, 258:8, 258:12, 260:6, 261:11, 267:12, 268:3, 268:19, 269:9, 270:18, 270:25, 271:12, 271:24, 275:25, 280:13
goal
159:4, 159:17
goes
76:3, 94:22, 96:7, 175:15, 251:15
goggles
40:10
going
7:22, 8:1, 8:10, 8:13, 8:21, 9:23, 10:6, 16:3, 23:25, 42:6, 42:23, 43:11, 45:4, 50:2, 50:6, 55:8, 57:18, 67:8, 82:3, 90:23, 113:7, 138:23, 144:9, 144:25, 145:3, 146:10, 146:22, 147:7, 152:4, 154:5, 168:9, 172:21, 172:22, 173:24, 182:1, 182:11, 182:12, 187:5, 187:6, 199:12, 199:13, 202:16, 202:17, 202:18, 211:18, 211:19, 221:12, 221:18, 231:20, 238:19, 244:10, 254:6, 255:7, 276:11
gone
66:4, 120:5, 126:15
good
9:1, 12:9, 25:22, 49:16, 142:20, 147:15, 181:23, 233:3, 235:13
govern
73:3
governing
73:10
government
207:2
grab
44:8, 89:5, 89:7, 89:13, 91:1
gradation
94:18
gradations
94:12

gradually
91:17
graphics
234:12
gras
126:10
gray
108:9, 110:14
great
7:21, 49:17, 145:16, 187:25, 244:19
greater
31:16, 120:5
gripping
43:2
group
30:10, 47:5, 152:21, 153:2, 153:5
guarantee
228:1, 228:5
guard
79:7, 79:12
guess
33:16, 33:18, 33:20, 41:25, 60:3, 67:3, 70:10, 70:25, 85:9, 85:13, 88:7, 94:12, 100:3, 111:9, 122:11, 157:1
guidance
209:20
guru
245:11

H

h-u-m
170:25, 171:1
hack
160:19
half
99:16, 127:24, 239:12
hammer
77:12
hand
42:25, 43:10, 43:20, 43:22, 44:2, 48:7, 72:9, 78:5, 80:15, 81:10, 91:1, 103:8, 188:3, 189:17, 190:7, 191:2, 193:9, 193:18, 283:28
handheld
76:4, 174:23, 175:1, 175:8, 175:11, 188:2, 188:19, 188:20, 188:23, 189:4, 189:7, 189:12, 190:4, 190:22, 192:13, 192:20, 193:4, 193:14, 193:22, 194:1, 194:11, 195:7, 195:12, 195:19, 240:6
handle
215:24
handling
16:18
handset
224:19, 224:22
handy
185:18
happen
10:5
happening
62:20
happy
13:10, 25:19, 36:15, 37:3, 163:23, 173:21, 181:20, 181:25, 254:5
hard
43:21, 74:22, 80:19, 103:6, 191:7
harder
108:3
hardware
40:15, 54:1, 78:5, 78:8, 79:14, 143:20, 150:3, 150:14, 178:17, 204:17, 217:23, 218:12, 229:4, 230:2, 232:22, 252:2, 252:21, 266:8
harut
2:24
hazard
238:22
head
48:23, 49:1, 49:12, 49:20, 49:23, 50:14, 50:18, 52:3, 52:4, 52:13, 57:20, 57:21, 84:16, 84:22, 84:24, 85:5, 85:10, 85:18, 99:21, 105:18, 105:25, 112:19, 112:20, 112:23, 112:24, 116:2, 116:15, 116:17, 116:18, 117:7, 120:12, 120:14, 126:8, 126:22, 126:23, 127:3, 127:12, 127:23, 127:25, 128:24, 129:2, 129:3, 134:22, 145:25, 166:18, 173:15, 186:18, 188:2, 188:10, 188:16, 190:6, 190:11, 191:1, 192:2, 192:6, 192:7, 192:10, 193:5, 193:23, 194:2, 194:10, 194:13, 200:2, 203:4, 205:12, 212:9, 230:18, 240:7, 240:11, 248:23, 249:17, 249:19, 249:24, 250:5
head-mounted
40:13, 40:23, 42:10, 188:15, 188:22, 189:3, 189:6, 189:21, 190:2, 190:7, 190:12, 191:2, 192:11, 193:8, 194:17, 194:19, 194:23, 206:17, 229:11
head-related
50:22, 58:11, 58:15, 58:20, 59:6, 59:13, 62:2, 62:4, 62:5, 62:6, 62:7, 62:11, 62:13, 62:17, 62:19, 62:21, 64:21, 69:6, 116:19, 119:5, 119:9, 198:19, 199:5, 200:24, 206:9, 251:7
head-track
250:3, 250:13
head-tracked
247:25, 248:20, 253:11
head-tracking
249:15
head-worn
190:21, 192:15, 193:1, 193:12
headband
51:16, 52:2, 52:12, 191:23, 192:1
header
233:2, 242:13
heading
247:25, 248:3, 250:12

headphone
175:25, 192:3, 249:18
headphones
48:25, 112:21, 229:12
heads
55:5, 125:22, 126:3
headset
51:17, 172:7, 277:14
hear
15:24, 17:17, 18:10, 49:17, 49:22, 54:24, 60:23, 60:25, 76:21, 85:17, 99:20, 101:8, 101:21, 102:8, 102:11, 103:15, 103:16, 103:18, 112:18, 112:21, 112:23, 118:13, 133:25, 182:6, 182:9, 191:7, 191:13, 204:14, 224:21, 225:5, 225:7, 225:9, 227:9, 227:20, 227:21, 279:13
heard
17:5, 17:11, 21:19, 110:19, 123:3, 131:11, 133:13, 152:12, 153:6, 167:2, 169:7, 170:14, 171:17, 189:8, 208:21, 211:6, 211:7, 211:8, 211:14, 211:15
hearing
32:10, 49:18, 85:5, 102:18, 167:3, 224:1, 224:2, 225:16, 225:17, 225:22, 226:10, 226:22, 227:18, 236:24, 248:24
held
188:3
hello
113:2
help
24:2, 51:11, 66:2, 67:6, 209:19, 209:21, 210:7, 235:1, 235:9
helped
209:18
helpful
234:17
helpfully
237:10, 238:2
helping
210:6
helps
9:16
henry's
277:21
here
6:1, 10:4, 33:2, 43:16, 44:1, 45:4, 48:22, 80:25, 81:18, 89:16, 96:23, 98:10, 110:14, 115:21, 119:8, 141:13, 143:8, 143:16, 151:23, 156:15, 157:25, 159:10, 168:2, 171:7, 174:19, 178:15, 178:16, 178:19, 186:10, 188:10, 214:18, 225:3, 225:4, 226:21, 230:14, 232:13, 236:3, 237:16, 237:20, 237:22, 238:8, 258:24, 259:24, 280:12
here's
46:6
hereby
281:4, 283:2
heuristic
29:10
hi
244:5
hide
111:12
high
64:20, 93:18, 109:22, 134:18, 160:13
high-pass
65:7
high-stress
237:22
higher
93:20
highlighted
173:18
highlights
173:23
highly
110:12
hired
20:25, 161:19
historical
41:14, 41:24
histories
24:17
hmd
41:9, 42:9, 44:7, 46:15, 190:16
hold
29:13
holding
224:18, 231:20, 240:5
holistically
140:15
home
7:10, 82:12, 82:14, 87:13, 88:16, 124:19, 171:6
honestly
17:15, 20:12, 44:9
hooks
161:20
hope
75:10
horn
83:13, 83:14, 83:21, 83:22, 84:5
horns
84:2, 84:4
hour
5:2, 15:8, 15:10, 15:13, 16:11, 16:12, 99:16, 109:18
hourly
14:21, 14:24, 14:25, 15:1, 15:7, 15:8
hours
19:1, 19:3, 19:5, 19:7, 19:9, 19:13, 19:16, 19:19, 19:21, 19:23, 20:9, 20:17, 20:18, 25:3, 70:18, 71:7, 254:2
house
90:2, 90:6, 90:10, 90:11, 90:14, 91:4, 91:8, 99:9, 100:9, 100:13
houses
90:16, 100:11
however
235:20
hped
188:3, 261:9
hrtf
63:15, 69:10, 125:25, 128:21, 132:1, 132:10,

Meta Platforms, Inc.
Exhibit 1095
Page 098

132:13, 134:16, 143:19, 227:24, 240:16, 240:18, 240:21, 246:19, 247:8
hrtfs
50:20, 50:22, 69:2, 117:6, 117:12, 117:13, 117:18, 117:20, 117:24, 118:8, 118:19, 125:21, 126:3, 126:12, 126:13, 126:15, 126:18, 127:6, 128:13, 128:23, 129:1, 129:17, 129:22, 130:12, 130:17, 130:19, 131:4, 131:8, 133:2, 133:5, 133:6, 133:16, 134:9, 134:11, 134:17, 135:3, 135:7, 135:23, 186:3, 199:5, 200:24, 203:13, 204:7, 206:9, 206:12, 206:15, 212:15, 214:20, 218:5, 239:15, 239:19, 239:24, 239:25, 240:2, 240:4, 240:9, 240:14, 240:23, 241:2, 241:5, 241:14, 241:20, 246:9, 251:4, 251:21
hum
170:21, 170:24, 170:25, 171:1, 171:3
human
103:17, 116:17, 174:21, 190:11, 230:20, 237:22, 239:17, 248:8, 266:10, 266:11
humorously
112:24
hybrid
29:9
hybrids
170:10
hypothetical
74:22, 89:16, 90:15, 90:16, 103:13, 156:8
hypothetically
83:18, 84:1, 219:7, 219:15
hypotheticals
91:9

I

icons
167:15, 168:22, 207:16
idea
44:5, 79:15, 88:4, 90:25, 123:13, 215:14, 267:6
idealized
249:15
ideally
127:11
identification
4:2, 8:25, 11:7, 145:5, 172:25, 182:16, 187:9, 199:16, 202:20, 211:22, 221:22
identified
23:18, 140:17, 141:5, 229:9
identifier
26:22
identifies
140:3
identify
6:12, 80:9, 80:25, 81:19, 93:7, 138:11, 138:24, 139:22, 150:17, 151:4, 151:17, 152:14, 168:2, 168:10, 168:25, 180:15, 214:18, 215:4, 218:25, 219:20, 220:16, 279:7, 279:18, 280:3
iir
62:25, 63:12, 63:14, 63:21, 63:25
ild
121:16, 121:22
image
111:5, 111:18, 112:1, 112:3, 112:4, 112:10, 124:20, 129:12, 200:14, 200:17, 200:23, 203:14, 204:9, 211:5, 212:17, 214:21, 218:7, 251:10, 251:11
images
112:5, 112:6, 135:14, 210:23, 224:1, 234:14
imagine
43:21, 53:20, 103:6, 114:20, 117:23, 219:5, 219:7, 219:15, 220:1
immediately
139:17, 180:6
immersivity
233:8, 248:5, 248:15
impact
74:19
impart
62:1
imperative
242:18
implement
141:25, 148:24, 154:14, 177:10, 179:19, 184:13, 184:25, 185:12, 196:23, 198:8, 201:3, 203:18, 213:7, 220:2, 235:16
implementation
40:9, 78:8, 204:24, 215:11, 215:21, 230:10
implementations
180:18, 266:9
implemented
39:8, 155:15, 170:12, 187:2, 204:15, 217:7, 220:23, 235:22, 251:6
implementing
152:1, 152:8, 204:20, 229:23, 248:22
implies
77:25
important
236:20, 237:9
impression
193:19, 194:6
improper
254:16, 259:23, 260:15, 261:18, 262:14, 263:3, 263:17, 263:18, 265:2, 265:10, 276:15, 276:19
improve
208:6, 235:25
improved
236:23
improvement
243:2
impulse
62:4, 62:7, 62:11, 62:13, 63:5, 63:8, 63:9, 127:1, 251:12, 251:15

inadvertent
168:23, 169:8, 169:16, 170:13, 170:18, 171:9
inadvertently
168:15
inarticulate
94:25
inc
1:11, 6:3
incapable
219:16
inches
86:24, 87:1
include
34:22, 34:23, 34:24, 35:9, 84:2, 84:4, 116:12, 200:22, 240:10, 240:11, 243:3, 249:19, 255:20, 266:4
included
229:11, 256:14
includes
116:16, 197:25, 199:4, 255:19, 274:20
including
8:18, 13:12, 135:9, 141:10, 143:8, 254:12
inclusion
242:17
inclusive
281:3
incongruity
123:22, 123:25
increase
91:17, 120:24, 125:8
increases
93:17, 103:19, 109:18
increasing
125:18
incredibly
103:7
indecipherable
33:24, 45:21, 49:3, 49:13, 50:25, 112:23, 113:23, 118:7, 157:24, 170:21, 233:20, 247:9, 253:22
indeed
71:5
independent
192:11, 194:10, 248:23, 250:5
independently
124:7
index
3:1
indicate
8:12, 140:23, 231:13
indicates
137:6
indicating
9:8, 54:25, 89:6, 171:7, 187:12, 199:17, 202:21, 211:23, 222:1
indication
258:18
indicative
141:13, 141:15, 141:18
indigo
63:7
individual
260:1
individualized
239:15, 240:15, 240:23, 241:1, 241:5, 241:20
individually
225:19, 225:24, 273:23
individuals
16:24, 260:2
industry
13:20, 58:19, 118:18, 124:22, 124:24, 138:15, 139:12, 149:2, 151:21, 152:15, 154:12, 175:19, 176:3, 177:14, 177:22, 179:21, 184:18, 185:3, 195:7, 197:1, 198:10, 201:6, 203:20, 206:23, 207:2, 207:12, 213:7, 213:10, 234:25, 241:13, 241:19, 253:17, 254:25
infer
98:19
infers
168:21, 170:16
infinite
60:4, 60:8, 60:9, 63:5, 63:9
influence
26:8, 122:12, 239:21
influential
129:24, 130:1, 130:20, 131:1
information
32:20, 115:9, 115:11, 193:5, 193:6, 194:8, 194:16, 238:24, 248:6
informing
157:23, 158:6
infrared
192:14
initial
17:19, 17:20, 21:12, 21:14, 24:1, 40:9, 264:18
injecting
123:22, 168:8
inmos
252:12
input
34:15, 64:11, 67:10, 67:23
inputs
60:11
inside
84:16, 84:21, 84:22, 84:24, 85:5, 85:14, 85:16, 85:17, 88:22, 88:24, 99:7, 99:11, 99:14, 99:20, 99:21, 100:16, 105:17, 105:18, 105:25, 112:19
instance
31:3, 32:24, 40:12, 57:19, 89:3, 96:20, 107:18, 116:13, 124:16, 124:17, 124:19, 125:12, 131:10, 150:8, 150:10, 150:19, 157:23, 158:3, 158:7, 160:21, 161:25, 166:24, 175:6, 209:23, 217:11, 225:5, 227:19, 230:18, 235:21, 235:25, 236:20, 237:24, 238:5, 238:15, 240:5, 240:10, 240:20, 260:11
instead
40:12
instructed
26:1
instruction
158:25
instructions
147:21, 147:24, 148:17, 151:12, 155:1, 156:22, 157:7, 157:17, 157:22, 157:23,

158:6, 158:14, 159:16, 159:21, 159:23, 160:12, 163:5, 163:10, 176:22, 178:10, 207:20
integrative 129:12
intelligibility 92:17, 97:22, 98:4, 98:12, 98:24, 99:2, 102:4, 102:16, 105:6, 108:5, 108:24, 109:3, 109:8, 109:21, 110:5, 110:21, 123:1, 125:8, 125:18
intelligible 93:5, 97:6, 97:10, 97:18, 98:17, 102:17, 102:18, 103:20, 104:24, 107:18, 107:22
intend 173:18
intended 50:18, 208:4
intensity 117:7, 121:1, 121:4, 121:5, 121:7, 121:9
intention 35:4, 169:6, 230:9
intentional 169:4, 169:5, 171:14
inter 121:19
interact 47:22, 47:23, 160:25
interacted 21:18
interacting 49:4, 226:17
interaction 21:20, 21:21, 208:6, 248:8
interactive 39:25, 40:10, 40:22
interactively 55:17, 55:25
interaural 121:17, 121:23, 122:2, 247:2
interchangeability 272:24
interchangeable 126:14, 136:17
interchangeably 121:4, 136:10, 263:14, 263:20, 274:19
interest 127:12, 127:16, 128:20, 132:4, 133:19, 134:3, 134:21, 153:7, 283:24
interested 47:3
interesting 209:24
interests 34:19
interface 52:17, 248:6
interfaced 189:17
interfaces 237:23
intermediate 245:17, 245:21
internal 194:24
internalized 112:22
internet 266:5
interpolate 246:9, 247:1
interpolating 50:19, 246:19
interpolation 245:14, 245:21, 245:24, 246:5, 246:10, 246:12, 246:13, 246:17, 246:18
interpretation 73:10, 73:16, 74:9, 74:11, 74:19, 273:9
interpreted 43:2
interpreting 73:20
interrupt 9:25, 15:21
intersperse 25:25
interview 21:2, 21:12, 21:14
introduce 8:1
invented 57:23
invention 14:14
invitation 269:5
invite 10:9, 10:15, 197:24, 268:8, 269:3, 269:15, 271:18, 272:5
invited 153:5
involve 215:2, 226:11, 229:19, 230:7, 246:11
involved 17:2, 17:9, 17:12, 17:14, 21:11, 21:14, 24:15, 38:4, 40:18, 40:22, 55:20, 80:14, 81:5, 81:7, 114:21, 142:9, 142:10, 169:14, 186:9, 206:24, 215:1, 229:10, 230:9
involves 31:2, 76:6, 115:23, 115:25, 225:16, 225:18, 225:23, 227:15, 229:6, 230:1
involving 29:22, 40:23, 71:22, 143:19
iphone 175:5, 240:5
irr 66:20
irrelevant 43:12, 47:19, 48:3, 48:12, 48:21, 50:16, 51:6, 51:14, 52:6, 52:15, 52:21, 53:4, 53:13, 54:14, 55:12, 56:24, 58:9, 58:16, 59:1, 59:8, 59:15, 135:24, 208:24, 210:12, 228:4, 229:15, 229:20, 230:8, 230:16, 231:8, 232:1, 232:12, 233:12, 233:21, 234:5, 234:21, 235:3, 235:11, 236:10, 237:2, 237:18, 238:9, 238:14, 239:7, 241:3, 241:15, 241:21, 242:20, 242:24, 243:8, 243:18, 243:22, 245:6, 245:9,

245:15, 245:25, 246:4, 246:21, 247:7, 248:9, 248:13, 249:1, 249:5, 250:6, 250:15, 250:21, 251:1, 251:5, 251:17, 251:22, 252:6, 252:15, 252:20, 253:1, 253:13, 253:24, 254:14
issue
14:8, 14:17, 18:6, 18:16, 22:11, 273:14
issues
31:6, 73:13, 270:16
itd
122:1, 240:20
item
264:24
iterated
278:5
iterations
42:7
itself
78:22, 89:24, 126:15, 190:7, 193:8, 194:19, 265:5, 276:23

J

japan
82:24, 85:25
jaron
45:12
john
230:23
judge
98:4
judgment
100:13
jump
27:22, 28:5, 28:14, 154:20
jumping
28:12

K

k-e-m-a-r
126:5
k-n-o-w-l-e-s
126:9
kansas
2:7
keep
20:7, 168:8, 173:23, 210:23, 249:23, 250:4
kemar
126:5, 126:7, 126:11, 126:15, 126:17, 128:4, 128:24, 129:2, 240:11
kennedy
38:24
kernel
68:19
key
243:6, 243:15, 248:4, 248:17
keys
248:14
khz
1:5, 6:3, 12:3, 17:11, 18:3, 21:25, 25:10, 282:10
kilohertz
130:2, 130:24, 131:6
kilometers
259:6
kind
31:13, 35:3, 51:19, 58:2, 58:4, 90:17, 91:6, 101:18, 104:5, 107:16, 110:13, 110:14, 131:10, 139:7, 140:15, 151:22, 152:16, 155:18, 159:5, 231:4, 239:24, 266:21
kinds
91:10, 92:24, 128:10, 128:15, 140:9
kits
152:9
knob
121:14, 158:25
knowles
126:9
known
58:3, 60:14, 138:21, 139:5, 139:11, 148:23, 149:1, 149:11, 154:11, 177:9, 177:13, 177:21, 179:18, 179:20, 184:13, 184:16, 184:25, 185:2, 195:7, 195:18, 195:24, 196:5, 196:23, 196:25, 198:8, 198:9, 201:3, 201:5, 201:11, 203:18, 203:19, 203:23, 207:11, 208:11, 208:20, 211:10, 213:7, 213:10, 213:15, 250:2, 253:10
kyle
2:4, 6:16, 21:10, 21:17, 21:24, 24:2, 24:7, 24:9, 24:11, 25:5, 25:8, 55:21, 114:11, 142:18, 151:8

L

lab
45:14
lack
131:3, 219:6, 220:3
lacked
219:8
lag
16:4
laid
279:4
landline
76:2, 76:3, 76:15, 265:12
language
147:20, 164:19, 166:25, 167:1, 174:23, 175:13, 199:3, 230:14, 259:19, 274:12
lanier
45:12
large
8:10, 109:22, 222:9
larger
46:5
larry
35:21
last
17:15, 24:1, 26:16, 26:21, 137:1, 137:4, 147:19, 147:23, 148:25, 162:21, 163:25, 167:7, 176:13, 176:16, 177:11, 177:24, 178:6, 178:12, 179:4, 206:20, 225:11, 233:5, 249:22, 262:20
late
44:19, 45:1, 57:23
lately
160:23
latency
249:23, 250:7
later
17:18, 65:4, 134:19, 180:18,

232:18, 253:9
latest
13:7
latham
2:13, 6:14
latter
72:15, 72:17
launch
38:23, 254:1
law
6:14, 6:17
laws
283:26
lawsuit
17:2, 17:9, 17:12, 17:14, 24:15, 32:22
lay
121:3, 121:13
layperson
31:16
leading
263:18
learn
125:2, 129:20, 130:17
least
23:8, 127:12, 135:19, 137:14, 153:8, 232:14, 234:15
leave
182:24, 239:21
leaving
9:22
left
239:4, 239:9
legacy
152:7
legal
29:21, 31:7, 31:10, 31:23, 32:17, 33:2, 33:3, 33:7, 33:22, 70:13, 73:3, 73:6, 73:7, 73:10, 73:15
legally
73:17
lengthy
197:24, 200:7
lenses
190:16
less
19:21, 19:23, 19:24, 20:1, 20:3, 20:5, 71:6, 85:21, 103:20, 149:6, 177:6, 181:4
let's
8:20, 28:10, 31:24, 46:7, 46:10, 48:6, 50:4, 54:2, 64:10, 81:25, 102:9, 109:16, 109:19, 110:15, 114:15, 118:16, 127:22, 143:25, 144:25, 147:3, 147:13, 158:4, 159:1, 168:14, 172:14, 173:17, 178:16, 179:11, 181:15, 183:9, 183:15, 187:22, 196:12, 200:3, 203:5, 212:10, 217:12, 221:8, 231:23, 234:12, 236:24, 244:9, 252:7, 254:17, 255:3, 260:25, 269:13
letters
39:24
level
93:2, 93:4, 93:18, 93:22, 93:23, 94:3, 94:6, 94:9, 94:19, 95:13, 95:18, 97:6, 97:9, 97:13, 97:17, 97:18, 98:20, 103:3, 103:18, 105:3, 108:25, 109:3, 109:23, 110:6, 120:22, 120:25, 121:2, 121:6, 121:10, 121:17, 121:23, 121:25, 160:13, 160:14, 161:1
levels
93:3, 93:6, 93:7, 93:12, 93:14, 93:15, 93:19, 94:15, 95:1, 95:8, 96:11, 96:16, 96:24, 97:5, 97:8, 97:9, 103:16, 109:15, 259:25, 261:24
libraries
138:15, 139:13, 149:3, 149:16, 151:14, 151:24, 152:1, 152:24, 154:13, 159:10, 160:1, 160:3, 177:15, 177:23, 178:4, 179:22, 180:3, 184:18, 185:4, 185:10, 197:2, 197:6, 198:11, 198:14, 201:7, 201:12, 203:21, 203:24, 213:11, 213:16
library
159:3, 159:14, 159:15
light
194:9
lights
171:8
likely
35:4, 254:16
likes
278:6
limit
106:20
limitation
147:19, 147:21, 147:23, 148:14, 148:25, 153:13, 154:7, 154:24, 155:13, 156:3, 157:2, 157:25, 162:5, 162:7, 162:10, 162:21, 163:12, 163:15, 163:20, 163:25, 164:12, 164:16, 164:24, 166:10, 166:13, 166:17, 174:22, 175:12, 176:13, 176:16, 176:19, 177:11, 177:24, 178:7, 178:9, 178:12, 179:4, 183:15, 183:16, 184:4, 185:24, 186:20, 186:21, 186:23, 187:25, 196:12, 196:16, 196:24, 197:9, 197:12, 197:14, 197:23, 200:6, 200:9, 200:21, 201:15, 201:23, 201:25, 203:8, 203:11, 203:19, 204:1, 204:20, 205:16, 206:3, 206:8, 206:20, 212:13, 212:24, 213:9, 214:1, 214:5, 214:11, 215:1, 215:6, 215:18, 217:24, 219:9
limitations
184:14, 185:1, 185:7, 219:17, 257:22
limits
69:22, 110:14

line
43:12, 43:14, 108:17, 108:23, 108:24, 109:2, 144:22, 164:11, 200:17, 257:3, 257:5, 259:12, 259:15, 260:4, 260:6, 260:9, 261:7, 261:12, 276:12
linear
246:10, 246:17
lines
10:7, 10:10, 98:16, 152:22, 172:13, 258:8, 258:10, 267:13, 267:15, 267:16, 267:25, 268:3, 268:4, 268:11, 268:15, 268:16, 268:19, 269:3, 269:6, 269:9, 269:10, 269:15, 269:18, 269:19, 271:12, 271:18, 271:22, 271:24, 272:5, 272:9
lip
108:2, 110:20, 123:1
list
65:3, 248:16
listed
176:25, 229:6
listener
34:16, 34:18, 35:8, 36:4, 37:5, 37:11, 98:5, 102:19, 110:25, 111:1, 117:7, 119:4, 119:6, 119:7, 119:13, 119:22, 120:15, 120:17, 122:7, 122:12, 122:14, 122:16, 122:18, 149:20, 226:25, 228:14, 237:12, 259:3, 259:5, 261:1, 261:4
listener's
120:8, 120:13
listeners
122:22, 175:20, 176:4
listening
166:14, 166:19, 167:2, 167:3, 172:6, 224:19, 227:14
lit
238:1
literal
61:10
literally
60:3, 149:7
literature
40:20, 40:21, 41:16, 84:16, 94:14, 94:22, 95:2, 141:23, 246:8
literature's
133:13
litigated
32:20
litigation
29:23, 32:6, 32:14, 32:17, 32:19, 32:21, 32:22, 32:25, 33:1, 33:2
little
8:8, 10:4, 15:21, 16:2, 16:4, 20:24, 22:6, 31:8, 48:22, 93:16, 116:18, 116:19, 155:17, 156:16, 181:19, 231:21, 249:12
llc
1:5, 1:12, 1:13, 6:3
llp
2:3, 2:13
localization
35:18, 36:1, 36:5, 37:10, 84:17, 148:2, 148:4, 148:7, 148:8, 158:10, 174:5, 200:15, 259:12
localize
124:19
localized
84:22
localizes
37:5, 37:11, 186:4, 199:6, 203:14, 204:8, 212:16, 214:21, 218:6
locally
9:17, 145:11
located
7:11, 51:9, 51:24, 84:24, 85:1, 85:12, 126:22, 126:23, 127:7, 166:18, 193:19, 200:17, 239:17, 261:2
location
36:3, 37:5, 37:11, 51:20, 88:21, 123:8, 123:9, 125:11, 148:2, 149:19, 151:13, 158:19, 161:21, 162:13, 177:4, 194:12, 200:16, 224:6, 224:14, 235:23, 236:4, 236:12, 236:19, 238:3, 238:13, 250:4, 266:19
locations
35:13, 48:15, 124:3, 125:13, 127:3, 135:14, 136:12, 226:9, 226:25, 227:22, 228:13, 228:14, 233:18, 234:10, 234:14, 234:20, 235:9, 235:20, 235:24, 238:1, 273:6, 274:8, 275:8, 277:7, 277:13
locomotive
277:12
lodge
276:14
long
25:2, 107:7, 124:21, 175:19, 221:11, 231:9, 255:4, 255:17, 265:23, 280:9
longer
26:22, 70:17, 70:18, 108:17, 131:5, 132:12, 132:18
look
10:12, 10:15, 12:17, 23:14, 24:5, 40:14, 41:16, 108:19, 111:16, 116:22, 136:2, 136:5, 138:2, 146:16, 147:13, 147:19, 154:5, 154:20, 154:21, 155:23, 156:1, 156:6, 156:13, 157:5, 162:5, 164:8, 164:21, 166:5, 173:17, 176:6, 178:15, 179:11, 183:9, 183:15, 183:22, 187:22, 195:6, 196:12, 197:20, 200:3,

Meta Platforms, Inc.
Exhibit 1095
Page 104

203:5, 203:8, 206:20, 212:10, 212:13, 228:25, 232:25, 238:21, 244:16, 247:20, 250:11, 255:13, 259:11, 262:4
looked
40:20, 146:7, 257:7
looking
20:23, 70:20, 70:21, 136:23, 137:1, 154:8, 154:22, 154:24, 155:11, 156:12, 157:12, 164:10, 166:10, 174:1, 175:9, 178:9, 185:23, 186:20, 196:15, 197:12, 217:24, 218:4, 242:10
lose
105:2
lost
155:18, 163:21
lot
9:18, 70:20, 94:13, 133:12, 153:6, 153:7, 160:11, 181:5, 232:5, 264:23, 266:16
lots
109:17
loud
34:24, 124:17, 125:15, 127:2, 171:6
low
64:20, 107:19, 132:19, 133:9, 134:19
low-cost
253:10
low-pass
65:7
lower
94:3, 94:5
lungs
85:14
lyren
17:4, 17:8

M

m-a-c-s
150:25
m-a-x
151:1, 151:2
ma
78:6
macintosh
253:12
macs
253:18, 253:20, 254:25
made
36:25, 37:1, 45:8, 86:21, 127:2, 128:3, 150:8, 232:20, 239:17, 240:12, 260:8, 269:5, 283:18, 283:20
magnetic
189:16, 194:9, 195:10, 230:2
magnitude
247:2, 247:4, 247:6
main
134:21, 144:6
maintain
48:24, 49:1, 49:11, 50:13
maintained
92:17
maintaining
242:18
major
29:9
make
8:11, 8:15, 19:11, 28:1, 36:14, 36:15, 36:20, 78:19, 92:7, 103:7, 110:20, 111:8, 127:13, 133:12, 156:2, 161:1, 165:5, 202:2, 240:16, 242:25, 278:19, 282:14, 283:13
making
31:9, 79:8, 79:18, 80:4, 107:4, 119:4
maneuver
9:18
manifestation
41:23
manifested
265:5
manipulate
35:7, 124:7, 159:16, 161:21
manipulating
58:5
manipulation
35:9, 151:22, 152:16, 152:23, 159:20, 160:7
many
12:14, 14:5, 18:6, 24:23, 25:12, 30:7, 34:19, 46:20, 47:2, 57:17, 59:9, 59:11, 59:25, 69:5, 86:24, 114:20, 114:21, 117:5, 117:12, 117:19, 119:6, 126:13, 126:14, 133:12, 134:14, 137:10, 137:11, 151:21, 159:6, 165:6, 167:13, 169:13, 231:18, 246:13, 249:7, 265:5, 267:6
mark
7:8, 9:3, 11:3
marked
8:25, 11:7, 145:5, 172:25, 182:16, 187:9, 199:16, 199:23, 202:20, 202:25, 211:22, 221:22
market
253:9
marks
280:20
markup
14:25, 15:16, 16:13
mars
83:7, 86:8
massachusetts
2:16
master
29:7
match
240:3
material
204:4
materials
7:12, 56:11
math
249:8
mathematical
59:19
mathematically
245:16
matrix
61:16
matter
6:3, 30:24, 30:25, 31:7, 33:22, 49:3, 49:5, 50:17, 104:7, 173:16, 227:8, 228:15
matters
31:23, 33:2, 33:3, 33:7, 73:17
maturing
180:19

max
150:20, 150:25, 151:1, 160:21
maybe
13:8, 33:20, 35:10, 44:2, 55:3, 65:13, 87:1, 89:3, 89:8, 90:12, 91:4, 93:14, 93:25, 98:17, 103:8, 104:25, 105:1, 113:18, 122:13, 128:7, 132:20, 133:7, 153:8, 159:25, 180:17, 195:16, 208:3, 215:24, 226:18, 234:13
mcmullen
24:2, 24:7, 24:9, 70:16, 70:18, 70:23, 70:25
mcmullen's
24:11, 70:5, 70:19
mean
14:14, 14:16, 21:21, 31:4, 31:5, 31:6, 34:17, 34:19, 35:1, 44:10, 48:23, 50:22, 53:17, 53:18, 55:24, 61:10, 62:19, 73:6, 74:3, 74:17, 74:23, 76:2, 77:19, 80:23, 87:8, 87:17, 92:1, 92:15, 94:21, 100:5, 103:14, 117:23, 118:25, 120:23, 121:5, 121:24, 122:3, 124:4, 141:15, 142:13, 148:12, 155:21, 160:11, 160:12, 165:25, 166:2, 166:21, 167:6, 168:7, 176:17, 193:25, 194:3, 204:24, 209:13, 209:18, 224:18, 225:21, 245:11, 264:7, 267:4
meaning
89:17, 90:25, 132:9, 167:16, 170:4, 170:5, 170:6, 175:3
meaningless
74:5
means
32:19, 32:22, 37:5, 65:8, 71:18, 71:20, 71:22, 72:4, 72:6, 75:20, 75:21, 76:7, 92:5, 92:16, 111:10, 111:18, 137:16, 169:24, 170:11, 216:23, 217:6, 258:19
means-plus-function
256:4, 256:7
meant
65:14, 65:15, 111:7, 119:19, 120:1, 120:2, 148:8, 208:6, 210:5, 226:4, 226:5, 226:7, 226:18, 235:24, 238:2
meantime
146:11
measure
93:2, 128:13, 128:15
measured
93:1, 95:2, 96:10, 126:3, 129:18, 129:21, 130:12, 133:2, 133:6, 133:16, 134:10, 134:11, 134:16, 134:17, 134:18, 239:19, 245:18, 245:19, 246:9, 246:19
measurement
105:6, 125:25, 127:2, 128:8, 128:19, 239:17, 239:21, 240:17
measurements
126:17, 127:13, 128:3, 128:11, 129:4, 132:21, 240:12
measuring
34:20, 128:17, 132:17
mechanical
230:2
media
6:1, 29:8, 45:11
medication
26:9
medium
136:11, 273:5, 274:20, 275:3, 275:7
meet
7:2, 7:4
meeting
24:25, 25:2, 25:4, 75:11
meetings
24:20
meets
156:3
megaphone
92:18
members
79:7
memorandum
181:4
memory
22:2, 43:25, 45:4, 206:9, 206:12, 206:15, 206:18, 215:24, 219:17, 220:3, 232:13
mention
36:5, 97:22
mentioned
13:5, 13:16, 13:23, 21:4, 23:5, 23:7, 23:11, 28:20, 65:11, 66:14, 66:20, 67:21, 69:15, 70:14, 93:24, 95:14, 96:16, 110:23, 119:8, 120:8, 123:21, 124:2, 125:4, 125:21, 127:6, 141:22, 150:16, 161:15, 230:12, 246:17, 252:7
mentioning
59:21, 98:24
menu
44:6, 47:21
mers
152:2
message
169:14, 169:20, 169:25
met
21:23, 24:9
meta
1:11, 6:3, 18:4, 277:14, 282:10
meter
93:2, 93:13, 96:7, 129:2, 129:21, 130:17, 131:4, 131:5, 133:21, 134:11, 186:5

meters
93:14, 96:1, 96:3, 96:8, 96:19, 97:20, 98:21, 106:22, 110:18, 126:23, 127:7, 128:4, 133:21, 186:5
method
115:23, 148:24, 174:4, 174:8, 177:10, 179:19
methods
160:16, 195:6, 245:24, 246:19, 246:24, 247:1
mic
114:1
microphone
34:24, 112:22, 172:6, 261:3
microphones
55:4, 112:20, 116:13, 116:14, 175:25, 239:17
mid-s
54:7
middle
259:14
might
8:11, 8:14, 13:25, 16:18, 21:11, 21:14, 31:15, 32:24, 33:2, 36:23, 39:12, 40:1, 40:11, 44:6, 44:8, 46:5, 46:22, 48:5, 57:20, 68:23, 70:15, 73:15, 79:23, 80:15, 89:4, 90:8, 90:9, 90:10, 90:11, 90:13, 91:2, 91:5, 91:8, 93:16, 95:8, 99:20, 100:14, 101:20, 101:24, 102:12, 104:23, 105:2, 106:19, 107:5, 107:11, 107:20, 109:7, 110:1, 110:5, 114:13, 118:3, 122:12, 122:22, 124:4, 124:17, 125:10, 127:22, 141:20, 142:11, 143:20, 149:13, 152:21, 153:9, 153:20, 153:21, 157:14, 160:3, 165:25, 166:11, 166:12, 171:7, 171:11, 175:3, 193:5, 204:15, 217:7, 217:9, 217:14, 226:12, 227:7, 230:17, 232:20, 233:15, 234:7, 234:8, 234:17, 235:1, 235:2, 235:18, 238:22, 239:25, 243:9, 265:24, 277:11, 277:23, 278:3
miles
109:18
mills
29:8
mimic
216:5, 217:22, 218:11
mind
101:11, 165:17, 180:6, 180:12, 180:13
minute
68:6
minutes
23:15, 99:16, 147:1, 217:1
mischaracterizes
258:25, 267:1
mishearing
101:13
missed
277:25
mission
45:10
missouri
2:7
mistaken
172:7
misunderstanding
226:19
mixed
68:17, 105:11
mm-hmm
112:16, 257:9
model
223:22
models
29:10
modification
63:18, 126:16, 245:22
modifies
112:4
modify
132:13
moment
8:15, 9:13, 10:23, 124:8, 144:5, 211:24, 222:5, 260:18
monaural
115:6, 115:7, 115:12, 115:14, 115:18, 115:23, 172:6, 208:22, 209:5, 234:12, 235:14, 236:24
monday
1:24, 5:1
monitor
6:7, 175:25
moon
83:3, 84:4, 84:5
more
19:1, 19:3, 19:5, 19:7, 19:9, 20:24, 30:14, 31:8, 48:22, 54:24, 60:17, 61:4, 64:2, 65:23, 71:3, 76:13, 79:16, 79:25, 85:21, 89:9, 100:6, 107:8, 116:19, 118:8, 118:19, 120:3, 132:25, 136:12, 137:14, 149:6, 152:4, 152:5, 174:4, 177:6, 180:19, 180:20, 181:4, 190:17, 200:13, 200:22, 202:4, 226:25, 229:22, 233:16, 234:9, 235:19, 246:12, 249:12, 267:7, 267:8, 273:6, 274:8, 275:8, 277:7, 277:13, 278:8, 280:2
most
31:1, 32:6, 32:13, 33:6, 33:9, 103:2, 107:22, 107:25, 113:22, 114:7, 114:19, 114:20, 114:25, 127:20, 127:25, 128:21, 129:22, 129:24, 130:1, 130:18, 130:20, 130:25, 131:14, 133:5, 133:16, 245:1, 245:12, 246:25
mostly
40:21, 70:21
motion
236:22
motivations
171:25

Meta Platforms, Inc.
Exhibit 1095
Page 107

motorola
38:5
mounted
51:16, 51:19, 51:20, 231:14, 252:22
mouse-like
231:12
mouth
103:8, 261:21
move
44:8, 47:7, 47:16, 47:25, 48:14, 48:16, 48:23, 48:25, 49:2, 89:9, 135:13, 160:13, 174:5, 196:1, 196:7, 196:8, 232:10, 239:10
moved
48:6, 48:9, 231:14
movement
48:19, 52:3, 52:4, 52:13, 117:7, 120:12, 120:14, 188:2, 193:14, 248:23, 250:5
movie
131:15
moving
49:7, 49:13, 50:14, 177:2, 231:20, 236:21, 236:22, 237:15, 240:6, 249:21, 249:24
msp
150:20, 160:21
much
18:23, 20:10, 32:4, 44:9, 53:16, 70:5, 70:17, 70:25, 79:25, 131:5, 181:6, 191:20
muir
7:11, 82:9, 82:16, 82:20, 82:24, 83:3, 83:7, 83:14, 83:23
multimedia
4:15, 223:1, 229:1, 244:25
multiple
150:14, 226:15, 232:20
multiplication
61:16
multiplied
59:20
multiply
61:24, 62:23
multiplying
64:14
munge
23:25
music
29:7, 29:10, 124:16
must
117:13, 117:20
mute
114:4
mylene
2:23, 6:9
myself
21:3, 39:16, 73:17, 84:15, 114:4, 118:12, 126:4

N

name
7:5, 9:5, 14:3, 14:6, 17:6, 21:13, 22:1, 22:3, 23:21, 23:24, 38:15, 38:17, 45:13, 145:7, 145:8, 151:25, 152:2, 152:14, 152:19, 172:23, 182:13, 193:20, 199:14, 202:18, 211:20, 221:24
name's
7:2
named
16:24, 283:3, 283:9
names
21:19, 152:10
nasa
14:9, 38:20, 39:5, 39:6, 41:15, 42:3, 44:19, 53:21, 151:19, 181:3, 222:11
nasa's
45:10
national
14:10
native
153:20
natural
225:16, 248:24
nature
30:3, 208:21
navigate
209:22, 210:6, 223:20, 241:25, 247:21
navigation
210:17
nd
5:1, 6:6, 11:15
near
109:19, 128:18, 129:16, 131:7, 132:1, 132:10
necessarily
29:23, 81:5, 102:25, 112:2, 114:16, 114:18, 115:4, 115:22, 132:23, 154:1, 165:20, 166:1, 166:21, 167:6, 167:13, 168:5, 168:8, 179:9, 217:19, 240:2
necessitating
92:18
need
8:14, 8:16, 9:22, 10:4, 13:3, 15:5, 25:19, 30:16, 55:1, 87:16, 109:20, 109:21, 110:19, 160:14, 165:5, 219:2, 232:9, 244:5, 244:7, 245:3, 254:4, 262:20
needed
44:13, 162:3, 232:3, 232:14, 232:15
negotiated
16:19
neighbor
91:7
network
273:7, 275:9, 277:7
never
27:24, 28:7, 28:16, 87:20, 152:12, 171:17, 278:17
new
27:7, 27:14, 27:23, 28:7, 28:16, 45:15, 151:13
next
10:2, 88:11, 88:15, 88:18, 90:2, 90:14, 99:4, 99:9, 100:9, 174:22, 233:15, 237:6, 251:25, 261:2
nice
7:2, 7:4

nine
18:15
nobody
25:8
noise
55:2, 109:9, 109:11, 109:18, 109:23, 110:6, 122:11, 168:14, 168:24, 169:8, 169:16, 170:13, 170:18
noises
171:9, 171:11
noisy
109:16
non-3-d
235:13
non-individualized
240:8, 240:23, 241:2, 241:5, 241:14
noncommunicative
168:13
none
43:15, 269:25
nonspeech
170:10
nontestifying
15:10
nontransitory
184:2
normal
48:24, 86:18, 92:20, 93:7, 93:10, 93:12, 93:23, 94:9, 95:9, 95:17, 96:6, 96:8, 96:10, 96:24, 97:5, 97:8, 97:9, 97:16, 97:17, 97:18, 98:20, 101:24, 102:6, 102:18, 102:19, 107:21, 108:25, 109:3, 109:7, 109:15, 110:15
normally
92:23
norris
16:23, 17:1, 17:5
note
13:7, 223:25, 282:3
noted
254:10
notes
7:15
nothing
6:24, 276:19
noun
154:2, 274:9
number
6:1, 6:5, 12:18, 13:4, 13:25, 14:2, 19:15, 19:19, 26:22, 54:6, 60:4, 60:8, 60:9, 137:13, 144:22, 144:23, 150:9, 152:3, 165:22, 167:15, 173:7, 225:18, 225:23, 226:8, 226:12, 244:19, 266:8, 267:4, 280:4
numbers
20:22, 26:16, 64:9, 64:11, 67:7, 67:9, 67:15, 67:22, 146:1, 146:3, 185:18

O

oath
6:24
object
16:3, 43:12, 44:8, 86:23, 111:19, 111:20, 114:23, 204:24, 236:19, 236:21, 236:22, 257:4, 257:12, 276:11
object's
196:8
objecting
254:12
objection
12:16, 14:19, 15:19, 15:24, 16:1, 16:15, 18:10, 20:14, 21:1, 22:8, 22:15, 22:25, 23:9, 27:9, 27:10, 27:17, 27:25, 28:9, 28:18, 28:24, 31:11, 32:8, 32:16, 33:8, 33:14, 33:19, 34:9, 35:11, 35:14, 37:16, 37:24, 38:3, 38:21, 39:3, 40:4, 41:12, 42:11, 42:18, 43:11, 45:3, 45:19, 45:25, 46:17, 47:9, 47:18, 48:2, 48:11, 48:20, 49:14, 50:15, 51:5, 51:13, 52:5, 52:14, 52:21, 53:4, 53:13, 54:14, 54:22, 55:12, 56:1, 56:20, 56:23, 57:3, 57:8, 57:15, 58:9, 58:16, 58:22, 58:25, 59:8, 59:15, 60:2, 60:7, 60:15, 60:19, 60:24, 61:5, 61:17, 62:12, 64:8, 65:22, 66:7, 66:15, 66:22, 67:13, 68:1, 68:21, 69:20, 70:7, 71:2, 71:10, 71:15, 71:25, 72:11, 72:24, 73:22, 74:6, 74:12, 74:21, 75:5, 75:19, 75:25, 76:10, 76:20, 77:3, 77:9, 77:16, 78:13, 78:21, 79:1, 79:10, 79:20, 80:5, 80:12, 81:3, 81:22, 82:17, 82:21, 82:25, 83:4, 83:8, 83:16, 83:24, 84:6, 84:13, 85:7, 85:20, 86:2, 86:9, 86:22, 87:9, 87:15, 87:23, 88:3, 88:12, 88:20, 89:1, 89:14, 89:22, 90:3, 90:7, 90:21, 91:19, 92:4, 93:9, 94:4, 94:11, 94:20, 95:10, 95:19, 96:4, 97:24, 98:6, 98:14, 98:25, 99:6, 99:10, 99:15, 100:2, 100:10, 100:22, 101:9, 101:17, 102:22, 103:5, 103:12, 103:24, 104:4, 104:8, 104:20, 105:10,

105:16, 105:23, 106:5, 106:10, 106:18, 107:2, 107:14, 108:15, 109:5, 109:13, 110:4, 110:11, 111:2, 113:25, 114:10, 114:12, 115:3, 115:15, 115:20, 116:7, 117:14, 117:21, 118:20, 120:9, 122:24, 123:24, 124:23, 125:23, 126:19, 127:10, 127:17, 128:6, 130:13, 133:3, 133:24, 133:25, 134:1, 134:13, 135:15, 135:24, 137:17, 139:3, 139:15, 139:24, 140:5, 140:21, 141:9, 144:15, 144:17, 144:19, 148:15, 149:5, 149:12, 149:21, 150:18, 151:7, 151:9, 152:18, 153:15, 153:25, 154:17, 155:5, 155:16, 156:5, 156:24, 157:9, 157:20, 158:20, 159:24, 160:10, 162:16, 162:23, 163:7, 163:17, 164:3, 165:4, 165:13, 165:19, 167:10, 167:20, 167:24, 168:4, 169:11, 171:19, 171:23, 172:4, 172:17, 174:14, 175:22, 176:20, 177:5, 177:16, 177:25, 178:8, 178:25, 179:7, 179:23, 184:20, 185:5, 185:14, 186:7, 186:16, 186:25, 188:8, 188:24, 189:5, 189:13, 189:22, 190:5, 190:13, 190:18, 190:24, 192:22, 193:2, 193:16, 194:4, 194:18, 194:25, 195:9, 195:14, 195:21, 196:2, 196:9, 197:3, 197:16, 198:17, 199:9, 201:8, 201:17, 202:1, 202:13, 204:2, 204:12, 205:10, 205:19, 206:25, 207:8, 207:13, 208:1, 208:13, 208:24, 209:7, 209:15, 210:1, 210:12, 210:25, 211:11, 213:12, 213:19, 214:4, 214:24, 215:8, 217:5, 218:10, 218:18, 219:4, 219:13, 219:24, 220:12, 220:20, 221:6, 224:8, 224:16, 227:4, 228:4, 228:17, 229:14, 229:20, 230:8, 230:16, 231:8, 232:1, 232:12, 233:12, 233:21, 234:5, 234:21, 235:3, 235:11, 236:6, 236:7, 236:10, 237:2, 237:18, 238:9, 238:14, 239:6, 241:3, 241:15, 241:21, 242:20, 242:24, 243:8, 243:18, 243:22, 245:5, 245:9, 245:15, 245:25, 246:4, 246:21, 247:7, 248:9, 248:13, 249:1, 249:5, 250:6, 250:15, 250:21, 251:1, 251:5, 251:17, 251:22, 252:6, 252:15, 252:20, 253:1, 253:13, 253:23, 254:1, 254:10, 256:13, 258:14, 259:21, 260:13, 261:16, 262:12, 263:1, 263:15, 264:17, 264:25, 265:9, 270:2, 270:10, 270:17, 270:24, 273:12, 274:15, 275:4, 275:13, 275:19, 276:1, 276:10, 276:14, 277:15, 278:4, 278:15, 278:22, 279:2, 279:10, 279:12, 279:21, 280:6

objections
25:25, 254:15, 257:16, 258:20, 258:25, 260:24, 263:8, 265:17, 266:3, 266:15, 267:1

objectively
93:1

objects
47:7, 47:17, 47:23, 87:6, 91:10, 114:17, 195:20, 196:1, 196:7, 242:19

obtained
29:3

obvious
175:3, 188:10

obviously
43:13, 125:14

occasion
31:23

occur
92:21, 99:19, 128:20, 136:17, 161:1, 170:14, 186:10

occurred
32:21, 128:8, 170:15

occurs
32:25, 200:16

odd
91:9, 231:21

oddly
155:7

off-the-shelf
157:16, 158:16

offer
138:7, 179:13, 272:12, 272:16, 272:20

offered
73:14, 146:13, 183:12, 216:22, 273:2

office
2:5, 7:10, 11:23, 14:16, 14:17, 82:12, 82:14, 87:13, 88:16

often
35:18, 44:12, 112:6, 125:17

oftentimes
10:14, 125:12, 226:8

oh
13:5, 19:22, 27:23, 28:6, 28:15, 29:20, 33:20, 42:23, 46:6, 72:25,

86:24, 89:8, 90:12, 93:25, 94:8, 101:8, 112:17, 121:25, 123:5, 125:4, 134:2, 143:24, 144:16, 145:14, 145:25, 150:24, 153:8, 156:12, 161:18, 163:2, 166:21, 175:23, 182:8, 182:10, 184:2, 191:16, 197:4, 211:6, 220:8, 223:7, 223:14, 226:7, 226:18, 226:23, 233:25, 237:19, 254:8
old
219:18
old-fashion
76:14
old-fashioned
225:7, 246:15
older
219:18
once
8:5, 112:17, 145:10, 258:12
one's
48:7, 93:16, 123:14, 154:2, 187:6, 208:6
one)____
281:8
one-ear
224:2
ones
18:9, 75:6, 109:14, 136:22, 144:6, 249:18
only
17:5, 22:1, 58:19, 59:24, 67:17, 84:14, 89:15, 104:25, 133:2, 134:18, 138:7, 144:21, 172:5, 178:9, 236:23, 269:1, 272:7, 278:18
open
8:3, 10:1, 10:18, 11:11, 11:12, 55:4, 114:1, 145:12, 145:15, 182:18, 182:21, 182:24, 199:19, 211:25, 212:3, 222:6, 222:7
operated
232:22
operating
35:5
operation
59:19, 62:1, 62:20, 62:23, 63:24, 64:1, 64:2, 66:10, 66:11, 66:24, 67:16
operations
140:25, 171:24
opined
138:24, 146:5, 147:17, 176:8, 216:12
opining
86:15
opinion
72:21, 74:2, 74:4, 133:1, 138:7, 149:10, 149:13, 179:13, 183:12, 204:10, 214:2, 214:22, 218:8, 233:13, 272:13, 272:17, 272:21, 276:4, 276:22, 278:11, 278:25
opinions
73:4, 146:13, 216:22, 259:23, 260:15, 261:18, 262:14, 263:3, 263:17, 265:3
opportunity
113:16, 168:9, 280:2
opposed
27:7, 27:15, 31:24, 70:12, 194:13, 236:23
optical
189:16, 192:17, 192:19, 193:3, 193:18, 194:7, 195:10
optimize
235:24
order
12:21, 34:14, 61:23, 62:1, 62:8, 62:21, 67:11, 87:5, 148:1, 157:6, 162:12, 280:18
ordinary
155:1
orient
229:2
orientation
120:14
oriented
32:6, 32:15
origin
148:4, 176:1
original
161:3, 181:2
originally
40:21, 72:19, 126:8
originates
224:6, 224:14
others
64:23, 64:25, 65:2, 65:4, 138:3, 150:17, 151:4, 180:15, 211:10, 229:22
otherwise
134:20, 148:8, 215:13, 261:2
out
13:9, 22:1, 27:22, 28:6, 28:12, 28:15, 44:15, 46:15, 46:21, 47:3, 67:6, 73:3, 73:7, 73:18, 108:3, 109:25, 110:13, 127:11, 127:21, 127:24, 133:20, 134:6, 136:16, 150:10, 151:14, 155:12, 157:25, 163:19, 165:15, 170:12, 172:8, 181:6, 186:9, 237:11, 238:23, 258:2, 273:22, 279:4
outdoors
109:17
outer
116:15, 264:13
outline
56:3
outlined
151:23
output
64:16, 157:14
outside
16:17, 47:9, 48:2, 48:11, 48:20, 51:6, 51:14, 52:5, 52:14, 56:23, 84:25, 85:10, 85:12, 99:18, 112:20, 112:24, 143:12, 238:18, 258:14, 275:20, 280:3
over
12:18, 14:25, 15:20, 15:24, 16:4, 19:12, 19:19, 20:15,

40:5, 60:24, 75:9, 75:21, 76:3, 77:1, 77:4, 79:8, 79:24, 80:4, 103:8, 110:16, 118:11, 128:21, 172:6, 224:22, 249:22, 257:6, 262:20, 264:24, 265:21, 266:5, 273:6, 277:10
overlap
57:25, 58:10, 240:13
own
14:2, 46:20, 84:23, 85:9, 85:14, 100:25, 135:6, 135:12, 135:21, 172:8, 240:3
owned
29:15, 30:11

P

p-h-o-s-i-t-a
142:7, 142:13, 142:23
p-i-n-n-a
130:8
p-i-n-n-a-e
130:5, 130:7
p-l-a-n-e
134:7
p-o-l-h-e-m-i
232:17
p-o-l-h-e-m-u-s
43:6, 51:4
pacific
5:2, 6:7, 280:24
page
3:2, 4:2, 9:22, 9:23, 25:15, 222:15, 222:19, 223:19, 223:21, 223:23, 225:11, 228:22, 232:25, 233:1, 233:7, 237:6, 237:7, 241:24, 242:5, 242:8, 244:16, 244:18, 247:20, 248:3, 248:20, 251:9, 251:25, 252:1, 253:5, 256:1
pageline
282:15
pages
70:19, 70:21, 71:6, 164:22, 222:10, 255:17, 255:19, 281:2
pair
112:21
pairs
116:14
paper
7:14, 54:3
papers
207:4
paragraph
111:13, 111:16, 116:23, 117:4, 118:24, 119:1, 136:6, 136:8, 137:1, 137:4, 138:2, 138:6, 138:7, 138:11, 138:14, 138:25, 139:22, 139:25, 140:2, 140:20, 140:23, 141:8, 141:12, 143:1, 143:3, 143:7, 143:13, 143:14, 143:17, 143:22, 144:3, 144:4, 144:6, 144:8, 144:12, 144:21, 154:6, 154:16, 154:21, 164:15, 191:12, 216:20, 225:12, 228:25, 233:5, 233:6, 237:8, 237:21, 244:19, 251:9, 251:10, 252:1, 252:4, 253:8, 258:11, 259:11, 259:14, 259:16, 260:7, 260:20, 261:22, 262:4, 262:11, 262:20, 262:25, 263:10, 273:10, 273:19, 274:12
paragraphs
136:23, 139:21, 255:22, 255:23, 255:24, 255:25, 262:6
paralleling
216:25
paraphrase
188:12, 205:20, 225:25
paraphrased
177:17, 184:22
pardon
212:19
parentheses
9:6, 221:25
paris
82:20, 264:20
part
12:14, 23:2, 29:21, 35:5, 38:10, 38:12, 44:3, 46:7, 47:4, 54:15, 85:1, 152:9, 162:17, 172:9, 189:24, 191:6, 198:18, 218:20, 226:1, 226:2, 233:15, 237:20, 277:25
partial
262:20, 262:25
participated
46:22
particle
121:8
particular
15:2, 30:24, 44:14, 65:10, 89:3, 127:8, 144:22, 159:17, 162:4, 163:11, 165:23, 165:24, 173:16, 234:23, 235:16, 262:10, 269:21
particularly
132:19, 185:6
parties
6:10, 37:4, 69:17, 71:12, 71:17, 72:4, 74:14, 76:7, 76:13, 77:13, 77:21, 79:16, 174:13, 266:7, 278:14, 279:1, 279:9, 279:19, 279:23
parts
46:24
party
14:23, 21:3, 169:7, 171:15, 174:15, 186:3, 186:4, 186:5
pass
64:20, 236:23
past
54:8, 54:12, 54:20, 55:10, 107:3, 124:14
patents
14:2, 14:7, 14:8, 14:9, 14:11, 16:25, 17:7, 18:4, 18:6, 18:15, 18:18, 18:20, 18:24, 19:16, 19:20, 19:21, 22:11, 23:7,

Meta Platforms, Inc.
Exhibit 1095
Page 112

23:16, 24:14, 24:18, 26:15, 26:19, 27:2, 28:23, 35:17, 35:18, 35:24, 36:6, 36:9, 36:25, 56:12, 75:2, 95:7, 95:11, 95:17, 95:20, 96:15, 97:21, 98:1, 98:3, 98:7, 98:11, 98:23, 131:10, 132:24, 132:25, 135:6, 135:9, 135:10, 135:12, 135:19, 135:21, 136:15, 137:22, 138:9, 138:13, 138:18, 139:2, 139:11, 139:14, 139:23, 140:4, 140:15, 140:19, 141:6, 141:7, 143:2, 143:8, 143:15, 143:23, 144:2, 144:13, 185:17, 197:11, 198:25, 201:19, 204:4, 205:4, 213:22, 256:11, 256:12, 256:15, 257:6, 264:3, 264:6, 264:8, 264:19, 273:14
patrick
2:5, 6:16, 21:10, 21:17, 21:24, 25:6, 55:21
paul
35:22
pause
16:3, 44:24, 257:15
pc
253:12
pdf
9:14, 10:18, 11:2, 11:4, 145:7, 202:18, 211:19, 223:19, 241:25, 244:17, 247:20
peak
102:10
penalty
283:25
pending
254:6, 254:18
people
30:16, 31:19, 31:21, 45:5, 45:14, 46:21, 47:2, 55:3, 62:18, 77:12, 81:1, 81:9, 81:13, 81:20, 90:10, 94:14, 96:20, 102:6, 107:25, 121:3, 128:9, 129:23, 130:19, 131:7, 137:6, 170:8, 175:19, 176:3, 177:20, 177:21, 188:22, 189:3, 189:6, 195:7, 195:12, 195:18, 195:24, 196:5, 206:11, 206:14, 207:11, 208:10, 210:6, 210:23, 234:11, 234:25, 238:21, 239:23, 240:19, 241:1, 241:4, 241:13, 241:18, 246:12, 249:20, 253:17, 254:24
people's
108:4
perceive
122:22, 224:6, 224:14
perceived
35:13, 36:3, 122:16, 123:8
perceives
122:20, 228:14
percent
33:20, 33:21, 239:12
percentage
33:10, 33:13
perception
35:7, 39:9, 122:18, 243:7, 243:16
perfect
191:19
perform
63:21, 64:3, 148:13, 148:19, 151:5, 153:12, 156:2, 156:11, 156:15, 162:3, 163:15, 177:23, 178:6, 178:22, 179:4, 180:4, 180:7, 185:12, 186:2, 186:14, 186:22, 195:12, 195:15, 197:8, 197:14, 198:15, 199:3, 201:13, 201:22, 203:25, 204:7, 206:2, 213:17, 214:1, 214:11, 215:5, 216:3, 219:1, 219:11, 220:17, 257:1
performance
235:24, 238:21
performed
163:4, 218:15, 257:9, 257:18
performers
124:18
performing
61:25, 148:24, 154:14, 177:10, 179:19, 184:14, 184:25, 196:24, 198:9, 201:4, 203:18, 213:8, 219:16, 219:21, 220:6
performs
162:10, 162:20, 163:24, 205:8, 205:15
perhaps
79:12, 95:1
period
17:17, 53:2, 283:17
perjury
283:25
person
17:6, 24:3, 24:4, 41:19, 73:13, 73:16, 103:6, 107:21, 111:8, 125:16, 142:11, 142:21, 147:25, 148:3, 148:5, 148:6, 148:23, 149:1, 149:10, 149:18, 155:1, 158:17, 162:11, 162:14, 165:21, 165:23, 166:2, 166:8, 166:14, 166:18, 166:19, 166:23, 166:24, 167:2, 167:3, 177:9, 177:12, 179:18, 180:4, 184:16, 193:23, 197:7, 198:14, 203:24, 210:2, 213:16, 217:8, 224:5, 224:7, 224:13, 224:15, 224:17, 224:21, 226:17, 261:21
personal
152:12, 239:15,

239:19
personalized
240:2, 240:14, 240:16
persons
80:20, 154:11, 178:5, 184:12, 184:24, 185:11, 196:22, 198:7, 201:2, 201:12, 203:17, 213:6
perspective
57:21
pertain
31:7
pertained
22:10
pertains
22:14
pertinent
7:17
ph
1:23, 5:5, 6:21, 281:15, 282:9
phases
126:16
phd
6:2, 11:15, 29:3, 280:21
phenomenon
84:17
philip
17:4, 17:8
phone
21:2, 69:19, 69:25, 71:14, 71:16, 72:9, 72:15, 72:18, 72:22, 74:3, 74:5, 74:10, 74:18, 75:13, 75:21, 75:24, 76:2, 76:9, 76:14, 76:15, 76:16, 76:17, 76:19, 76:25, 77:15, 77:18, 77:19, 77:20, 77:24, 78:3, 78:7, 78:9, 78:16, 78:23, 79:13, 79:15, 80:7, 80:14, 80:17, 80:18, 80:22, 81:8, 81:15, 148:1, 149:18, 158:18, 162:12, 224:7, 224:15, 224:17, 224:22, 264:23, 264:24, 265:4, 265:7, 265:15, 265:24, 266:2, 266:14, 272:13, 272:17, 272:21, 273:1, 273:10, 273:17, 274:6, 274:17, 274:21, 274:23, 277:23, 278:3, 278:19
phones
75:18, 78:17, 266:8
phosita
138:22, 139:17, 140:8, 141:19, 142:4, 142:13, 142:22, 159:15
phrase
35:20, 35:23, 36:7, 36:24, 37:2, 37:8, 53:14, 62:18, 95:6, 101:4, 111:6, 111:8, 119:3, 177:1, 189:24, 191:6, 262:16, 263:5, 273:23, 273:24
phrased
66:17
phrases
263:9
phrasing
213:21
physical
84:19, 84:23, 85:1, 86:23, 99:19, 204:15, 204:23, 243:14
physically
89:5, 261:2
pick
161:14
picture
231:17, 237:24
pictures
181:6
piece
76:2, 78:5
pilot
237:23, 239:10
pilots
80:3
pin
101:20, 101:21, 102:2, 102:8, 106:12
pinna
130:4, 134:23
pinnae
129:24, 130:1, 130:20, 130:25
pitch
230:18, 230:24, 231:1, 231:13, 232:8
pixel
1:13
place
143:14, 144:21, 157:24, 158:3, 158:8, 158:9, 169:15
placed
171:12
plaintiff
1:7, 2:2, 17:11
plaintiff's
4:5
plaintiffs
6:17
plan
270:15
plane
132:7, 132:12, 132:18, 133:20, 134:6, 207:17
planer
128:16
planet
6:10, 6:19
planetary
264:19
plastic
76:3
platforms
1:11, 1:12, 6:3
play
48:14
please
6:11, 6:20, 7:5, 9:8, 20:13, 43:5, 43:17, 51:11, 63:4, 68:10, 70:25, 76:23, 81:25, 136:6, 183:9, 187:12, 187:22, 196:13, 197:20, 200:3, 202:21, 203:5, 212:10, 224:9, 232:25, 247:14, 257:24, 267:12, 268:3, 268:19, 269:9, 271:12, 271:24, 274:12, 280:4, 280:16, 281:1
plethora
137:5, 137:9, 137:12, 137:16, 266:24, 267:4, 276:21
plug
244:6
plus
15:16, 16:13, 249:6
point
14:12, 28:10, 35:19, 36:2,

36:6, 37:10, 41:14, 41:24, 44:6, 44:16, 44:20, 47:7, 47:16, 47:25, 48:5, 53:20, 78:5, 96:17, 109:20, 132:11, 136:16, 137:18, 141:7, 148:2, 148:4, 148:7, 148:8, 151:19, 158:10, 174:5, 181:24, 194:8, 195:19, 195:25, 196:6, 200:15, 216:14, 216:16, 249:13, 253:6, 253:10, 259:2, 259:12, 261:3, 263:25, 264:2, 269:16, 271:11, 274:12
pointed
165:15
pointing
10:7, 43:3, 43:24, 195:16
points
47:20, 140:8
pole
51:19
polhemi
232:17
polhemus
42:24, 43:5, 50:25, 51:4, 51:7, 52:8, 191:22, 192:6, 192:8, 231:24, 232:11, 232:16
pop
8:5
popular
45:11
portable
174:23, 175:1, 175:8, 175:11, 188:2, 188:20
portion
47:4, 66:24, 67:1, 67:2, 218:22, 227:16
posa
142:10, 170:8
pose
244:22
posita
138:22, 141:25, 142:4, 142:8, 217:8
position
35:10, 42:25, 44:4, 48:24, 49:1, 49:12, 50:13, 50:18, 50:19, 111:18, 112:11, 148:1, 149:19, 151:13, 158:10, 158:18, 158:22, 162:12, 192:7, 193:18, 226:12, 227:22, 230:2, 230:20, 238:17, 238:25, 239:3, 239:13, 239:18, 245:19, 245:20
positioned
194:1, 194:2, 226:9
positioning
225:18, 225:23, 226:11, 226:14, 226:15, 226:24, 227:2, 227:8, 227:16
positions
227:9, 245:18, 246:13, 246:20
possibility
170:12, 235:18
possible
84:21, 178:2, 218:11, 224:5, 224:13, 224:21, 224:25, 265:20, 283:7
possibly
69:4
potential
33:7, 45:12, 238:22
potentially
33:3
power
30:16, 219:8
practice
8:23
practicing
155:13
preamble
174:3, 174:19, 183:16, 206:8
precise
33:1, 131:12, 131:18, 131:19, 131:20
precisely
26:25
predating
240:25, 241:12
prefer
36:16
preference
182:25
prepare
22:7, 24:20, 270:15, 270:22, 271:9
prepared
5:7, 270:19
preparing
270:1, 270:8, 270:12
prerecorded
246:6
prescribe
227:19
prescribed
227:23
prescription
228:12
prescriptive
227:6, 227:12, 227:16
present
2:22, 12:8, 13:3, 14:6, 21:8, 25:4, 44:10, 277:12
presentation
35:4, 35:6, 57:4, 152:23
presented
56:17, 56:18, 210:23
pressure
93:2, 93:6, 120:22, 120:25, 121:1, 121:6, 121:10
presumably
192:1
presume
174:21
presuming
32:25
pretty
44:20, 45:5, 103:17, 158:14, 210:19
prevent
26:9
previews
8:13
previously
178:17, 231:25, 276:7
primarily
46:2, 120:3
primitive
265:20
print
282:3, 282:5
prior
28:20, 46:19, 142:8, 150:12, 151:22, 152:15, 197:11, 201:19, 208:25, 254:2, 259:4, 283:3
probably
7:25, 16:4,

19:6, 54:4, 103:15, 106:21, 110:17, 121:9, 125:5, 151:21, 189:17, 215:24, 228:5, 259:14
problem
113:3, 146:25, 155:20
problematic
228:9
problems
227:23
procedure
283:5, 283:15, 283:22
procedures
141:19, 141:21
proceed
26:1
proceeding
283:4, 283:6, 283:8
process
25:23, 48:10, 58:20, 59:6, 59:12, 59:24, 60:12, 60:14, 60:18, 60:21, 61:4, 61:7, 61:16, 62:10, 64:6, 64:19, 65:24, 66:4, 66:5, 66:10, 66:14, 67:2, 67:23, 67:25, 68:20, 68:23, 69:3, 69:7, 118:9, 134:20, 138:20, 141:17, 160:20, 198:19, 200:14, 205:1, 214:20, 217:12, 254:25
processed
218:5, 251:4
processes
48:18, 59:12, 60:1, 60:4, 61:4, 63:21, 64:3, 65:21, 66:21, 139:16, 139:17, 150:15, 197:25, 199:4, 200:23, 251:21
processing
34:6, 34:10, 34:14, 38:6, 58:12, 58:15, 63:17, 63:20, 65:19, 117:11, 117:18, 118:21, 129:12, 135:7, 135:13, 135:23, 138:16, 139:13, 140:9, 142:1, 148:24, 149:4, 151:3, 152:8, 152:23, 153:19, 153:24, 154:14, 159:3, 159:14, 177:15, 179:22, 183:17, 184:5, 184:19, 185:8, 186:2, 193:6, 196:13, 203:9, 203:12, 204:7, 205:22, 212:14, 214:5, 214:7, 214:25, 215:1, 215:2, 215:11, 215:14, 215:17, 215:21, 217:7, 217:20, 219:9, 219:16, 220:2, 220:23, 239:20, 252:19, 252:24, 253:3, 253:18, 253:21, 257:1, 257:10, 257:21
processor's
216:5
processors
59:6, 59:14, 135:23, 150:7, 150:11, 157:21, 158:13, 187:2, 187:3, 194:24, 200:14, 200:22, 202:4, 202:6, 216:1, 216:4, 217:4, 217:18, 249:23, 257:2
produce
94:24
producing
132:12, 132:18
product
22:16, 33:11, 172:9, 172:13, 270:2, 270:10, 270:17, 270:24
program
151:2, 152:2, 160:22, 162:2, 174:6, 174:7, 174:20, 217:9, 217:12
programmed
148:13, 156:2, 156:10, 157:5, 160:23, 176:18
programmer
161:19
programming
138:15, 139:12, 149:3, 154:13, 157:17, 158:19, 160:9, 160:11, 161:1, 177:14, 177:22, 179:21, 184:18, 185:3, 197:1, 198:11, 201:6, 203:21, 213:10
programs
160:5, 160:8, 180:6
progresses
150:13
project
53:23
projects
151:25, 152:3
pronounce
23:23
pronouncing
142:8
propagating
34:20
proper
41:22, 44:23, 233:18, 234:10, 234:19, 235:9, 235:20, 235:23, 236:3, 236:12
properly
65:23, 66:25, 207:1
protocol
266:5
prototype
38:22, 53:8, 54:1, 54:3
proven
224:2
provide
13:10, 26:5, 32:20, 138:1, 175:15, 224:2, 237:10
provided
7:17, 56:5, 56:13, 56:16, 70:15, 143:12, 166:19, 198:22, 198:24, 276:7, 283:16
provides
237:9
providing
140:7, 175:12, 175:20, 176:3, 177:3, 248:6
proviso
198:21, 250:7
proximate
51:25, 86:12, 86:14, 86:16, 86:17, 86:20, 87:3, 87:4, 87:7, 87:8,

87:14, 87:19, 87:20, 87:22, 88:2, 88:4, 88:8, 88:19, 88:21, 88:24, 89:4, 89:9, 89:10, 89:12, 89:17, 89:18, 90:6, 90:9, 90:11, 90:12, 90:25, 91:3, 91:5, 91:12, 91:14, 91:23, 92:3, 92:5, 92:10, 92:16, 95:5, 95:23, 96:3, 96:12, 96:22, 97:1, 97:3, 97:4, 97:8, 97:15, 97:23, 98:5, 98:13, 98:19, 101:16, 101:20, 101:24, 102:15, 102:21, 103:4, 103:23, 103:25, 105:9, 106:9, 106:16, 106:22, 106:25, 107:11, 107:12, 107:16, 107:20, 108:13, 108:17, 109:20, 110:2, 110:9, 110:25, 136:24, 137:6, 148:3, 149:20, 162:14, 258:13, 258:19, 259:3, 259:20, 260:1, 260:12, 260:23, 261:1, 261:3, 261:14, 261:20, 266:22, 268:14, 269:2, 272:8
proximity
87:24, 91:13, 91:16
psychoacoustic
46:4, 160:25, 161:16
psychoacoustics
39:10, 46:3
public
58:3
publication
14:13
publications
13:8, 13:14, 13:15, 13:23, 41:21, 59:5, 256:11
publicly
181:13, 181:21, 223:9, 223:15
published
14:7, 207:4
publisher
181:2
pull
22:1
purpose
63:11, 125:17, 254:3
purposes
55:7
pursuant
283:4, 283:14, 283:21
put
28:11, 54:2, 71:6, 73:6, 103:8, 112:20, 117:22, 124:2, 137:13, 144:25, 155:7, 163:19, 172:21, 202:16, 211:18, 236:18
putting
30:6, 85:16, 133:19, 134:6, 206:1

Q

qualification
36:4, 36:14, 37:1, 66:2, 168:8
qualifies
137:9
qualify
26:20, 36:10, 81:2, 81:5, 87:16, 107:20, 137:12, 164:1, 199:7, 221:3
quality
125:9
quantify
114:19
quasi-realistic
249:21
quest
277:14
question
16:7, 19:17, 28:1, 28:12, 32:13, 40:18, 41:25, 43:17, 47:12, 49:18, 49:24, 52:9, 53:15, 53:18, 54:15, 60:23, 60:25, 61:18, 66:16, 68:18, 69:11, 72:19, 76:23, 92:6, 94:6, 94:8, 100:25, 101:3, 104:15, 105:13, 113:18, 114:4, 114:15, 114:18, 117:15, 118:13, 124:25, 130:14, 131:2, 133:4, 141:3, 143:23, 155:6, 156:13, 161:3, 161:4, 161:6, 161:9, 162:18, 162:24, 163:2, 186:11, 186:21, 188:25, 191:4, 195:1, 198:24, 200:8, 202:5, 202:9, 204:13, 205:12, 205:20, 205:24, 206:1, 211:16, 219:6, 220:9, 220:13, 224:9, 224:20, 228:9, 233:25, 235:5, 241:4, 241:8, 241:9, 254:6, 254:7, 254:18, 254:23, 256:17, 267:22, 270:3, 270:11, 271:1, 271:7, 276:18, 277:18, 277:24, 278:8, 279:14
questioning
43:12, 43:14, 256:25, 257:3, 257:6, 269:16, 271:19, 272:6, 276:12, 277:22, 278:2
questions
25:24, 26:1, 26:5, 101:11, 244:22, 256:18, 256:19, 267:8, 267:18, 267:20, 268:5, 268:21, 268:24, 269:11, 270:6, 271:15, 272:2, 277:17, 278:7, 280:11, 280:12
quibble
254:11
quick
50:1, 178:14, 244:6
quicker
182:25
quickly
25:14
quiet
94:1, 94:9, 94:19, 94:22, 95:9, 102:20, 103:1, 103:8,

Meta Platforms, Inc.
Exhibit 1095
Page 117

105:1
quieter
94:23
quietly
94:24
quite
45:5, 45:8
quote
65:9, 102:12, 156:14, 234:10, 235:23, 236:12, 240:2
quoted
70:16
quotes
56:11

R

r-e-n-é
7:7
r-o-l-l
230:24
radial
129:2, 129:21
radiating
132:7
radio
76:5, 78:25, 79:2, 79:12, 79:23, 80:1, 121:15, 266:18
radiofrequency
79:24
radios
79:8, 79:18, 80:4, 277:8, 277:9
raise
93:16, 110:19
range
92:20, 96:1, 96:18, 98:21, 102:13, 106:22, 108:6
rare
237:3
rate
14:21, 14:24, 14:25, 15:1, 15:2, 15:3, 15:7, 15:8, 15:15, 16:20
rates
15:6, 16:12, 16:17
rather
222:9
ratio
239:12
re-plug
244:7
reach
27:5, 27:13
reaches
117:6, 119:3, 119:6, 119:7, 119:12, 119:22, 120:8, 120:13, 120:17, 122:7, 122:12, 122:14, 122:17
read
26:11, 27:5, 27:13, 27:21, 28:5, 28:14, 36:5, 74:23, 74:25, 148:11, 149:6, 165:10, 166:5, 176:16, 176:21, 191:11, 191:15, 200:6, 220:13, 248:19, 258:12, 258:16, 259:15, 260:6, 260:10, 261:11, 262:5, 262:8, 262:19, 275:6, 281:1
reader
10:2, 10:18
reading
108:2, 110:20, 123:1, 140:15
reads
136:9, 137:5, 174:3, 203:12, 212:14, 223:25, 225:15, 233:7, 233:15, 242:16, 244:25, 248:4, 248:20, 252:11, 253:9
ready
53:8, 173:7, 222:4
real
50:1, 96:13, 210:10
real-time
151:3
realism
242:19
realistic
243:1, 248:6
reality
4:14, 39:6, 45:7, 46:6, 58:3, 96:13, 112:6, 113:23, 114:8, 114:17, 114:22, 115:1, 190:3, 190:10, 190:22, 192:15, 192:20, 193:1, 193:13, 195:13, 195:19, 195:25, 196:6, 211:9, 223:1, 226:19, 229:1, 229:5, 229:10, 229:19, 230:1, 230:7, 238:8, 244:25, 248:4, 253:9
really
22:4, 40:15, 48:5, 49:16, 49:17, 54:7, 62:19, 89:8, 103:14, 105:3, 121:8, 123:16, 165:9, 171:6, 197:17, 232:13, 244:6, 256:8
reason
26:4, 26:7, 49:17, 49:19, 125:7, 238:20, 248:20
reasonable
19:8, 157:13
reasonably
87:6
recall
13:25, 16:19, 17:15, 17:22, 18:2, 18:25, 20:12, 21:12, 21:15, 22:5, 22:19, 22:22, 23:19, 23:21, 24:10, 39:24, 40:1, 40:16, 41:19, 44:1, 47:22, 48:4, 48:5, 48:9, 49:2, 55:23, 59:21, 70:8, 75:4, 75:6, 86:15, 92:12, 95:6, 95:12, 95:16, 96:21, 97:20, 97:25, 98:3, 98:15, 98:21, 125:4, 128:8, 129:19, 136:21, 136:22, 146:8, 152:10, 152:22, 153:2, 153:4, 208:18, 208:19, 232:18, 267:24
recalling
152:24
received
29:9
receiver
51:18, 51:23, 52:17, 97:14, 121:14, 189:15, 232:14
receivers
232:21
receiving
177:2, 194:8

recent
249:18
recently
13:10, 246:13
recess
50:8, 82:5, 113:9, 147:9, 182:3, 221:14, 244:12, 255:9
recitations
139:6, 139:8
recite
72:15, 72:17, 72:22, 151:5, 200:9
recited
138:8, 140:3, 140:6, 140:12, 140:18, 141:6, 146:5, 146:14, 148:14, 148:20, 148:25, 152:17, 153:13, 154:15, 155:13, 156:23, 157:8, 159:9, 160:4, 162:15, 163:6, 163:15, 163:25, 164:1, 176:19, 177:11, 177:23, 178:6, 178:22, 179:5, 179:20, 180:5, 184:14, 185:1, 186:6, 186:14, 186:23, 196:24, 197:8, 197:14, 197:15, 198:15, 199:3, 199:7, 201:4, 201:14, 201:22, 201:25, 202:12, 203:19, 203:25, 204:11, 204:20, 204:22, 205:8, 205:16, 205:17, 206:5, 213:8, 213:17, 214:1, 214:3, 214:11, 214:13, 215:5, 219:1, 219:21, 220:6, 220:17, 221:4
recites
147:24, 164:12, 164:25, 166:17, 186:15, 187:25, 206:8, 219:23
recognition
166:25
recognize
10:21, 11:13, 173:10, 183:3, 187:16, 199:22, 202:24, 212:4
recognizing
174:16, 174:17
recollection
93:20
recommend
181:7
recommended
86:25
reconvene
254:21
record
7:6, 8:21, 12:2, 36:16, 50:1, 50:5, 50:7, 50:10, 55:7, 81:25, 82:4, 82:7, 113:4, 113:8, 113:11, 146:24, 147:8, 147:11, 181:25, 182:2, 182:5, 191:15, 221:9, 221:13, 221:16, 244:9, 244:11, 244:14, 246:13, 254:1, 254:5, 254:10, 255:3, 255:5, 255:8, 255:11, 276:23, 280:14, 280:22, 283:6
recorded
115:8, 115:22, 115:24, 116:1, 125:21
recording
29:8, 57:19, 116:12
records
20:7, 20:23
redirect
259:23, 260:16, 261:18, 262:15, 263:3, 263:17, 275:5, 276:13, 276:15, 276:20
redirected
209:11, 211:15
reduced
283:9
reduction
105:3, 109:8, 120:21
redundant
237:10, 237:17, 238:2, 238:12
refer
9:22, 26:15, 53:7, 79:14, 84:16, 86:17, 94:19, 112:25, 115:8, 118:24, 138:14, 145:20, 167:12, 204:25, 205:2, 213:20, 274:5
reference
95:22, 116:15, 181:17, 181:20, 181:21, 208:16, 222:11, 222:22, 223:15, 228:22, 229:11, 229:25, 230:6, 233:7, 234:11, 235:8, 237:7, 240:22, 241:24, 248:4, 250:2, 250:19, 253:5, 263:12
references
56:4, 56:6, 56:9, 56:11, 57:18, 59:11, 93:20, 137:24, 139:16, 144:22, 264:8, 264:19
referred
26:15, 41:5, 63:23, 78:16, 80:21, 123:13, 124:14, 159:8, 165:7
referring
14:6, 36:24, 40:8, 52:9, 56:9, 60:11, 67:14, 70:22, 74:25, 76:4, 79:23, 85:13, 98:4, 136:20, 139:5, 140:12, 140:14, 140:15, 150:25, 151:1, 210:11, 216:17, 222:16, 228:11, 230:15, 237:16, 237:19, 247:5, 273:8, 273:13
refers
124:11, 202:3, 202:4
reflected
263:23
reflection
120:5
reflections
180:10
reflects
13:19
regarding
22:21, 73:13, 138:7, 178:17, 185:16
regards
261:24, 263:20
registered
42:25
regular
280:15

Meta Platforms, Inc.
Exhibit 1095
Page 119

regulations
5:8
relate
131:3, 136:23
related
33:7, 53:11, 53:16, 54:4, 116:19
relating
270:16, 270:23, 271:10
relationship
66:3, 88:8, 90:24, 131:11, 185:17, 213:22
relative
50:18, 64:15, 238:17, 239:9
relatively
200:7
relevance
45:3, 254:15
relevancy
27:10, 27:18, 27:25, 28:18, 28:24, 43:11, 45:19, 46:17, 135:17
relevant
43:15, 45:10, 47:10, 264:15
relied
198:15
relying
43:25
remain
248:22
remember
13:24, 17:23, 21:13, 21:16, 22:3, 45:13, 98:11, 98:23, 99:1, 125:22, 126:2, 129:11, 130:21, 145:25, 146:2, 146:3, 151:25, 185:19, 193:20, 216:12, 239:11, 256:24, 257:2, 257:5, 258:1, 267:18, 267:20, 268:5, 268:21, 269:11, 271:15, 272:2
remembered
5:1
remind
52:9
remote
1:22, 6:9, 7:22, 8:7, 9:16
remotely
6:11
remove
80:16
render
61:22, 67:11, 67:17, 118:18
rendered
141:20
rendering
74:4, 162:3, 170:9
rené
7:7
repeat
16:7, 28:1, 34:1, 46:19, 54:16, 61:1, 101:3, 114:3, 117:15, 163:23, 170:23, 247:13, 271:6, 277:24
repeated
271:7
repeating
101:11
rephrase
155:6, 156:13, 241:7, 241:9
reply
4:5
report
8:20, 255:13
reported
133:13
reporter
1:32, 5:4, 6:18, 6:20, 15:23, 32:9, 34:1, 37:17, 37:20, 39:17, 39:20, 41:1, 43:5, 43:7, 45:23, 46:1, 49:5, 49:9, 49:15, 51:2, 55:1, 60:22, 113:1, 113:3, 114:3, 118:10, 121:19, 130:3, 130:6, 130:9, 131:13, 131:17, 131:21, 134:5, 142:3, 142:22, 146:17, 146:20, 158:1, 158:5, 158:11, 161:2, 161:7, 170:22, 170:25, 181:23, 191:3, 191:14, 191:19, 230:22, 230:25, 231:3, 244:5, 247:13, 247:17, 279:13, 280:13, 280:17
reporter's
3:17, 283:1
represent
6:12, 37:4, 64:21, 67:10, 67:22, 69:5, 69:15, 248:21
representation
111:21, 243:1
representative
245:2
representing
6:10, 6:19, 21:25
represents
13:21, 29:20, 64:10, 64:11, 66:25, 67:8, 148:4
reproduction
115:8, 115:23
republication
181:1
republish
181:3
reputation
24:12
request
56:16, 283:20
requested
283:12
require
174:12
required
162:21, 217:9, 218:9, 219:9
requiring
245:2
research
17:22, 39:12, 40:3, 40:5, 40:18, 57:17
researched
41:25
researcher
46:23
resort
149:1, 177:13, 184:16
resorted
203:24
resorting
179:20, 196:25, 198:9, 201:5, 203:19, 213:9
respect
27:1, 70:24, 186:21, 260:12
responded
167:7
responding
270:5
response
30:20, 56:16, 63:5, 63:8, 65:9, 134:21,

Meta Platforms, Inc.
Exhibit 1095
Page 120

177:3, 246:18
responses
62:5, 62:7, 62:8, 62:11, 62:13, 63:9, 251:12, 251:15
responsible
117:6
responsive
141:3, 278:21
rest
148:14, 176:19
restart
118:13
restarted
44:13
restate
92:6, 113:18, 113:20, 144:18, 178:20, 188:25, 224:9, 254:23
restricted
104:21
restrictive
57:25
result
157:10, 217:15, 227:19, 283:14
resulting
68:13
retained
14:23, 17:18, 17:24
retention
15:17, 16:14
reverberation
64:24, 65:11, 65:14, 65:15, 119:14, 120:2, 242:14, 243:5, 243:11, 243:15, 244:4
reversal
228:2
reverse
68:22
review
23:13, 98:7, 166:8, 264:6, 264:18, 283:12, 283:14
reviewed
18:18, 18:20, 22:9, 22:11, 22:13, 22:17, 23:1, 23:2, 23:5, 23:11, 23:16, 23:18, 23:20, 24:17, 70:14, 95:12, 184:15, 264:3, 264:7, 283:21
reviewing
18:22, 18:23, 19:16, 19:19, 19:21, 23:7, 70:5, 71:1
rhetorical
76:24
right-hand
222:20
ring
129:13
river
250:12
road
25:14
roger
63:7
roland
150:8, 150:17
roll
230:19, 230:23, 230:24, 231:13, 232:8
rolls
231:4
room
31:25, 96:20, 107:18, 117:7, 118:25, 119:12, 119:24, 120:6, 122:8, 122:10, 128:10, 137:7, 180:8, 259:4, 260:2
rooms
109:16
root
265:4, 274:23
rotate
231:12
rough
280:15
roughly
93:12, 97:20
routines
250:20
rubric
40:17
rule
170:12
rules
25:13, 73:9, 73:11, 73:19, 73:24, 73:25, 283:5, 283:15, 283:21
run
250:19

S

s-l-a-b
151:18
s-p-e-c-t-r-a-l
247:15
safely
19:12
said
5:3, 5:6, 19:18, 22:13, 23:15, 27:23, 28:6, 28:15, 36:10, 42:16, 43:4, 43:23, 64:7, 68:9, 72:20, 82:9, 84:8, 97:7, 99:18, 100:24, 107:7, 107:11, 110:14, 120:3, 123:20, 130:3, 130:18, 130:24, 131:14, 131:17, 133:16, 134:5, 146:17, 148:7, 150:25, 158:2, 158:5, 158:8, 167:12, 167:21, 169:12, 169:22, 169:24, 180:24, 182:9, 191:16, 227:15, 230:23, 236:3, 254:5, 264:2, 264:3, 283:7, 283:12
salter
29:16, 29:18, 29:22, 29:25, 30:8, 30:12, 30:18, 31:19, 31:22
sam
35:21
same
17:5, 17:25, 25:15, 28:9, 28:19, 28:22, 32:18, 38:19, 47:4, 47:5, 48:24, 49:12, 50:13, 54:22, 63:11, 72:1, 74:4, 74:14, 74:18, 74:25, 76:16, 77:17, 80:23, 102:21, 115:11, 134:10, 137:7, 139:4, 141:11, 150:4, 153:16, 167:6, 167:24, 181:5, 185:15, 195:1, 195:2, 197:10, 198:21, 201:18, 204:3, 213:20, 216:3, 217:14, 223:23, 225:11, 232:22, 236:12, 236:21, 242:11, 243:14, 258:20, 258:25, 259:4,

260:2, 260:24, 263:8, 263:9, 263:10, 265:17, 266:3, 266:15, 267:1
san
29:4
santa
29:10
santiano
2:23, 6:9
save
9:17
saw
35:23, 98:16, 137:13, 231:11, 264:19
say
13:11, 18:21, 19:12, 23:24, 31:24, 34:17, 35:1, 38:5, 39:12, 40:2, 41:1, 41:3, 46:10, 48:6, 50:22, 52:25, 54:24, 56:3, 56:9, 60:6, 60:8, 64:10, 65:13, 65:16, 78:7, 80:16, 82:12, 85:9, 88:6, 89:2, 89:8, 90:12, 91:2, 91:13, 92:21, 97:15, 100:12, 104:13, 104:14, 107:15, 108:9, 108:17, 109:9, 109:16, 109:19, 110:15, 112:1, 121:13, 122:11, 130:7, 134:6, 142:20, 142:21, 148:8, 154:10, 159:1, 159:5, 159:15, 160:6, 162:9, 163:3, 166:15, 168:14, 169:4, 172:9, 175:15, 179:17, 191:4, 208:5, 217:12, 224:17, 230:23, 231:20, 234:12, 236:24, 239:9, 242:3, 247:4, 247:6, 248:15, 251:15, 251:20, 256:8, 261:20, 264:5, 264:9, 273:25, 279:20
saying
26:20, 39:17, 74:13, 120:21, 120:24, 134:9, 136:16, 137:23, 137:24, 138:19, 139:10, 142:4, 156:16, 191:8, 227:15, 248:17
says
56:6, 136:13, 148:16, 166:1, 166:10, 214:5, 222:15, 222:17, 222:19, 222:20, 250:22, 259:2
scaled
133:7
scene
39:5
scientific
94:15
scope
27:9, 27:17, 28:24, 45:3, 45:19, 46:17, 47:9, 47:18, 48:2, 48:11, 48:20, 50:16, 51:6, 51:14, 52:5, 52:14, 56:23, 188:8, 229:14, 229:20, 230:8, 239:6, 258:14, 259:21, 260:13, 261:16, 262:12, 263:1, 263:15, 264:25, 265:9, 275:5, 277:15, 280:3
scott
40:22, 41:10
screen
8:9, 10:14, 10:19, 49:22, 124:18, 125:16
scroll
223:19
second
136:8, 143:16, 147:25, 148:4, 148:5, 148:7, 158:17, 162:11, 164:15, 165:21, 166:8, 177:4, 184:4, 186:20, 197:23, 200:6, 200:20, 200:21, 201:14, 201:23, 226:1, 253:8, 260:1
seconds
118:12
section
5:8, 216:19, 223:24, 267:21, 267:22, 268:6, 268:8, 268:22, 268:24, 269:12, 272:3, 283:5, 283:14, 283:21
sections
56:10
security
30:2, 30:14
see
9:7, 9:11, 9:13, 10:11, 10:20, 10:24, 12:18, 21:10, 35:17, 44:7, 82:1, 87:6, 90:14, 91:3, 91:6, 91:7, 108:3, 112:11, 117:1, 117:9, 127:23, 137:7, 143:5, 143:25, 147:21, 148:16, 164:11, 164:19, 164:25, 166:6, 166:13, 166:20, 173:3, 174:3, 174:9, 174:22, 175:11, 175:13, 178:16, 183:16, 183:18, 184:2, 184:4, 187:25, 188:5, 198:1, 200:19, 201:1, 203:15, 206:7, 206:10, 206:22, 212:17, 216:21, 222:22, 223:4, 223:7, 223:8, 223:24, 225:11, 225:15, 225:20, 229:4, 230:4, 230:13, 231:23, 233:2, 233:9, 233:18, 234:2, 234:3, 237:7, 242:11, 242:13, 243:13, 243:19, 244:19, 244:21, 245:3, 247:25, 248:8, 248:10, 248:25, 250:14, 251:9, 252:7, 253:6, 253:12, 255:18, 260:25, 261:13, 262:16, 262:24, 263:4, 263:9, 263:19, 263:21, 264:8, 269:13
seeing
90:16, 95:13, 136:21, 145:13, 236:23

seem
74:24, 95:22, 104:23
seemed
155:7
seemingly
233:18, 234:19, 235:9, 236:3
seems
73:16, 74:22, 88:5, 163:9, 165:22, 166:3, 214:15, 231:21, 250:12
seen
24:14, 27:24, 28:8, 28:16, 95:16, 143:17, 231:18, 277:14
seldom
225:16
select
47:21, 195:20, 196:1, 196:7, 239:25
selecting
50:19
selection
239:23
semaphore
71:21
sense
48:15, 58:10, 80:6, 165:5, 193:14, 209:13, 233:8, 236:22, 242:19, 269:1
sensed
193:22
sensor
44:2, 193:25, 194:2, 232:3, 232:9
sensors
43:1, 43:23, 44:3, 230:1, 248:7
sentence
136:8, 136:14, 136:20, 137:2, 137:4, 137:21, 223:25, 225:15, 225:20, 226:2, 226:3, 226:4, 226:6, 227:5, 228:11, 233:6, 233:15, 234:15, 235:15, 237:8, 237:21, 242:16, 243:13, 244:24, 244:25, 248:3, 248:19, 252:8, 252:11, 253:8, 261:7, 261:9
sentences
244:21
separate
10:1, 192:7, 193:4, 232:15, 247:4, 247:16
separately
247:2
separation
234:14
sequence
64:9, 64:11, 67:7, 67:9, 67:15
series
160:12, 256:24, 257:6, 264:11
served
143:9, 238:24, 269:23
services
15:16, 16:13
set
21:2, 48:25, 73:2, 73:7, 73:18, 210:23
sets
134:16, 134:17
setting
210:10, 238:8
settings
112:7
settled
16:17
seven
28:22
several
124:17, 126:16, 151:14, 217:20, 259:6, 278:5
shadow
134:22
share
10:14
sheet
4:6, 7:16, 8:22, 11:4, 11:14, 11:18, 255:20
shift
67:16, 112:19, 123:18, 123:20, 266:21
shifting
64:14, 64:16
ship-to-shore
79:13
shoe
239:24
shorthand
5:4, 26:15, 26:18
should
8:3, 8:5, 9:9, 18:21, 38:4, 85:9, 92:20, 100:12, 109:9, 121:10, 160:6, 169:4, 181:11, 182:20, 199:18, 222:4, 261:20
shouldn't
55:4
shout
94:14
shouted
93:18, 103:22
shouting
92:18, 92:23, 93:8, 94:8, 95:9
show
8:12, 8:14, 274:3
shown
156:15
shuttle
237:25
sickness
249:25
side
126:24, 174:20
sight
200:18
sign
282:7
signal
34:10, 37:22, 38:6, 58:14, 58:20, 59:6, 59:13, 63:17, 64:12, 65:18, 67:11, 69:9, 122:5, 135:23, 140:9, 151:3, 153:23, 153:24, 157:2, 157:11, 159:3, 159:14, 169:17, 200:22, 201:24, 202:3, 202:6, 202:11, 203:12, 204:10, 204:16, 204:21, 204:25, 205:9, 205:17, 205:22, 206:4, 212:14, 214:3, 214:6, 214:13, 214:16, 214:17, 214:23, 214:25, 215:2, 215:7, 215:10, 215:11, 215:12, 215:14, 215:21, 215:22, 216:1, 216:4, 216:5, 216:7, 216:8, 216:10, 216:12, 216:19, 216:23, 217:3, 217:4, 217:10, 217:11, 217:18, 218:8,

218:17, 218:23, 219:3, 219:8, 219:16, 219:23, 220:2, 220:11, 220:19, 220:23, 221:4, 239:20, 266:7
signals
59:20, 61:24, 71:21, 80:15, 81:10, 167:15, 265:19, 266:18
signature
256:2
signature-mig2k
283:30
similar
26:23, 178:19, 186:21, 199:1, 204:4, 213:21, 240:6
similarities
57:9, 58:2
similarity
266:16
similarly
184:5
simple
246:22
simplified
120:24
simply
122:4, 246:5
simulate
65:15, 244:1, 244:2, 245:19
simulation
180:8, 208:4, 243:3, 243:6, 243:15
simultaneous
58:21
simultaneously
277:6
since
8:10, 12:19, 74:17, 79:25, 231:9, 231:18, 249:7
single
115:8, 134:12, 172:6, 172:19, 225:16, 226:12, 267:4
single-ear
225:6
sir
136:25
sit
89:16
sits
216:10
sitting
7:9, 7:10, 80:25, 81:18, 87:19, 88:2, 88:6, 88:7, 98:10, 168:2, 214:18, 261:1
situation
110:13, 117:23, 207:23, 207:25
situational
237:21
situations
114:21, 234:8, 237:11
six
40:24, 130:2, 230:15, 231:16, 232:10
six-degree-of-fr-eedom
230:13, 231:10, 231:25
six-degrees-of-f-reedom
230:3, 230:14
sixth-degree-of--freedom
231:6, 231:18
size
128:9, 239:24
skill
142:12, 142:21, 148:23, 149:1, 149:10, 154:11, 155:1, 175:19, 177:9, 177:12, 177:21, 178:5, 179:18, 180:4, 184:13, 184:16, 184:24, 185:11, 196:22, 197:8, 198:8, 198:15, 201:2, 201:12, 203:17, 203:24, 206:11, 206:14, 213:7, 213:17, 217:8, 241:13, 241:18, 253:17, 254:24
skilled
73:13, 73:17, 149:17, 170:8
skipped
25:13
sky
44:7
slab
151:18, 180:17
slip
142:21
slow
90:23
slp
37:10, 149:19, 152:16, 158:18, 160:4, 162:12, 174:6, 177:3, 177:4, 186:4, 200:15
slps
36:20, 159:9
smart
266:8
smartphone
175:7, 175:10
smoke
44:15, 71:21
snap
85:10
software
8:8, 35:5, 138:15, 139:13, 149:3, 149:16, 150:15, 151:2, 151:14, 151:19, 151:20, 151:24, 152:1, 152:9, 152:24, 153:20, 154:13, 157:1, 157:12, 159:10, 159:22, 160:24, 161:15, 177:15, 177:23, 178:4, 178:17, 179:22, 180:3, 184:18, 185:4, 185:10, 197:2, 197:6, 198:11, 198:13, 201:6, 201:11, 203:21, 203:23, 204:24, 205:1, 213:11, 213:15, 215:15, 250:20, 257:10, 257:18
software-based
150:20
solid
141:17
solution
204:17
solutions
151:21, 152:14
some
11:19, 12:19, 12:20, 19:18, 21:19, 23:10, 23:16, 33:22, 34:8, 39:15, 40:11, 42:7, 44:18, 46:4, 46:24, 48:5, 48:18, 49:16, 49:19, 53:20, 55:3, 55:5, 56:4, 60:24, 62:14, 68:7, 68:23, 90:10, 93:19, 100:16, 108:2, 116:2,

116:16, 118:12, 119:20, 123:22, 125:19, 128:20, 131:25, 132:20, 133:8, 133:10, 133:13, 134:15, 136:21, 138:3, 143:7, 148:13, 153:20, 153:21, 158:21, 160:3, 160:5, 168:21, 171:11, 180:16, 189:14, 189:17, 194:9, 204:16, 206:24, 208:3, 221:7, 229:9, 229:22, 235:1, 239:12, 239:18, 239:23, 239:25, 240:1, 243:9, 246:3, 246:9, 246:11, 248:14, 249:16, 249:18, 249:20, 264:1, 264:2, 264:20, 265:20, 273:6, 275:8
somebody
43:21, 90:11, 90:13, 91:1, 98:19, 101:23, 107:17, 108:18, 109:22, 111:9, 122:19, 133:7, 149:13, 161:18, 224:19, 225:6, 225:7
somebody's
114:1
somehow
35:7, 87:16, 115:1, 125:10, 245:1
someone
35:5, 92:23, 93:4, 156:17, 161:17
something
27:23, 28:7, 28:16, 32:19, 40:7, 46:6, 49:25, 52:3, 52:13, 54:9, 62:21, 89:4, 92:19, 94:9, 96:21, 97:23, 98:12, 98:13, 98:16, 99:13, 102:10, 103:7, 103:9, 103:15, 107:7, 112:11, 113:19, 115:22, 123:15, 127:21, 152:22, 155:2, 159:13, 161:3, 166:12, 166:23, 169:18, 172:7, 172:8, 179:8, 180:7, 189:16, 214:16, 232:4, 237:23, 237:25, 240:15, 249:24, 253:6, 274:7, 278:18
something's
114:13
sometime
17:15
sometimes
51:20, 70:12, 79:13, 84:17, 121:4, 123:18, 125:9, 126:24, 127:8, 204:25, 205:1, 207:17, 247:1, 266:10
somewhere
19:12, 20:17, 25:3, 43:22, 96:2, 112:12, 250:22
sorry
9:25, 15:21, 15:23, 23:25, 32:9, 34:1, 37:17, 39:17, 41:1, 47:11, 49:5, 49:15, 51:2, 56:8, 61:12, 66:7, 70:12, 71:4, 72:17, 76:24, 90:23, 96:9, 97:7, 97:16, 103:1, 110:18, 112:15, 113:1, 114:1, 118:6, 118:10, 127:19, 129:11, 130:3, 131:13, 131:24, 137:24, 138:22, 142:3, 143:21, 144:16, 144:18, 144:19, 149:23, 150:24, 151:4, 154:20, 155:18, 158:1, 161:2, 163:20, 170:22, 179:1, 182:8, 182:10, 183:24, 186:8, 186:11, 190:7, 191:1, 192:11, 211:2, 217:8, 220:8, 222:17, 225:4, 228:18, 230:22, 233:25, 247:13, 257:13, 259:9, 266:21, 275:25, 277:10, 277:24, 277:25, 279:11
sort
8:9, 9:23, 10:7, 25:13, 26:14, 33:11, 33:22, 43:3, 73:19, 76:14, 92:19, 94:8, 96:21, 103:9, 116:2, 120:5, 123:21, 167:7, 168:21, 171:8, 189:14, 189:18, 194:9, 208:4, 226:19, 237:15, 237:23, 240:18, 273:6, 275:8, 278:6
sorts
16:20
sound's
81:7
sounded
54:25, 127:1, 142:3, 158:7, 230:23
sounds
9:1, 10:17, 12:9, 12:10, 13:2, 19:8, 25:22, 34:21, 48:14, 48:15, 48:25, 49:1, 49:2, 49:7, 84:14, 84:15, 84:19, 84:20, 84:21, 84:23, 84:25, 85:8, 85:9, 85:16, 85:17, 85:19, 85:22, 96:25, 99:19, 99:20, 99:24, 107:23, 113:23, 114:7, 114:17, 114:21, 114:25, 125:13, 127:4, 161:22, 165:6, 167:14, 167:15, 170:2, 171:11, 171:14, 207:16, 207:24, 208:14, 209:1, 209:4, 233:17, 234:9, 234:19, 235:9, 235:20, 235:23, 245:1, 246:6
source
50:18, 85:12, 97:14, 112:2, 117:8, 120:15, 126:22, 127:7, 132:6, 132:11,

Meta Platforms, Inc.
Exhibit 1095
Page 125

132:17, 133:19, 134:4, 225:12, 225:16, 226:13, 226:14, 250:4
source-medium-receiver 223:22
sources 35:10, 48:1, 48:6, 48:23, 49:11, 50:13, 85:13, 225:18, 225:23, 226:8, 226:12, 226:15, 226:25, 227:21, 228:13, 248:22, 251:7
space 14:10, 35:7, 36:3, 38:24, 171:12, 203:14, 204:9, 210:24, 237:25, 248:23, 250:4, 264:13
spatial 34:11, 34:21, 35:1, 35:6, 38:12, 38:14, 38:18, 53:3, 53:12, 53:16, 53:24, 54:12, 54:20, 55:10, 56:22, 57:20, 58:7, 63:19, 63:22, 64:4, 67:11, 67:17, 111:5, 111:17, 112:1, 150:7, 160:7, 161:21, 161:25, 162:3, 209:2, 210:16, 223:25, 224:2, 225:16, 225:17, 225:22, 226:10, 226:21, 227:17, 235:22, 248:24
spatialization 250:19
spatialized 118:18, 153:18, 207:4, 207:12, 240:25, 241:12, 241:19, 250:25, 253:21, 255:1
spatializing 180:9
spatially 34:15, 34:17, 170:14, 224:21
speak 32:11, 57:17, 94:14, 107:21, 124:4, 166:25, 276:23
speaker 34:24, 98:20, 102:14, 103:22, 114:13, 124:17, 125:16, 127:2
speaking 57:24, 60:3, 62:22, 92:23, 97:16, 97:17, 101:23, 102:19, 110:16, 111:3, 121:11, 166:24, 181:16, 226:21, 239:16
specialized 110:12, 160:24, 161:15, 215:16, 266:13
specific 30:25, 48:22, 54:8, 54:11, 54:19, 54:25, 55:9, 56:10, 56:11, 78:5, 78:8, 79:14, 89:17, 90:15, 95:13, 99:1, 100:6, 109:8, 111:8, 114:22, 120:3, 125:7, 137:23, 137:25, 143:25, 144:22, 146:1, 146:3, 151:24, 152:25, 205:2
specifically 11:20, 21:20, 30:10, 30:21, 48:4, 53:15, 53:24, 123:12, 125:24, 136:5, 136:17, 144:14, 158:23, 193:17, 208:5, 209:12, 217:22, 218:16, 252:8, 254:13, 263:20, 268:2, 268:13, 273:22
specification 261:15, 266:23, 274:19
specifications 136:10, 136:19, 136:21, 137:6, 146:12, 272:25
specificity 20:20
specify 282:6
spectra 62:24
spectral 63:17, 245:21, 247:8, 247:15
spectrum 120:18
speculate 111:7, 209:16
speculation 45:22, 45:25, 46:18, 48:12, 51:6, 51:14, 52:15, 59:1, 195:21, 211:1
speech 81:14, 91:25, 92:1, 92:12, 92:14, 92:16, 93:3, 93:7, 93:8, 93:12, 93:22, 93:23, 94:16, 94:22, 94:24, 94:25, 95:21, 96:10, 96:18, 96:24, 97:5, 97:6, 97:8, 97:9, 97:13, 98:17, 98:18, 102:4, 102:5, 102:6, 102:18, 103:7, 103:18, 103:19, 104:22, 105:1, 106:13, 106:15, 106:16, 106:21, 106:24, 106:25, 107:10, 107:19, 108:1, 108:13, 108:18, 108:25, 109:4, 109:7, 109:21, 110:1, 110:5, 110:9, 110:15, 110:21, 110:25, 122:25, 125:8, 125:18, 127:22, 128:1, 165:23, 166:3, 166:11, 166:12, 166:22, 167:4, 167:14, 168:22, 170:10, 174:16, 174:17, 230:3, 259:25, 261:24, 265:19, 266:18
speech-like 167:14
speed 219:17, 220:3
spell 43:5, 45:13
spelling 142:23
spencer 2:3, 6:17, 15:4, 15:5
spend 19:24, 20:1, 20:5, 70:5,

70:20
spent
18:23, 19:15, 19:19, 19:21, 19:23, 20:3, 20:7, 20:10, 20:17, 20:21, 70:18, 71:1
spherical
128:24, 132:7, 132:12, 246:11, 246:18
splash
45:8
split
8:9, 10:19
spoke
272:23
spoken
21:23, 22:4, 25:10
spread
116:14
staff
171:25
stand
9:7, 10:3, 11:5, 39:23, 62:25, 63:7, 174:24, 187:12, 199:17, 200:11, 202:21, 211:23, 222:1, 231:13, 242:2, 242:7
standard
5:2, 6:7, 14:25, 15:1, 15:7, 15:8, 152:24, 280:25
standardizing
152:22
standards
93:24
standing
261:1, 280:18
standpoint
108:18, 118:21, 121:3, 139:4
stands
129:10
start
105:2, 109:7, 118:16, 142:11, 158:4, 224:24, 277:10
starting
6:13, 93:25
starts
184:1, 228:25
state
5:4, 6:12, 6:23, 7:5, 47:11, 55:20, 140:20, 187:1, 201:18, 273:20, 281:4
stated
65:23, 100:13, 114:17, 154:18, 163:11, 163:20, 215:18, 261:5
statement
99:18, 148:16, 188:10, 233:11, 234:1, 234:2, 234:3, 234:7, 242:21, 242:23, 243:21, 245:8, 245:10, 248:12, 249:4, 250:16, 259:24, 260:17
statements
14:15
states
1:1, 4:7, 4:8, 4:9, 4:10, 4:11, 4:12, 4:13, 6:4, 145:18, 173:12, 183:4, 187:18, 199:24, 203:1, 212:6, 261:19, 265:13, 280:8, 283:26
static
264:24
stating
36:11
stay
209:18
stenographic
1:32, 15:23, 32:9, 34:1, 37:17, 37:20, 39:17, 39:20, 41:1, 43:7, 45:23, 46:1, 49:5, 49:9, 49:15, 51:2, 60:22, 113:1, 114:3, 118:10, 130:3, 130:6, 130:9, 131:13, 131:17, 131:21, 134:5, 142:3, 146:17, 146:20, 158:1, 158:5, 158:11, 161:2, 161:7, 170:22, 170:25, 181:23, 191:3, 191:14, 191:19, 230:22, 230:25, 231:3, 244:5, 247:13, 247:17, 279:13, 280:13, 280:17
stenographically
283:8
steps
139:8, 257:1, 257:10, 257:18
stereo
115:10, 116:4, 116:10, 116:12, 175:24, 190:14, 208:23, 209:5
still
18:21, 25:25, 40:16, 53:21, 53:23, 97:15, 103:15, 106:20, 145:13, 153:9, 163:16, 164:10, 181:8, 186:6, 206:7, 255:14, 262:19
stimuli
123:17, 124:9, 125:6, 125:11, 125:12, 125:14, 161:1
stimulus
123:18, 123:19, 123:21, 124:15, 124:16
stop
53:11, 91:16, 257:13
stopped
54:1, 54:4
storing
206:8, 206:12, 206:15
straightforward
158:14
strange
88:5
strap
192:3
streams
193:4
street
2:6, 2:15
strictest
240:16
strictly
12:6
strike
26:12, 52:25, 128:24, 131:25, 134:14, 154:21, 164:8, 205:5, 228:10, 233:5, 241:9, 269:18
strived
132:10
structure
140:7, 161:19, 161:20, 218:21
structures
138:21, 139:5, 139:11, 140:10, 141:13, 141:16, 141:25, 143:20,

Meta Platforms, Inc.
Exhibit 1095
Page 127

149:2, 153:11, 154:12, 177:14, 177:22, 178:4, 179:21, 180:2, 184:17, 185:3, 185:10, 196:25, 197:7, 198:10, 198:13, 201:5, 201:11, 203:20, 203:23, 213:10, 213:15
studied
124:22
studies
39:11, 46:4, 46:20
study
46:23
stuff
16:5, 44:17, 171:10
style
248:16
subject
46:24, 102:5
subjective
90:9, 91:24, 92:11, 100:14
submit
20:9
submitted
14:11, 14:12, 14:14, 14:15, 70:23
subparagraph
116:25, 117:4
subparagraphs
117:1, 229:7
subsequent
227:13
subsequently
228:13
subsidiary
29:15, 30:8, 30:11
substance
56:2
subtitle
223:21
success
248:5
successful
44:13, 229:22
sufficiently
114:12
suggest
9:19, 10:1
suggested
139:18
suite
2:6
summing
64:15, 64:16
super
152:19
superlative
133:5
supplement
259:23, 260:15, 261:18, 262:14, 263:3, 263:17, 265:2, 265:10
support
4:4, 138:8, 138:12, 138:25, 140:3
suppose
175:3, 188:9, 219:17
supposed
12:2, 44:18
sure
8:13, 8:15, 16:16, 19:18, 21:22, 28:2, 28:4, 33:5, 33:18, 34:3, 36:12, 36:13, 36:15, 36:18, 36:20, 43:6, 43:19, 45:17, 47:14, 51:12, 52:11, 54:18, 55:19, 57:12, 60:11, 61:20, 64:9, 66:19, 67:3, 67:20, 68:10, 73:16, 82:1, 92:7, 92:9, 100:8, 103:14, 109:12, 109:14, 111:11, 111:15, 111:17, 114:5, 117:17, 118:7, 119:23, 122:11, 128:7, 130:16, 146:9, 146:24, 151:18, 152:4, 152:7, 154:9, 155:9, 159:8, 163:8, 166:5, 170:19, 170:21, 171:9, 176:11, 180:18, 189:2, 194:2, 194:6, 202:2, 208:18, 210:19, 212:22, 216:18, 220:15, 224:12, 224:24, 228:8, 244:8, 254:17, 267:15, 279:15
surprise
131:3
surprised
129:20, 130:16
swear
6:20
switch
134:16, 208:20, 209:1, 209:4
switching
208:22
sworn
6:23, 283:4
symbolic
207:16
synthesis
236:18
synthesized
134:19
synthetic
167:1, 167:3, 167:14, 168:22, 240:4
system
38:13, 38:15, 38:20, 39:2, 39:4, 39:6, 39:13, 39:15, 39:18, 40:3, 40:6, 40:7, 40:10, 40:17, 40:19, 40:21, 40:23, 41:8, 41:15, 42:4, 42:9, 42:14, 42:16, 45:1, 45:6, 46:6, 46:8, 46:10, 46:14, 46:16, 46:21, 46:25, 47:1, 47:4, 47:8, 47:15, 47:16, 51:1, 51:8, 51:16, 52:22, 63:24, 78:22, 79:4, 81:12, 134:12, 148:24, 150:20, 155:11, 156:17, 156:18, 166:25, 168:15, 171:5, 171:6, 174:5, 175:25, 177:10, 179:19, 184:25, 192:12, 193:20, 193:21, 196:23, 198:9, 210:7, 210:16, 213:8, 225:17, 225:22, 226:8, 226:10, 226:22, 227:7, 227:17, 227:18, 229:5, 229:10, 230:1, 231:24, 231:25, 238:16, 239:21, 242:18, 244:6, 253:10, 265:13, 277:11
systems
42:7, 45:7, 133:1, 134:9,

Meta Platforms, Inc.
Exhibit 1095
Page 128

134:15, 134:24, 135:3, 154:14, 178:18, 184:13, 185:12, 192:17, 192:19, 193:4, 193:18, 194:15, 201:3, 203:18, 208:25, 209:4, 209:10, 209:14, 209:18, 209:20, 209:21, 210:13, 210:22, 211:8, 229:1, 229:19, 230:7, 232:19, 235:22, 240:1, 240:25, 241:12, 241:20, 248:21, 249:15, 250:3, 250:14, 266:4, 266:6, 266:9

T

table
110:16, 255:21
take
8:15, 25:20, 34:15, 50:2, 51:22, 81:24, 89:6, 118:11, 146:22, 147:3, 159:2, 178:14, 181:24, 221:8, 231:19, 244:6, 253:25, 254:4, 254:20, 262:2, 262:4
taken
50:8, 82:5, 113:9, 126:17, 147:9, 182:3, 221:14, 244:12, 255:9, 283:8
takes
193:6
taking
6:13
talk
36:21, 70:4, 77:23, 84:19, 95:17, 108:4, 116:18, 138:23, 152:21, 153:2, 153:5, 172:14, 215:10, 224:20, 227:17, 266:10
talked
124:8, 125:25, 191:22, 205:25, 275:11
talker
96:12, 96:23, 97:16, 97:17, 101:23, 102:3, 102:18, 103:3, 105:2, 111:22, 112:11, 261:2, 261:4
talkers
92:17, 95:23, 103:2, 107:22
talking
15:20, 15:24, 31:14, 31:15, 37:9, 37:11, 40:21, 52:6, 60:24, 71:5, 77:1, 77:23, 87:10, 91:9, 98:19, 99:24, 100:3, 101:19, 103:1, 104:5, 104:21, 107:10, 111:24, 111:25, 112:2, 118:11, 121:12, 122:18, 127:22, 131:25, 140:24, 142:16, 143:18, 143:19, 145:21, 150:12, 151:11, 153:13, 155:21, 156:4, 159:6, 164:14, 165:21, 166:8, 166:14, 166:18, 166:22, 166:24, 168:20, 190:16, 204:23, 215:13, 225:8, 227:16, 227:18, 228:12, 261:4, 274:21
talks
154:6, 166:13, 174:19, 252:4
target
238:23
task
150:4
tasks
178:19
taste
231:4
team
47:5, 245:11
technical
121:6, 121:7, 181:3
technically
62:22, 105:18, 105:25, 181:16, 208:2
technician
2:24, 9:7, 11:5, 49:25, 173:5, 182:20, 187:12, 199:17, 202:21, 211:23, 222:1, 222:4, 242:2, 242:7
technique
57:19, 116:2, 245:20
techniques
34:22, 68:3, 116:12, 138:15, 139:12, 139:18, 139:23, 140:8, 149:3, 154:13, 177:15, 177:22, 179:22, 184:18, 185:4, 197:1, 198:11, 201:6, 203:21, 213:11, 246:7
technologies
1:12
tele
75:20, 274:24
telecommunications
30:1, 30:14
telegraph
81:4
telephone
69:19, 70:1, 71:24, 72:10, 72:16, 72:18, 72:23, 74:3, 74:5, 74:10, 74:19, 75:15, 77:2, 77:5, 77:6, 77:8, 77:11, 77:18, 77:23, 78:6, 78:25, 79:3, 79:9, 79:12, 79:18, 79:22, 80:4, 80:10, 80:22, 81:2, 81:12, 81:15, 81:20, 166:20, 175:4, 183:17, 184:5, 224:3, 224:5, 224:13, 224:19, 225:6, 225:7, 262:24, 262:25, 263:4, 263:7, 263:13, 263:14, 263:21, 263:22, 265:12, 266:17, 272:13, 272:17, 272:21, 273:1, 273:10, 273:18, 273:21, 273:22, 273:23, 273:24, 274:1, 274:3, 274:6, 274:7, 274:9, 274:14, 274:18, 274:22, 275:2, 275:12, 275:16, 275:18, 275:23, 276:2, 276:5, 277:2, 277:3,

Meta Platforms, Inc.
Exhibit 1095
Page 129

277:11, 278:14, 278:17, 279:1, 279:3, 279:9, 279:20, 279:24, 280:9
telephones
78:12, 78:19, 80:1, 265:22
television
124:19
tell
15:1, 15:5, 16:3, 16:20, 19:20, 19:23, 20:24, 22:6, 65:4, 126:20, 133:5, 133:11, 226:4, 258:12
telling
74:17, 74:18
temperature
122:13
ten
19:3, 82:1, 147:3, 147:4, 147:5, 147:6, 152:4, 152:5
ten-minute
81:24, 181:24
tends
124:19
term
31:10, 32:17, 35:18, 36:22, 37:5, 37:15, 41:22, 57:16, 57:22, 57:24, 58:2, 74:11, 79:23, 86:16, 86:17, 89:17, 90:9, 91:24, 92:11, 95:4, 115:7, 120:1, 120:23, 121:6, 131:9, 132:15, 136:24, 148:11, 148:12, 155:2, 168:19, 176:17, 184:8, 191:17, 198:3, 200:13, 200:20, 211:15, 216:23, 256:4, 256:7, 262:16, 264:16, 267:5, 273:21, 274:1, 274:13
terms
13:12, 46:21, 57:25, 63:16, 69:18, 69:25, 70:1, 70:4, 70:13, 72:8, 72:13, 72:15, 72:17, 72:23, 73:25, 74:5, 74:9, 74:18, 74:20, 74:23, 75:2, 76:6, 86:23, 91:12, 93:3, 93:19, 100:14, 121:11, 136:9, 140:22, 141:12, 146:4, 146:13, 154:2, 154:7, 154:15, 165:2, 165:10, 165:25, 167:8, 167:18, 168:21, 176:14, 183:19, 185:16, 196:19, 198:5, 198:21, 200:9, 201:4, 201:14, 201:15, 201:22, 213:3, 213:21, 230:18, 230:20, 262:9, 262:24, 263:13, 263:19, 272:23, 273:9, 273:14, 273:16, 274:18
terrible
231:4
test
45:4, 112:14, 112:15, 157:2, 182:6, 182:8
tested
157:11, 210:14
testified
6:24, 52:20, 67:7, 267:5
testifying
12:25, 13:20, 15:13, 26:13
testimony
15:9, 26:5, 36:16, 138:17, 143:21, 258:22, 259:1, 259:5, 259:25, 260:18, 261:23, 264:1, 265:11, 267:2, 276:7, 276:9, 277:21, 278:1, 282:3, 282:5, 283:6
testing
33:11, 232:13
tests
73:15
texas
1:2, 6:5
text
181:4, 283:9
textbook
180:21, 180:25, 181:12, 181:16, 181:17
th
283:28
thank
37:20, 39:20, 41:5, 43:7, 44:25, 46:1, 49:9, 61:1, 130:6, 130:9, 131:21, 146:20, 158:11, 161:7, 161:12, 173:4, 191:19, 212:21, 222:3, 223:18, 225:10, 228:21, 230:25, 231:3, 232:24, 247:12, 247:17, 256:19, 256:21, 258:5, 280:18, 280:19
thanks
148:10
theatre
131:16
themselves
6:12, 140:13, 165:25, 230:21
theory
44:11
thereafter
283:9
therefore
36:6, 128:20, 274:10
therein
251:16, 283:9
thin
42:22
thing
33:11, 43:3, 45:15, 58:1, 74:4, 74:14, 74:18, 74:25, 80:23, 167:7, 175:5, 242:11, 249:22
things
10:16, 16:21, 23:10, 27:7, 27:15, 31:2, 31:14, 34:19, 34:25, 44:12, 44:14, 47:21, 60:9, 67:10, 83:18, 83:25, 84:9, 85:23, 99:18, 99:25, 100:5, 110:21, 119:6, 119:8, 119:18, 120:4, 124:7, 128:15, 128:20, 150:15, 152:8, 159:6, 160:12, 161:21, 165:6, 165:17,

165:25, 167:6, 170:2, 171:8, 176:25, 177:2, 178:20, 181:6, 208:6, 215:25, 229:23, 243:3, 248:16, 254:12, 264:12, 277:5, 278:6
thinking
40:9, 76:15, 193:21, 208:5, 209:20, 225:3, 225:5, 237:22
third
14:23, 21:3, 203:8, 203:11, 203:25, 204:20, 205:16, 206:3, 212:13, 212:24, 213:8, 214:1, 214:11, 215:6, 217:24, 223:25, 244:25, 263:22
thoroughly
28:11
thought
36:23, 44:22, 67:7, 96:5, 118:5, 146:21, 169:16, 231:9, 271:7, 278:16
threads
217:20, 217:22, 218:22
three
13:24, 13:25, 23:15, 25:3, 26:16, 26:21, 74:13, 76:6, 117:1, 136:9, 147:1, 229:7, 230:17, 230:19, 246:25
three-degree-of--freedom
232:6
three-dimensional
57:4
three-minute
146:22
through
9:18, 14:9, 14:23, 40:14, 42:6, 44:7, 45:6, 45:14, 54:6, 66:4, 78:11, 106:12, 116:1, 126:16, 127:7, 134:20, 135:22, 158:24, 159:16, 160:8, 171:4, 172:5, 175:12, 175:15, 175:20, 176:4, 209:22, 210:6, 210:8, 231:2, 233:24, 250:20, 257:22, 258:10, 260:6, 261:11, 264:11, 267:17, 268:4, 268:20, 269:10, 269:19, 276:6, 276:22, 281:2
throughout
8:17, 10:9, 12:1, 25:24, 36:24
throw
123:14, 123:16
tied
112:6, 248:5
time
5:3, 6:7, 6:8, 12:10, 17:17, 18:23, 20:7, 20:10, 20:21, 41:8, 41:24, 42:3, 44:5, 44:10, 45:15, 50:6, 50:9, 53:2, 59:4, 59:11, 61:11, 61:12, 61:14, 61:23, 62:1, 62:20, 62:23, 70:5, 70:20, 71:1, 82:3, 82:6, 93:17, 113:7, 113:10, 120:18, 122:2, 122:4, 132:20, 134:19, 147:7, 147:10, 150:11, 152:1, 153:7, 167:7, 182:1, 182:4, 189:8, 221:12, 221:15, 229:18, 230:6, 231:9, 235:16, 235:21, 237:25, 244:10, 244:13, 247:2, 247:9, 247:16, 249:16, 254:2, 255:7, 255:10, 256:20, 263:25, 264:24, 265:23, 269:16, 276:8, 276:11, 279:18, 280:21, 280:25, 283:9
times
12:21, 32:20, 32:24, 114:20, 126:13, 232:5, 280:4
tiny
102:8
title
22:19, 22:22, 29:13, 31:21, 222:25, 282:10
titled
30:11
today
6:9, 6:18, 7:9, 7:13, 9:19, 11:23, 21:8, 25:16, 26:6, 26:18, 36:12, 36:22, 37:2, 37:19, 43:16, 82:10, 143:9, 168:2, 172:13, 172:14, 172:15, 180:15, 214:19, 264:23, 267:23, 268:9, 268:22, 268:25, 269:4, 269:16, 271:19, 272:6, 276:7, 277:22, 278:1
today's
6:6, 24:20
together
31:21, 112:6, 244:3, 260:2
tokyo
82:24, 85:25, 86:7, 264:20
told
36:13
tone
101:24, 102:19, 102:20, 107:21
tones
207:17
took
113:13, 264:11
toolbox
140:8
top
51:16, 52:2, 52:12, 145:25, 173:15, 186:17, 200:2, 203:4, 205:11, 212:9, 218:4, 242:10, 242:11, 262:4
topic
22:22, 144:7, 235:12, 237:21
topics
69:21, 266:21
total
20:10, 40:6, 160:19
totality
36:8, 36:25
totally
8:16, 25:20, 37:3, 42:2,

46:12, 118:14, 188:14
towards
64:2, 107:5, 227:12, 262:4
track
43:23, 52:3, 188:23, 189:4, 189:7, 189:16, 190:3, 190:6, 192:7, 192:20, 193:18, 248:8
trackball
230:3, 231:7, 231:10, 231:12, 231:14, 231:19
trackballs
230:14
tracked
52:13
tracker
42:24, 44:5, 51:1, 51:3, 51:7, 52:8, 192:10
trackers
192:15, 230:2, 232:20
tracking
188:1, 189:12, 190:7, 190:22, 191:1, 191:2, 192:4, 192:10, 192:17, 192:19, 192:25, 193:5, 195:6, 230:18, 231:24, 249:17, 249:19
tracy
278:18
traffic
238:16
trail
49:21, 49:23
trailed
49:18
trailing
49:19
train
79:3, 275:11, 275:12, 277:8, 277:9
train's
78:25, 79:2
trains
78:10, 78:11, 78:19, 278:6
trajectories
48:14
transcribe
55:1
transcript
5:7, 283:13, 283:19, 283:20
transfer
34:23, 50:23, 58:12, 58:15, 58:20, 59:6, 59:13, 62:2, 62:3, 62:5, 62:17, 62:19, 62:21, 63:14, 64:21, 69:6, 116:19, 119:5, 119:10, 198:20, 199:5, 200:24, 206:9, 247:3, 247:4, 247:5, 247:6, 251:7
transformation
143:18
transformations
51:17
transformed
62:7
translatable
128:21
translates
81:6
translating
167:1
transmission
194:9, 194:10
transmit
44:3, 51:23, 76:11, 76:12, 266:18
transmitted
169:15, 266:7
transmitter
51:15, 51:22, 52:2, 52:12, 52:16, 189:15, 192:6, 192:8, 232:15
transmitters
232:21
transmitting
77:24, 166:22, 166:23
trees
109:17
trial
12:19
trials
12:19, 12:20, 12:22, 13:12
trick
36:19
tried
47:2
triple
104:23
tripped
36:22
trombone
104:22, 104:24
trouble
235:16
truck
236:23, 237:15
true
138:10, 159:12, 160:5, 183:21, 184:10, 198:6, 228:3, 250:16, 257:21, 278:12, 283:6, 283:27
trust
24:6
truth
6:23, 6:24
truthful
26:5
try
44:18, 46:7, 46:15, 49:25, 142:20, 155:12, 155:22, 225:25
trying
35:9, 36:19, 36:20, 46:21, 66:6, 67:5, 80:13, 101:21, 133:8, 155:9, 170:1, 231:17, 234:23, 242:25
turn
32:11, 49:23, 171:6, 251:9, 259:8
turned
81:9, 81:13, 238:23, 258:2
turning
49:20, 158:24, 254:2
twice
137:14
twisted
1:13
twisting
68:6
two
13:8, 13:13, 13:15, 13:23, 13:24, 20:21, 25:3, 41:23, 57:25, 59:20, 62:23, 63:16, 64:14, 67:10, 67:15, 70:13, 71:12, 71:17, 72:3, 74:14, 76:7, 76:13, 77:13, 77:21, 79:16, 80:20, 81:1, 81:9, 81:20, 92:17, 92:24, 115:11, 115:25, 116:13, 116:14, 119:18,

119:21, 120:19, 121:25, 122:5, 125:14, 127:24, 130:8, 136:11, 137:6, 165:17, 170:10, 174:13, 175:25, 185:17, 193:7, 200:9, 244:21, 245:17, 262:5, 266:7, 273:6, 274:8, 275:8, 277:6, 277:13, 278:14, 279:1, 279:9, 279:19, 279:23
two-ear
224:1
two-minute
50:2
tx
2:5
type
29:17, 32:2, 40:13, 44:1, 68:3, 68:12, 80:9, 105:3, 106:11, 136:11, 168:17, 169:17, 207:14, 207:25, 266:13, 273:5, 274:20, 275:2, 275:7
types
29:22, 30:2, 30:15, 31:20, 34:21, 64:18, 69:14, 84:14, 122:9, 161:23, 167:13, 167:15, 170:9, 189:20, 207:11, 209:1, 265:19, 266:6
typical
126:20
typically
8:8, 30:3, 30:4, 64:5, 91:11, 93:15, 96:9, 96:10, 111:7, 116:1, 118:2, 118:7, 118:17, 127:9, 140:25, 193:21, 226:11, 229:21, 235:14
typos
11:19, 11:20, 181:5

U

uc
29:9, 129:14
ultimately
14:11
unable
41:14
under
19:15, 20:15, 26:8, 31:21, 31:22, 40:16, 109:1, 109:4, 109:8, 109:25, 112:9, 122:12, 205:7, 205:14, 242:16, 248:3, 250:11, 251:10, 277:21, 283:9, 283:25, 283:26
understand
12:1, 12:11, 18:3, 18:5, 19:17, 19:22, 25:16, 25:18, 25:23, 26:3, 27:2, 30:19, 32:22, 36:1, 36:8, 37:2, 37:9, 37:12, 61:18, 66:2, 66:6, 67:5, 69:17, 73:6, 103:2, 108:1, 114:12, 130:14, 143:24, 148:11, 148:22, 158:2, 158:8, 165:11, 170:1, 174:10, 176:17, 177:8, 184:11, 202:2, 205:12, 210:5, 227:25, 252:18, 271:5, 278:24
understanding
18:17, 31:9, 32:18, 33:1, 36:7, 37:2, 37:15, 39:14, 66:9, 66:23, 69:22, 73:7, 73:12, 142:12, 188:6, 188:11, 193:3, 193:23, 194:5, 197:18, 217:2, 219:6, 256:6, 256:9, 274:22
understandings
73:3, 73:10
understood
138:22, 170:8, 227:11, 274:14
unintelligible
102:12
unintentional
168:13
unique
26:22
unit
34:7, 52:19, 192:11, 193:6, 217:20
united
1:1, 4:7, 4:8, 4:9, 4:10, 4:11, 4:12, 4:13, 6:4, 145:18, 173:12, 183:4, 187:18, 199:24, 203:1, 212:6, 265:13, 283:26
units
189:20
unity
152:11, 152:13
university
29:4
unless
26:1, 103:6, 125:15
unlike
48:24
unmute
118:12
unnecessary
246:14
unquote
65:9, 102:12, 156:14, 234:10, 235:23, 236:12, 240:2
unrelated
34:22
unsighted
210:2
unusual
103:7
uploading
173:5, 187:13, 222:2
usage
39:13
usages
136:17
use
26:18, 26:21, 35:3, 35:18, 36:24, 37:8, 37:10, 38:8, 38:9, 39:10, 43:19, 56:22, 58:7, 58:14, 61:15, 61:21, 61:22, 61:23, 61:24, 62:16, 62:18, 63:9, 63:14, 67:8, 68:9, 68:11, 68:13, 68:19, 68:23, 69:2, 69:4, 73:24, 76:1, 76:12, 77:10, 77:11,

77:12, 79:14, 80:15, 81:14, 84:5, 90:13, 90:15, 90:24, 91:2, 91:8, 91:21, 92:18, 92:24, 98:18, 104:13, 107:25, 109:6, 110:20, 111:6, 111:11, 111:17, 120:23, 121:4, 123:25, 125:21, 127:7, 128:21, 133:1, 134:9, 136:10, 139:19, 153:18, 153:20, 153:21, 154:12, 168:19, 169:17, 173:21, 177:21, 189:6, 189:10, 202:3, 203:25, 213:17, 226:7, 241:13, 241:19, 245:20, 249:17, 253:18, 253:20, 254:25, 273:5, 273:23, 274:20
user
35:10, 43:9, 43:19, 125:9, 125:19, 174:7, 174:20, 174:21, 175:16, 188:2, 188:3, 188:11, 188:16, 194:12, 200:18, 208:21, 212:16, 214:21, 218:7, 235:25
user's
43:10, 43:20, 49:12, 50:14, 192:2, 227:13
users
209:18, 234:17
uses
34:11, 77:22, 95:4, 95:6, 156:18
using
34:22, 38:5, 46:3, 48:7, 52:8, 58:19, 59:5, 59:12, 62:4, 62:6, 64:1, 68:2, 69:7, 75:17, 76:5, 76:7, 76:14, 76:24, 77:2, 77:5, 78:4, 78:12, 80:1, 80:18, 93:1, 105:6, 105:8, 108:10, 116:2, 131:7, 132:17, 134:4, 160:21, 160:22, 168:20, 172:5, 172:13, 172:15, 172:19, 188:22, 189:3, 207:4, 209:1, 224:5, 224:13, 234:11, 241:1, 241:4, 251:21, 252:5, 252:19, 252:21, 252:24, 253:2, 266:5, 266:18, 267:5, 275:8, 277:7
usually
16:20, 31:13, 41:21, 115:7, 115:23, 115:24, 116:16, 127:9, 133:18, 157:21, 229:5, 229:10, 229:19, 230:1, 230:7, 232:8
utterance
33:24, 45:21, 49:3, 49:13, 50:25, 112:24, 113:23, 118:8, 157:24, 170:21, 233:20, 247:10, 253:22

V

v-i-e-w
39:18
vague
117:22
valid
163:11
value
245:17
values
245:17
variants
40:11, 40:16
varieties
126:15
variety
34:25, 207:15, 265:18
various
29:22, 34:21, 45:14, 47:20, 217:21, 218:22
velocity
121:8
ventriloquism
123:3, 123:7, 124:11, 124:21, 125:2
ventriloquist
123:10, 123:11
ventriloquists
123:13
verb
154:2
verbal
207:20
versa
193:9
version
13:9, 42:23, 149:22, 151:20, 173:19, 180:25, 222:11, 223:3, 223:12, 223:13
versions
52:7, 153:22
versus
90:11, 92:23, 106:12, 114:20, 155:3
via
5:3, 5:5, 8:2, 8:3, 8:6, 8:11, 9:4, 12:3, 12:5, 21:3, 69:12, 79:5, 143:9, 192:14
viable
160:20
vice
193:9
video
5:3, 5:5, 6:7, 6:10, 31:19, 79:5, 80:14, 80:17, 81:8, 81:11, 124:17
videographer
2:23, 6:1, 6:9, 6:18, 50:6, 50:9, 82:3, 82:6, 113:7, 113:10, 147:7, 147:10, 182:1, 182:4, 221:12, 221:15, 244:10, 244:13, 255:7, 255:10, 280:20
videotaped
1:22, 6:2
view
38:19, 38:20, 39:2, 39:4, 39:6, 39:13, 39:15, 39:18, 39:23, 40:3, 40:6, 40:17, 40:19, 42:3, 46:15, 46:24, 47:15, 51:1, 51:15, 57:2, 57:14, 78:20, 80:10, 81:20, 94:10, 102:14,

103:4, 103:11, 108:25, 110:8, 110:24, 132:2, 137:9, 143:18, 145:12, 148:23, 155:14, 167:8, 167:19, 168:3, 168:11, 169:1, 169:9, 170:7, 172:15, 175:1, 177:9, 177:20, 178:21, 179:17, 184:12, 188:17, 201:13, 205:9, 206:4, 214:12, 214:19, 215:7, 215:22, 216:2, 237:12, 239:10, 259:2, 278:12
viewed
139:7
virtual
4:14, 39:6, 39:25, 44:6, 44:8, 45:7, 46:5, 47:7, 47:16, 47:23, 48:7, 48:24, 49:12, 50:13, 50:18, 58:3, 97:17, 111:18, 111:21, 112:6, 113:23, 114:8, 114:17, 114:21, 114:25, 135:13, 190:3, 190:10, 190:21, 192:15, 192:20, 193:1, 193:12, 195:13, 195:18, 195:20, 195:24, 196:1, 196:5, 196:7, 196:8, 203:14, 204:9, 207:24, 208:11, 209:19, 209:21, 210:10, 210:17, 210:21, 210:22, 210:24, 211:9, 212:16, 214:21, 218:7, 223:1, 225:17, 225:22, 226:10, 226:19, 226:21, 226:23, 226:24, 227:17, 229:1, 229:5, 229:10, 229:18, 230:1, 230:7, 234:14, 238:8, 242:19, 244:25, 248:1, 248:4, 248:20, 248:23, 249:15, 249:25, 250:3, 250:4, 250:14, 253:9, 253:11, 261:3
visible
8:15
visual
46:9, 46:13, 87:6, 91:10, 108:1, 110:20, 112:3, 112:6, 113:24, 114:8, 114:17, 114:22, 115:1, 122:21, 123:17, 123:19, 123:21, 124:6, 124:9, 124:15, 124:20, 125:6, 125:11, 125:13, 190:14, 236:19, 237:10, 237:17, 238:2, 238:4, 238:7, 238:13, 238:18, 238:23, 239:3, 239:4, 245:1
visually
111:23, 112:12, 209:22
vocabulary
168:21
vocal
92:25, 93:2, 93:6, 103:17
voice
6:12, 49:22, 76:21, 77:12, 79:5, 80:10, 81:19, 85:14, 93:4, 93:16, 94:1, 96:6, 97:17, 97:18, 101:24, 102:19, 102:20, 107:21, 112:18, 112:19, 112:22, 112:24, 123:14, 123:16, 146:15, 146:18, 147:25, 148:2, 148:5, 149:18, 151:13, 156:22, 157:7, 157:18, 158:17, 162:11, 162:13, 164:13, 164:19, 165:3, 165:15, 165:23, 166:1, 167:1, 167:9, 167:11, 167:12, 167:18, 168:3, 168:11, 168:16, 168:19, 169:2, 169:10, 169:12, 169:18, 169:21, 169:24, 170:4, 170:7, 170:16, 170:20, 171:13, 171:18, 172:3, 172:16, 174:6, 174:10, 174:11, 174:12, 174:19, 175:17, 186:2, 186:3, 265:20, 266:5, 277:12, 278:13, 278:25, 279:7, 279:8, 279:19, 279:23
voices
95:9, 110:19, 165:7, 170:3
voltage
44:3
volume
32:11, 121:5, 121:12, 121:13, 121:14
vr
233:16, 234:18, 235:10
vs
1:9, 6:3

W

w-e-n-z-e-l
41:18
waco
1:3, 6:5
wait
68:6, 92:6, 163:21, 186:11
waiting
145:9
walk
210:7
walked
208:10, 276:22
walkie-talkie
77:6, 77:8, 77:10, 77:12, 78:3, 266:13, 266:17
walkie-talkies
77:1
walking
207:24, 209:11, 211:15
wall
87:13, 207:24
walls
208:11
walnut
2:6
want
16:7, 28:1, 36:14, 43:14, 46:13, 50:1, 51:8, 60:22, 63:2, 87:5, 92:7, 104:17, 111:14, 119:25,

125:8, 125:10, 127:11, 127:21, 127:22, 128:16, 129:5, 144:18, 155:12, 159:16, 159:18, 164:21, 166:6, 176:6, 197:24, 202:2, 215:10, 223:20, 226:5, 227:19, 240:15, 247:21, 248:15, 254:1, 255:13, 259:15, 280:14, 282:4, 282:6
wanted
49:2, 69:9, 78:5, 167:5, 191:9
wanting
222:7
warning
146:11, 207:18, 238:1
waste
276:11
wasted
254:2
wasting
276:8
watch
278:17, 278:19
watching
49:22, 124:16
water
88:17, 88:18, 89:5, 89:15, 99:4
watkins
2:13, 6:15
wave
128:16, 132:7, 132:8, 132:12, 132:18, 133:20, 134:6, 134:7
wavelength
127:12, 127:16, 128:19, 131:6, 133:18, 134:3
way
8:6, 9:24, 18:21, 28:11, 30:6, 36:21, 53:14, 54:2, 54:23, 58:4, 63:16, 63:23, 66:16, 67:17, 68:7, 69:6, 76:14, 78:4, 79:22, 87:7, 96:17, 98:4, 98:12, 113:21, 115:22, 117:22, 119:21, 120:21, 120:24, 121:13, 122:12, 122:19, 126:2, 126:20, 133:10, 141:25, 148:13, 155:10, 159:4, 194:6, 215:20, 215:23, 215:25, 217:7, 217:21, 218:21, 223:20, 229:21, 232:3, 232:4, 239:19, 242:1, 246:9, 246:15, 247:21, 278:16
ways
69:5, 74:13, 119:21, 215:17, 215:24, 265:5, 265:18
we'll
138:2, 147:3, 147:6, 155:22, 166:7, 173:23, 239:21, 255:5
we're
7:22, 8:1, 8:10, 8:21, 12:2, 25:14, 30:24, 37:11, 43:15, 50:6, 52:6, 52:8, 61:25, 64:13, 75:8, 75:17, 77:23, 82:3, 82:6, 87:10, 91:9, 93:18, 100:3, 101:18, 101:19, 103:1, 106:19, 106:22, 107:5, 108:2, 110:13, 113:7, 114:2, 127:22, 138:23, 140:24, 142:1, 143:18, 143:19, 144:25, 147:7, 151:11, 153:13, 154:7, 156:4, 162:6, 164:14, 168:20, 172:13, 172:15, 172:21, 178:13, 182:1, 182:11, 185:7, 187:5, 199:12, 202:16, 204:23, 215:13, 217:24, 221:12, 223:23, 228:12, 242:10, 242:25, 244:10, 244:13, 254:6, 255:7, 255:10, 266:5
we've
11:25, 66:4, 66:19, 141:22, 197:11, 205:4, 231:24, 264:23, 276:6
weak
133:14
wear
43:9, 46:14, 46:15, 112:21, 190:11
wearable
40:1, 164:15, 188:1, 188:6, 188:16
wearing
43:21, 249:19
wed
188:1, 188:7
weird
68:7
welcome
131:22
well-known
141:24
well-studied
102:4
well-understood
102:7
went
40:12, 40:19, 44:2, 94:8, 106:12, 168:15, 257:22, 264:12
wenzel
41:17, 41:18
weren't
54:11, 54:19, 55:9, 80:13
western
1:2, 6:4, 78:6, 224:18, 265:12
whatever
41:22, 86:25, 147:5
whereas
64:1, 105:1, 168:19, 225:17
wherein
148:4, 200:21, 254:3
whereupon
8:24, 11:6, 145:4, 172:24, 182:15, 187:8, 199:15, 202:19, 211:21, 221:21, 280:23
whether
16:3, 19:20, 27:6, 27:14, 91:6, 92:22, 98:4, 98:12, 105:13, 110:8, 156:3, 226:14, 228:14
whisper
94:2

Meta Platforms, Inc.
Exhibit 1095
Page 136

whole
6:23, 8:1, 34:25, 265:18
wholly
29:15, 30:11, 259:24, 260:17, 260:19, 261:22, 261:23
wide
103:17, 207:15
widely
265:13
wind
109:17
window
8:4, 8:11, 238:18
windy
109:25
wired
51:21
wireless
265:22
within
69:21, 74:24, 86:24, 89:12, 94:12, 99:19, 106:22, 139:5, 139:11, 144:7, 149:2, 177:14, 179:21, 180:2, 184:17, 185:3, 196:25, 198:10, 201:5, 203:20, 209:18, 210:23, 218:12, 233:16, 235:19, 242:17, 259:20
without
20:23, 57:24, 81:11, 92:18, 98:10, 116:14, 157:17, 158:19, 244:3, 250:24
witness's
3:16, 282:1
wondering
113:22
word
32:18, 33:2, 36:5, 54:24, 61:25, 73:24, 75:20, 77:22, 79:13, 79:15, 80:18, 87:20, 97:25, 98:17, 98:18, 99:1, 121:4, 121:5, 121:9, 123:25, 142:6, 165:14, 169:12, 175:9, 185:8, 189:25, 191:7, 191:18, 203:9, 264:23, 265:4, 269:2, 273:22, 273:23, 273:24, 274:10, 274:23, 275:2
wording
199:1
words
35:6, 68:6, 68:22, 92:19, 169:14, 234:7, 236:15, 239:25, 263:21, 274:23, 282:4, 282:6
work
14:21, 15:10, 15:13, 21:16, 22:16, 29:21, 31:1, 31:5, 31:6, 32:6, 32:14, 33:6, 33:18, 33:21, 34:13, 38:2, 39:2, 39:12, 44:18, 46:3, 46:5, 53:2, 53:11, 53:16, 54:12, 54:20, 55:9, 118:7, 118:17, 162:1, 206:23, 206:24, 217:22, 232:3, 233:16, 234:9, 235:19, 270:2, 270:10, 270:17, 270:24
worked
194:7, 207:1, 207:2
working
39:9, 52:19, 53:21, 53:23, 54:2, 54:5, 118:9, 118:18, 161:23
works
52:23
world
96:13, 152:20, 249:21, 264:12
worn
188:1, 188:10, 188:16, 192:1
worries
113:21, 155:9, 161:8, 163:23
worse
181:6
wouldn't
89:2, 109:16, 110:18, 123:12, 124:24, 168:15, 170:20, 179:9, 188:12, 189:24, 191:5, 191:8, 221:3
wow
27:23, 28:7, 28:15, 147:4
write
55:15, 73:9, 159:22, 160:18, 160:19, 161:5, 161:9, 161:19
writes
161:16
writing
158:25, 159:2, 248:16
written
160:24, 161:16, 235:21
wrong
264:2
wrote
54:3, 55:17, 55:24, 56:2, 117:5, 119:24, 125:5, 225:4, 225:22, 229:4, 229:16, 229:18, 229:25, 230:6, 235:7, 237:3, 237:7, 243:14, 249:7, 250:2

X

x
283:12
xy
230:20
xyz
231:16

Y

y-a-w
230:24
yan
1:32, 5:4, 6:19, 283:2, 283:33
yaw
230:19, 230:24, 231:13, 232:8
yeah
9:25, 10:9, 13:2, 13:24, 15:5, 15:21, 16:1, 19:8, 23:17, 36:18, 37:3, 41:18, 46:12, 50:4, 79:11, 83:9, 106:19, 106:20, 108:19, 108:22, 113:4, 113:20, 122:18, 129:9, 129:14, 130:22, 145:10, 146:15,

Meta Platforms, Inc.
Exhibit 1095
Page 137

150:12, 152:6, 155:9, 155:18, 155:22, 161:8, 161:13, 164:17, 165:9, 165:17, 172:12, 173:22, 178:12, 210:13, 220:9, 225:1, 231:17, 233:2, 238:25, 243:2, 245:10, 247:18, 249:11, 249:13, 251:13, 251:14, 252:11, 254:17, 266:16, 267:22, 270:18
year
17:16, 39:5, 39:15, 41:23, 44:14, 53:7, 152:6, 223:14, 272:14, 272:18, 272:22, 273:3, 273:21, 274:14
years
40:5, 40:7, 40:20, 43:25, 57:18, 152:4, 152:5, 153:8, 231:18, 249:6, 249:7, 249:22
yellow
173:18
yesterday
25:1
yourself
45:18

Z

zoom
8:6, 9:22, 10:19, 11:25, 50:1, 75:9, 75:11, 75:18, 171:9, 171:10, 171:16, 171:25, 172:2, 172:10, 266:4
zoom's
172:13

$

$100
181:9
$400
15:8, 15:10, 16:11
$580
15:13, 16:12

0

01
10:20
02116
2:16
03
4:3, 5:2, 6:7, 280:24
04
221:24
05
4:3
09
50:6
090
27:1, 27:8, 27:21, 28:5, 145:20, 146:6, 146:12, 146:14, 147:14, 154:8, 154:22, 157:19, 163:25, 164:11, 185:19, 257:24, 258:6, 266:23, 267:13, 268:6, 268:9, 268:16, 268:22, 268:25, 269:12, 271:13, 271:22, 271:24, 272:3

1

1.4
128:4
1.5
133:21
10
4:14, 19:3, 33:20, 50:6, 50:9, 104:2, 104:12, 104:13, 104:14, 104:18, 104:23, 104:25, 105:1, 105:14, 106:8, 106:15, 106:21, 137:1, 137:4, 221:20, 221:21, 222:10, 222:20, 222:21, 260:20, 261:22
10,368,179
4:12, 203:1
10,448,184
4:13, 212:6
10,917,737
4:10, 187:18
100
19:23, 20:15, 20:18, 252:13
1000
2:6
10368179
202:18
10448184
211:19
106
244:17
10917737
187:11
11
4:6, 82:3, 82:6, 111:13, 111:16, 136:23, 259:9, 260:4, 262:2, 262:5, 262:19, 263:14, 268:19, 269:3, 269:6, 269:9, 269:15, 269:19, 271:12, 271:18, 271:22
11,290,836
4:11, 199:24
11290836
199:14
12
113:7, 113:10, 221:24, 261:7, 262:21, 271:25, 272:6, 272:9
13
82:3, 116:23, 117:4, 118:24, 232:25, 233:1, 233:7
130
70:19, 71:6
1341
147:7
1358
147:10
14
113:7, 143:17, 143:22, 143:25, 197:20, 197:23, 198:16, 199:7, 203:5, 203:7, 203:11, 204:1, 204:11, 204:21, 204:22, 205:8, 205:16, 205:18, 206:3, 206:5, 206:7, 206:21, 212:10, 212:20, 212:21, 212:24, 213:9, 213:18, 214:2, 214:3, 214:12, 215:6, 216:20, 217:25, 218:2, 218:9, 218:15, 219:1, 219:22, 219:23, 220:18, 221:4, 221:25, 237:7
1400
2:6
14316
1:32, 283:2, 283:33
145
4:7
15
19:5, 106:25,

107:11, 107:17, 107:22, 108:3, 139:25, 140:2, 140:23, 141:12, 143:7, 143:13, 143:14, 144:4, 144:6, 144:12, 144:21, 146:16, 147:13, 147:24, 148:25, 151:6, 152:17, 153:8, 153:13, 154:6, 154:16, 154:21, 154:22, 155:4, 156:4, 157:8, 157:18, 162:6, 163:16, 163:25, 164:10, 164:14, 165:22, 176:6, 177:11, 177:24, 178:7, 178:12, 178:22, 179:4, 261:7, 271:24, 272:5, 272:9
150
239:12
1510
182:4
16
138:2, 138:6, 138:25, 139:22, 140:20, 140:24, 141:8, 141:22, 143:1, 143:3, 144:6, 144:8, 183:22, 183:25, 184:15, 185:1, 186:20
1614
221:12
1621
221:15
1657
244:10
1658
244:13
167
247:20, 247:22, 248:3, 248:20
168
251:9
169
251:25
17
223:20, 255:22, 255:24, 255:25, 261:12, 269:9, 269:10, 269:16, 269:19, 271:25, 272:6, 272:9
170
253:5
1714
255:7
172
4:8
1727
255:10
177
247:20
179
203:3, 203:5, 204:1, 204:11, 204:21, 205:8, 205:16, 206:3
1803
280:21
182
4:9
184
212:7, 212:25, 213:9, 213:18, 214:12, 215:6, 218:2, 218:9, 218:15, 219:1, 219:22, 220:18, 221:4
187
4:10
19
179:11, 179:20, 180:5
1950
123:15
196
27:13, 27:16, 28:14, 173:13, 173:17, 177:12, 178:7, 178:22, 179:5, 179:11, 180:5, 185:21
1960
78:7
1965
265:8, 272:14
1979
29:10
1980
42:23, 44:19, 45:2, 52:7, 57:23
1981
29:8
1985
265:16, 265:20, 272:18
1987
29:3, 149:24
1988
41:15, 42:3
199
4:11
1990
53:6, 58:24, 59:4, 150:14
1992
125:5
1994
125:5, 180:21, 180:24, 223:11, 223:17, 237:4
1995
54:9, 54:12, 54:20, 55:10

2

2
182:1
20
19:7, 20:15, 20:17, 87:1, 99:16, 102:9, 104:25, 105:21, 107:7, 107:8, 108:11, 108:12, 108:17, 109:6, 110:1, 150:13, 152:6
200
2:15
2000
4:15, 181:1, 222:12, 223:4, 223:12, 223:14, 223:16
2014
135:9, 135:11, 135:13, 135:22, 149:11, 149:14, 149:17, 150:12, 150:14, 151:5, 151:22, 152:5, 152:15, 153:11, 154:11, 161:24, 176:4, 177:12, 177:24, 178:5, 179:17, 181:13, 181:21, 184:12, 185:2, 185:11, 188:22, 189:3, 189:21, 190:4, 190:23, 192:16, 192:21, 193:14, 194:16, 194:24, 195:8, 195:13, 195:18, 195:24, 196:5, 196:22, 197:7, 198:7, 198:14, 201:2, 201:12, 203:17, 203:25, 206:11, 206:14, 206:17, 206:23, 207:7, 207:12, 207:21, 208:11, 208:20, 208:25, 210:18, 210:22, 211:7, 211:10, 213:6, 213:16, 223:10, 223:13, 223:14, 234:25, 235:7, 237:1, 240:25,

Meta Platforms, Inc.
Exhibit 1095
Page 139

241:12, 241:18, 253:17, 254:24, 266:2, 272:22, 273:3, 273:21, 274:14
2015
180:3
202
4:12
2022
17:20
2023
1:24, 4:3, 5:2, 6:6, 10:22, 11:16, 11:18, 13:6, 55:15, 70:2, 73:2, 146:5, 183:13, 221:24, 249:10, 268:12, 269:7, 269:20, 271:21, 272:10, 272:12, 272:16, 272:20, 273:2, 273:20, 282:11, 283:28
20230503
9:5
21
50:9
211
4:13
22
1:9, 1:24, 5:1, 6:6, 11:15, 259:12, 268:3, 268:4, 268:11, 268:16, 282:11
221
4:14
243
222:10
2473
5:8
25
19:9, 30:12, 259:15
256
3:4
26
82:6, 283:28
267
3:5
277
3:6
278
3:7
281
3:16
283
3:17, 281:3
29
268:3, 268:4, 268:11, 268:16

3

3-d
4:14, 222:25, 225:17, 225:22, 226:7, 226:10, 226:22, 233:2, 233:7, 233:8, 235:13, 235:16, 242:13, 245:18
3-meter
107:4
30
19:21, 30:13, 70:21, 104:25, 106:4, 109:18, 239:9, 283:5, 283:14, 283:21
35
40:7, 40:20, 43:25, 249:6
360
150:9, 150:16
38
258:9, 258:10, 267:13, 267:16, 267:17, 267:25
3d
40:10, 40:24, 41:10, 42:16, 56:22, 57:2, 57:13, 57:22, 58:2, 58:11, 61:22, 61:25, 116:2, 133:1, 134:12, 134:15, 135:3, 152:1, 152:8, 152:22, 160:22, 170:9, 171:12, 180:18, 207:5, 227:7, 227:17, 227:18, 242:18, 247:25
3d-audio
246:6
3rd
10:22, 11:18, 13:6, 26:24, 55:15, 59:21, 70:2, 73:2, 146:5, 183:13, 268:12, 269:7, 269:20, 271:21, 272:10, 272:12, 272:16, 272:20, 273:2, 273:20

4

40
249:8, 249:22
41
258:9, 258:10, 267:13, 267:16, 267:17, 267:25
44
260:9, 268:19, 268:20, 269:4, 269:6
45
184:1, 239:11
46
113:10, 260:4, 260:6
48
218:4

5

5-foot
102:13, 102:17
50
19:24
51
268:19, 268:20, 269:4, 269:6
52
93:14, 93:25, 96:7, 271:12, 271:19, 271:22
53
93:25
56001
38:5
57
182:1
575
1:9, 6:6
58
93:13, 96:7
580
15:8

6

6
179:11, 180:5, 280:24
60
93:18, 170:21, 170:24, 171:3, 239:11
628
183:5, 183:9, 183:23, 185:2
64106
2:7
67
271:12, 271:19, 271:22
69
241:24, 242:3, 242:5, 242:8
6:-cv--ada-dtg
1:9, 6:6

7

7
4:3, 9:6
70
12:21
737
187:19, 196:13,

197:9, 197:13, 197:20, 198:16, 199:8
74
150:20
75
20:1
7_begault
9:6

8

80
12:21, 241:25, 250:9
83
221:25
836
199:25, 200:3, 201:23
85
20:3
88
149:24

9

9
5:2, 6:7
9,226,090
4:7, 145:18
9,282,196
4:8, 173:12
9,674,628
4:9, 183:4
90
12:23, 12:25, 33:21, 54:7
92
4:3, 9:6, 53:8
9226090
145:8
9282196
172:23
93
53:8
95
20:5, 244:16, 244:18
9674628
182:14