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Transcript of Richard Stern, Ph.D.

Date: April 8, 2026

Case: Amazon, Inc., et al. -v- SoundClear Technologies, LLC (PTAB)

Planet Depos

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

3 AMAZON.COM, INC.;
4 AMAZON.COM SERVICES LLC; and
5 AMAZON WEB SERVICES, INC.;

6 Petitioners,

7 v.

8 SOUNDCLEAR TECHNOLOGIES LLC,
9 Patent Owner.

10 IPR2025-00565

11 U.S. Patent No. 11,069,337

12 IPR2025-00673

13 U.S. Patent No. 11,244,675

14
15 VIDEOTAPED DEPOSITION OF

16 RICHARD STERN, PH.D.

17 Conducted Remotely Over Zoom

18 Wednesday, April 8, 2026

19 12:07 p.m.

20 Job No.: 627236

21 Pages 1 - 147

22 Reported By: Joan V. Cain

Transcript of Richard Stern, Ph.D.
Conducted on April 8, 2026

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1 Videotaped Deposition of RICHARD STERN,
2 PH.D., conducted remotely over Zoom:
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15 Pursuant to Notice, before Joan V. Cain,
16 Court Reporter and Notary Public in and for the
17 Commonwealth of Virginia.
18
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22

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1 A P P E A R A N C E S C O N T I N U E D

2

3 ALSO PRESENT:

4 Parker Simpson, Legal Videographer

5 Planet Depos, LLC

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Conducted on April 8, 2026

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C O N T E N T S

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By Mr. Reeves	140

E X H I B I T S

(Attached to the Transcript.)

DEPOSITION EXHIBITS	PAGE
EXHIBIT Complaint for Patent	140
1212 Infringement, 7/25/24	

PREVIOUSLY MARKED EXHIBITS	REFERENCED
EXHIBIT 1001 U.S. Patent No. 11,244,675	56
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Stern, Ph.D., 2/25/25	
EXHIBIT 1003 U.S. Patent Application	124
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E X H I B I T S

(Attached to the Transcript.)

PREVIOUSLY MARKED EXHIBITS	REFERENCED
EXHIBIT 1202 Reply Declaration of	52
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EXHIBIT 1208 U.S. Patent Application	127
Publication No.	
2016/0379638 A1	

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P R O C E E D I N G S

- - -

12:07 p.m. EDT

April 8, 2026

- - -

12:07:43

THE VIDEOGRAPHER: Here begins the
videotaped deposition of Dr. Richard Stern, in the
matter of Amazon.com, Incorporated; Amazon.com
Services LLC; and Amazon Web Services, Incorporated
versus SoundClear Technologies LLC, in the United
States Patent and Trademark Office, Before the
Patent Trial and Appeal Board, Case Nos.
IPR2025-00565 and IPR2025-00673.

12:07:52

12:07:54

12:07:57

12:07:57

12:08:09

12:08:10

12:08:13

12:08:15

Today's date is April 8, 2026. The time on
the video monitor is 12:08 Eastern Time. The
videographer today is Parker Simpson, representing
Planet Depos, headquartered at 451 Hungerford Drive,
Suite 400, Rockville, Maryland 20850.

12:08:24

12:08:32

12:08:39

12:08:43

12:08:46

All parties of this video deposition are
attending remotely. Would counsel please voice
identify themselves and state whom they represent.

12:08:46

12:08:48

12:08:51

MR. REYNOLDS: Steve Reynolds. Along with

12:08:51

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1	me is Kevin Sprenger. We represent the patent	12:08:54
2	owner.	12:08:56
3	MR. REEVES: Nathan Reeves of Morgan,	12:08:58
4	Lewis. With me is my colleague Colin Heideman, and	12:09:01
5	we represent petitioners and the witness.	12:09:04
6	Sorry about that.	12:09:10
7	THE COURT REPORTER: And the witness?	12:09:10
8	MR. REEVES: Yes.	12:08:58
9	THE VIDEOGRAPHER: And the court reporter	12:09:12
10	today is Joan Cain, representing Planet Depos.	12:09:14
11	The witness will now be sworn, and then we	12:09:16
12	may proceed.	12:09:18
13	THE COURT REPORTER: Counsel, do you	12:09:19
14	stipulate that I may swear in the witness even	12:09:19
15	though I am not in the physical presence of the	12:09:19
16	witness?	12:09:28
17	MR. REYNOLDS: Yes.	12:09:28
18	MR. REEVES: Yes.	12:09:29
19	Whereupon,	12:09:29
20	RICHARD STERN, PH.D.,	12:09:29
21	having been duly sworn under penalties of perjury by	12:09:29
22	the Notary Public, was examined and did testify as	12:09:29

1	follows:	12:09:43
2	THE COURT REPORTER: Thank you.	12:09:43
3	Please begin.	12:09:43
4	EXAMINATION BY COUNSEL FOR THE PATENT OWNER	12:09:45
5	BY MR. REYNOLDS:	12:09:45
6	Q Good morning, Dr. Stern.	12:09:46
7	A Good morning.	12:09:48
8	Q You're familiar with -- well, let me just	12:09:49
9	start. You've taken a lot of depositions, so I	12:09:52
10	won't go over all the instructions.	12:09:55
11	Is there any reason you can't give full and	12:09:57
12	complete and accurate testimony today?	12:09:59
13	A No, there's not.	12:10:01
14	Q Do you have anything in the room with you,	12:10:03
15	in terms of paper, a phone, or computer, other than	12:10:06
16	the computer you're speaking through right now?	12:10:09
17	A No, I do not.	12:10:11
18	Q Are you familiar with the concept of a	12:10:13
19	person of ordinary skill in the art?	12:10:15
20	A Yes.	12:10:19
21	Q And can we call them a POSITA for short?	12:10:19
22	A Yes.	12:10:23

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1	Q	And I believe you analyzed, in this case, a	12:10:25
2		POSITA at the time of 2018, right?	12:10:30
3		MR. REEVES: Objection. Form.	12:10:34
4		THE WITNESS: That's correct.	12:10:36
5		BY MR. REYNOLDS:	12:10:37
6	Q	Okay. So I'd like to go back to 2018 for a	12:10:38
7		moment.	12:10:42
8		How many ways would a POSITA have known to	12:10:44
9		design a device to determine whether input speech	12:10:46
10		was a whisper by using a threshold in 2018?	12:10:49
11		MR. REEVES: Objection. Form. Calls for	12:10:55
12		speculation. Assumes facts.	12:10:58
13		THE WITNESS: I can think of at least two	12:11:03
14		or three.	12:11:05
15		BY MR. REYNOLDS:	12:11:05
16	Q	Okay. Can you tell me what those are?	12:11:06
17	A	Well, detecting a whisper, you are looking	12:11:08
18		for the detection of glottal pulses, which are the	12:11:15
19		periodic pulses created by your larynx, so you're	12:11:19
20		looking for detection of periodic components. There	12:11:24
21		are multiple ways of doing that.	12:11:27
22		The most common way of doing that is to	12:11:28

1 perform what's known as an autocorrelation function 12:11:31
2 of the input in time, which involves multiplying the 12:11:34
3 input by itself time delayed and integrated in the 12:11:37
4 product. Looking for the maximum of that function 12:11:42
5 is a function of the time delay. Beyond zero time 12:11:46
6 delay will give you an indication of the likelihood 12:11:51
7 of having a whisper or not. 12:11:56

8 A second way would be to perform a cepstral 12:11:58
9 analysis. Cepstrum in this context is the inverse 12:12:01
10 Fourier transform of the log of the magnitude of the 12:12:09
11 Fourier transform. That cepstrum will indicate a 12:12:11
12 pulse at the time, and the horizontal axis would be 12:12:15
13 time corresponding to the fundamental period. 12:12:23

14 So those are two ways. 12:12:26

15 Q Can you please spell the word -- 12:12:27

16 A Cepstrum? 12:12:36

17 Q -- I think it was GO something pulses. 12:12:37

18 A Oh, glottal, G-L-O-T-T-A-L. That's the 12:12:41
19 technical word for the pulses that are created by 12:12:48
20 your vocal folds, or more commonly, vocal cords. 12:12:50

21 Q Understood. Would you please spell the 12:13:04
22 term something cepstral analysis, as best you can 12:13:07

1	for the court reporter?	12:13:11
2	A No. It's easy.	12:13:12
3	So the noun is cepstrum, C-E-P-S-T-R-U-M,	12:13:16
4	and that's really just spectrum with the phonemes	12:13:22
5	interchanged. And the adjective form would be	12:13:28
6	cepstral analysis, C-E-P-S-T-R-A-L, again, spectral	12:13:30
7	with the phonemes interchanged. Many people call it	12:13:37
8	cepstral analysis, but that's incorrect, the origin	12:13:41
9	of the word.	12:13:48
10	Q How would -- how many ways would a POSITA	12:13:48
11	have known to use some sort of threshold in	12:13:51
12	connection with the glottal pulses that you	12:13:55
13	mentioned?	12:13:59
14	MR. REEVES: Objection. Form. Calls for	12:14:00
15	speculation.	12:14:06
16	THE WITNESS: Well, in all cases, both the	12:14:06
17	autocorrelation function that I described for using	12:14:13
18	the autocorrelation method --	12:14:15
19	THE COURT REPORTER: What's the	12:14:15
20	correlation? I'm sorry. I missed that.	12:14:16
21	THE WITNESS: Autocorrelation, A-U-T-O.	12:14:19
22	THE COURT REPORTER: The first one. The	12:14:24

1	first one.	12:14:25
2	THE WITNESS: That's what it was, A-U-T-O,	12:14:26
3	hyphen, correlation. Sometimes it shows up without	12:14:29
4	the hyphen.	12:14:32
5	BY MR. REYNOLDS:	12:14:34
6	Q Okay. I'll repeat my question just so	12:14:37
7	we're clear.	12:14:39
8	How many ways would a POSITA have known to	12:14:40
9	use some sort of threshold in connection with that	12:14:42
10	autocorrelation?	12:14:47
11	MR. REEVES: Same objections.	12:14:48
12	THE WITNESS: The two methods that I just	12:14:51
13	described all require -- I'm sorry. The two methods	12:14:53
14	require the use of a threshold, as would all,	12:15:00
15	because we're doing a measurement on something	12:15:04
16	that's continuous, and classifying it into discrete	12:15:06
17	categories, two categories in this case, whisper or	12:15:11
18	no whisper. So normally that's done by comparing to	12:15:15
19	a threshold.	12:15:20
20	In the first case, the peak of the	12:15:22
21	autocorrelation function, we are -- we would be	12:15:28
22	looking at the value of the autocorrelation function	12:15:31

1 at the time lag corresponding to the fundamental 12:15:39
2 frequency of vibration. That's the frequency at 12:15:47
3 which you talk, minus around 100 hertz. You look at 12:15:53
4 that peak and you declare whether it is above or 12:16:01
5 below a face value. 12:16:04

6 Normally you would want to normalize that 12:16:06
7 value according to the value of that function and 12:16:13
8 zero lag, which corresponds to the overall amount of 12:16:15
9 power. If you talk louder, the value of the 12:16:18
10 threshold would be greater, vice-versa. 12:16:22

11 In the case of the cepstral analysis, 12:16:26
12 again, you would be comparing the value of cepstrum, 12:16:30
13 which is the function that I described previously, 12:16:36
14 to, again, a value. But in both cases, you're 12:16:39
15 looking at the threshold and that threshold will 12:16:43
16 also vary depending on how loud or how quiet 12:16:47
17 individual's talking. 12:16:53

18 BY MR. REYNOLDS: 12:17:00

19 Q Would the -- all the thresholds have been 12:17:00
20 the same in all of the cases you just mentioned? 12:17:02

21 MR. REEVES: Objection. Form. Assumes 12:17:06
22 facts. Lacks foundation. Calls for speculation. 12:17:08

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1 THE WITNESS: Not at all. The thresholds 12:17:12
2 are measuring two different things, and in two 12:17:15
3 different domains for that matter, and in all cases, 12:17:20
4 as I've stated, the actual absolute value would 12:17:29
5 depend on the context. It would depend on, among 12:17:32
6 other things, the overall power with which the 12:17:36
7 person talks. 12:17:39

8 You would want the person to -- you would 12:17:40
9 want the threshold to be greater if a person is 12:17:41
10 talking loudly than if the person is talking 12:17:43
11 quietly. 12:17:46

12 BY MR. REYNOLDS: 12:17:50

13 Q To be more specific, I'm talking about the 12:17:50
14 nature of the threshold that's incorporated into the 12:17:52
15 logic used to make those measurements. Would those 12:17:54
16 thresholds or the variables that contain the 12:17:58
17 thresholds all be the same? 12:18:01

18 MR. REEVES: Objection. Form. Calls for 12:18:04
19 speculation. Asked and answered. 12:18:06

20 THE WITNESS: As I said a moment ago, the 12:18:11
21 numerical value of the threshold would not be 12:18:12
22 constant. It would depend on the overall loudness 12:18:15

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1	or softness.	12:18:18
2	BY MR. REYNOLDS:	12:18:23
3	Q Would the units of all the thresholds in	12:18:23
4	any device that a POSITA would have known about in	12:18:26
5	2018 be the same?	12:18:29
6	MR. REEVES: Objection. Form. Calls for	12:18:32
7	speculation. Scope.	12:18:37
8	THE WITNESS: I think in the declaration --	12:18:38
9	and I'll point you to the spot. This would be in	12:18:42
10	the reply declaration for the '675 patent, in the	12:18:49
11	discussion concerning the proposed modification of	12:18:55
12	claim 5 of the '675 patent.	12:18:58
13	Okay. I apologize for the delay. I was	12:20:32
14	looking for a specific place in my report, and I'm	12:20:34
15	looking at paragraph 45 in the reply declaration for	12:20:38
16	the '675 patent, and what I state there is that --	12:20:43
17	this is concerning the threshold to which we --	12:20:50
18	which we're discussing: "I note that a person of	12:20:53
19	ordinary skill in the art would have understood	12:20:57
20	'peak frequency' to mean the frequency at which the	12:20:58
21	energy, power, intensity, or amplitude (which are	12:21:02
22	equivalent measures in this context) is maximum."	12:21:07

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1 So these are alternate ways of measuring 12:21:12
2 basically the same thing, which is how much stuff do 12:21:15
3 you have at a particular frequency. 12:21:20

4 BY MR. REYNOLDS: 12:21:28

5 Q How does that relate to whether all 12:21:28
6 thresholds in 2018 would have had the same units? 12:21:29

7 MR. REEVES: Objection. Form. 12:21:33

8 THE WITNESS: Well, it depends on how you 12:21:39
9 do the measurement. 12:21:41

10 The -- normally, energy, power, and 12:21:42
11 intensity would be proportional to the square of the 12:21:48
12 amplitude. The amplitude would be measured in volts 12:21:51
13 if you're measuring something that's coming -- 12:21:57
14 coming into a loudspeaker, or it could be measured 12:22:00
15 in units of air pressure and things like Newtons per 12:22:03
16 square meter if you're looking at the input of a 12:22:09
17 microphone or the input to a microphone, and the 12:22:12
18 energy, power, or intensity would be the square of 12:22:19
19 those units. 12:22:24

20 Now, people in the -- doing work in audio, 12:22:26
21 like myself, commonly use decibels, which converts 12:22:33
22 all of those units to the same thing, and that's 12:22:38

1 done because the amplitude is proportional -- the -- 12:22:42
2 for looking at amplitude measurements, the decibels 12:22:47
3 would be proportional to 20 times the logs of the 12:22:50
4 base ten of the amplitude for the other three 12:22:57
5 things, the reading in decibels would be 12:23:02
6 proportional to ten times the log to the base ten. 12:23:04
7 And since the square operation doubles the 12:23:07
8 log quantity, you -- the same relative -- 12:23:10
9 whatever -- along any of those dimensions would give 12:23:17
10 rise to the same increase or decrease in decibels. 12:23:21
11 BY MR. REYNOLDS: 12:23:27
12 Q You started your answer by saying: "Well, 12:23:27
13 it depends on how you do the measurement." 12:23:31
14 Which measurement are you talking about? 12:23:33
15 A Well, you were asking about the measurement 12:23:35
16 that you obtained in order to test the result of 12:23:45
17 that measurement against the threshold. You can 12:23:48
18 measure either the amplitude or any of the -- any of 12:23:50
19 the other three things, which, as I indicated, are 12:23:55
20 proportional to the square of the amplitude. 12:23:58
21 Q How many ways would a POSITA have known to 12:24:06
22 do that measurement? 12:24:08

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1	MR. REEVES: Objection. Form. Calls for	12:24:09
2	speculation. Outside the scope.	12:24:11
3	THE WITNESS: There are multiple ways.	12:24:17
4	Depends on where you take the measurement.	12:24:19
5	If you use the microphone, then you're	12:24:21
6	measuring air pressure. If you're measuring some	12:24:23
7	electrical signal, then you'll be using something	12:24:25
8	akin to a voltmeter. If you're looking at the	12:24:29
9	digital representation of something, then you'll be	12:24:31
10	looking at numbers inside a computer.	12:24:34
11	BY MR. REYNOLDS:	12:24:40
12	Q Would the use of thresholds have the same	12:24:41
13	units for each of those ways you just mentioned?	12:24:49
14	MR. REEVES: Objection. Form. Asked and	12:24:53
15	answered. Calls for speculation.	12:24:54
16	THE WITNESS: No. As I said, in general,	12:24:55
17	if you're looking at the raw units, like volts,	12:24:57
18	and -- versus power, which would be watts, they	12:25:03
19	would be different units. If you were converting	12:25:07
20	everything to decibels, they would be the same unit,	12:25:09
21	but it all depends.	12:25:13
22	BY MR. REYNOLDS:	12:25:17

1 Q You said in general, but I'm interested in 12:25:17
2 the entire universe of possibilities. How many 12:25:19
3 possibilities would a POSITA have known, in terms of 12:25:23
4 which units to use, when employing a threshold? 12:25:28

5 MR. REEVES: Objection. Form. Calls for 12:25:34
6 speculation. Outside the scope. 12:25:35

7 THE WITNESS: I think I've already answered 12:25:37
8 that question. There are as many units as you have 12:25:38
9 ways to make the measurement. You know, I've talked 12:25:44
10 about volts and power and the conversion of both of 12:25:49
11 those into decibels, but you could also -- there are 12:25:54
12 other things that we haven't talked about. 12:25:58

13 You could look at current running through a 12:26:00
14 resistor carrying the same signal, which would be 12:26:03
15 proportional. You could look at charge on a device. 12:26:07
16 There's an unlimited number of different ways. 12:26:10

17 BY MR. REYNOLDS: 12:26:22

18 Q How many ways was there to write the logic 12:26:22
19 that would make a determination based on the 12:26:24
20 threshold? 12:26:26

21 MR. REEVES: Objection. Form. Calls for 12:26:28
22 speculation. Outside the scope. 12:26:31

1 THE WITNESS: In terms of doing the 12:26:36
2 threshold information -- I'm sorry -- the -- the 12:26:38
3 threshold determination, you have a signal coming 12:26:43
4 in, measured and described in the form of your 12:26:48
5 choosing, and it's compared to a fixed number that's 12:26:50
6 also in units of the same form as the input. 12:26:57
7 BY MR. REYNOLDS: 12:27:15
8 Q I'm trying to focus more on the logic or 12:27:19
9 the source code or the electrical processes that are 12:27:21
10 applied to the threshold once a value is measured 12:27:23
11 and -- and whether it's compared to the threshold or 12:27:30
12 some other way. How many different ways were there 12:27:34
13 to use the threshold as part of that process? 12:27:38
14 MR. REEVES: Same objections. 12:27:45
15 THE WITNESS: Sorry. 12:27:45
16 The logic is very simple. You have an 12:27:46
17 input, you have a fixed number, and you asked the 12:27:48
18 question: Is the input greater to -- greater than, 12:27:55
19 rather, or less than the value of the threshold? 12:27:57
20 The compilation comes in the sense that the 12:28:06
21 value of the threshold, if you implement this 12:28:08
22 correctly, is going to be situational. The way in 12:28:11

1	which you obtain the input will vary depending on	12:28:18
2	the application.	12:28:22
3	BY MR. REYNOLDS:	12:28:25
4	Q How many applications were there in 2018?	12:28:25
5	MR. REEVES: Objection. Form. Calls for	12:28:28
6	speculation. Outside the scope.	12:28:29
7	THE WITNESS: Lots of different	12:28:36
8	applications. 2018, any speech recognition	12:28:37
9	application, you might cluster the applications into	12:28:41
10	a smallish number of categories, such as speaker	12:28:51
11	recognition, language identification, speech	12:28:56
12	recognition, and so forth. But there are many, many	12:29:01
13	different ways of implementing those black box	12:29:05
14	functionalities, and I'm not going to attempt to	12:29:09
15	enumerate that. Every company, every laboratory	12:29:13
16	would have its own.	12:29:17
17	BY MR. REYNOLDS:	12:29:33
18	Q I'm not sure I'm going to get this right,	12:29:36
19	so just, you know, correct me if I'm wrong, but I	12:29:39
20	think you described that a POSITA would have	12:29:41
21	compared a value to the value of some measured	12:29:42
22	variable to the value of a threshold. I think you	12:29:47

1	described that as the simple part of the logic; is	12:29:50
2	that right?	12:29:53
3	A That's correct.	12:29:53
4	MR. REEVES: Objection. Form, to the	12:29:54
5	extent it misstates testimony. Outside the scope.	12:29:57
6	BY MR. REYNOLDS:	12:30:05
7	Q Would the measured value in the threshold	12:30:05
8	always have to have the same units?	12:30:07
9	A Yes.	12:30:09
10	MR. REEVES: Same objections.	12:30:09
11	THE WITNESS: Yes.	12:30:12
12	BY MR. REYNOLDS:	12:30:13
13	Q It would not have been possible for a	12:30:15
14	POSITA to create any system in which a value is	12:30:16
15	compared to a threshold where the value had a	12:30:20
16	different unit than the threshold?	12:30:23
17	MR. REEVES: Objection. Form, outside the	12:30:25
18	scope, asked and answered, and calls for	12:30:28
19	speculation.	12:30:31
20	THE WITNESS: It would be meaningless.	12:30:31
21	That would be the classic apples-to-oranges	12:30:32
22	comparison.	12:30:45

Transcript of Richard Stern, Ph.D.
Conducted on April 8, 2026

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1	BY MR. REYNOLDS:	12:30:45
2	Q I think we might have gone a little too	12:30:46
3	quickly through the instructions part. So I used	12:30:48
4	the word "paper" when I asked if you had anything in	12:30:51
5	front of you because some lawyers sometimes refer to	12:30:55
6	documents as paper. Looks like you have your reply	12:30:59
7	brief or -- I'm sorry -- your reply declaration in	12:31:02
8	front you, right?	12:31:04
9	A I do.	12:31:05
10	Q Okay.	12:31:05
11	A I should have -- it was placed in front of	12:31:08
12	me. I have in front of me the two reply	12:31:09
13	declarations that were written.	12:31:13
14	Q Okay.	12:31:14
15	A That's all I have.	12:31:15
16	Q Anything else in terms of -- in terms of	12:31:15
17	documents?	12:31:17
18	A In terms of documents, no. There's a	12:31:18
19	watch, a pair of glasses, a Coca-Cola can, and a	12:31:21
20	glass containing a partially consumed beverage.	12:31:26
21	Q Appreciate that.	12:31:29
22	A Too much information, maybe.	12:31:32

Transcript of Richard Stern, Ph.D.
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1 Q In 2018 would a POSITA have known how to 12:31:32
2 classify voices without basing the classification on 12:31:43
3 distance? 12:31:47

4 MR. REEVES: Objection. Form. Calls for 12:31:49
5 speculation. Outside the scope. 12:31:50

6 THE WITNESS: There are many ways of 12:31:53
7 classifying voices. Classification based on 12:31:57
8 distance is one of them. 12:32:00

9 BY MR. REYNOLDS: 12:32:01

10 Q What's one way a POSITA would have done 12:32:01
11 it -- been able to do it without basing the 12:32:03
12 classification on distance? 12:32:06

13 MR. REEVES: Objection. Calls for 12:32:09
14 speculation. Outside the scope. 12:32:10

15 THE WITNESS: You could classify voices 12:32:13
16 according to whether the voice is believed to be 12:32:16
17 coming from a male or a female. That would be based 12:32:18
18 on fundamental frequency estimation, which, of 12:32:21
19 course, isn't always correct, but you can tell more 12:32:24
20 time -- more often than not. 12:32:27

21 BY MR. REYNOLDS: 12:32:35

22 Q In 2018 would a POSITA have known how to 12:32:35

1	classify voices using volume without basing the	12:32:39
2	classification on distance?	12:32:42
3	MR. REEVES: Objection. Form.	12:32:44
4	THE WITNESS: Yes.	12:32:49
5	BY MR. REYNOLDS:	12:32:49
6	Q How would that be done?	12:32:50
7	A Well, you would measure the average energy,	12:32:50
8	intensity, power, amplitude -- any of those -- and	12:32:57
9	compare that with the threshold, or -- or not and	12:33:02
10	use that as a means for classification.	12:33:08
11	Q But wouldn't those values change if the	12:33:15
12	user's distance changed?	12:33:17
13	A Of course.	12:33:20
14	Q So how would a POSITA then have made a	12:33:20
15	classification using volume, but not distance?	12:33:26
16	MR. REEVES: Objection. Form. Calls for	12:33:31
17	speculation. Outside the scope.	12:33:36
18	THE WITNESS: There are other ways of	12:33:43
19	inferring distance beyond volume and, for that	12:33:44
20	matter, beyond a specific distance-sensing device,	12:33:53
21	as disclosed by some of the prior art that we cite	12:34:00
22	in, you know, my documents.	12:34:03

1	You can listen to how reverberant speech	12:34:09
2	sounds and at least within a given context, if that	12:34:15
3	remains constant over a period of time, you can look	12:34:21
4	for increases and decreases of the power, energy,	12:34:23
5	intensity, amplitude measurements you obtain to	12:34:30
6	estimate at least relative loudness, relative	12:34:35
7	volume.	12:34:38
8	BY MR. REYNOLDS:	12:34:43
9	Q In that instance, how would a POSITA have	12:34:43
10	made sure that while measuring power, energy,	12:34:46
11	intensity, amplitude measurements were not measuring	12:34:49
12	variables that also responded to changes in	12:34:53
13	distance?	12:34:56
14	MR. REEVES: Objection. Form. Calls for	12:34:57
15	speculation. Outside the scope.	12:35:00
16	THE WITNESS: You'd never be sure. That's	12:35:01
17	a difficult problem even today. Voice activity	12:35:04
18	detection is an important problem and it's	12:35:07
19	difficult, in part, because environmental factors	12:35:11
20	such as background noise and other interferent	12:35:16
21	speakers make an unambiguous determination	12:35:21
22	difficult.	12:35:25

1	BY MR. REYNOLDS:	12:35:33
2	Q So you're saying that if we looked at any	12:35:33
3	device or paper or specification published or	12:35:36
4	created in 2018 that analyzed some form of volume	12:35:43
5	when classifying voice, we could never be sure	12:35:49
6	whether it's based on distance or not?	12:35:52
7	MR. REEVES: Objection. Form, to the	12:35:56
8	extent it misstates testimony. Calls for	12:35:57
9	speculation. Outside the scope.	12:36:03
10	THE WITNESS: As you heard, I didn't say	12:36:04
11	that. You would be able to determine how the	12:36:05
12	classification was made based on how the system was	12:36:09
13	described. Normally that would be disclosed in a	12:36:13
14	research paper or technical document. All you asked	12:36:18
15	me before was: Are there other ways of doing it?	12:36:23
16	BY MR. REYNOLDS:	12:36:28
17	Q What's one way we -- a POSITA would have	12:36:29
18	been able to analyze a system that measured volume	12:36:32
19	when making a classification to determine whether or	12:36:39
20	not the system also used distance when making that	12:36:43
21	classification?	12:36:47
22	MR. REEVES: Objection. Form. Outside the	12:36:49

1	scope.	12:36:52
2	THE WITNESS: I'm sorry. That's a -- I had	12:36:52
3	trouble with the question. Could you repeat it,	12:36:56
4	please?	12:36:58
5	BY MR. REYNOLDS:	12:36:58
6	Q Sure.	12:36:59
7	So let's assume a POSITA is looking at a	12:36:59
8	system. The POSITA sees that the system measures	12:37:02
9	volume and the POSITA sees that the system also	12:37:07
10	classifies voices. How would a POSITA have been	12:37:14
11	able to determine, when looking at that system,	12:37:18
12	whether the system also bases the classification on	12:37:21
13	distance or whether the system doesn't use distance	12:37:24
14	when classifying voices?	12:37:28
15	MR. REEVES: Objection. Form. Calls for	12:37:30
16	speculation. Incomplete hypothetical. Outside the	12:37:33
17	scope.	12:37:37
18	THE WITNESS: I assume I'm still supposed	12:37:37
19	to answer that nonetheless. That was part of the	12:37:39
20	instructions that you didn't read.	12:37:43
21	The system would be designed either to use	12:37:47
22	a distance sensor or not, to use an energy or	12:37:54

1	amplitude estimation or not. That would be baked	12:37:59
2	into how the system was designed and constructed.	12:38:04
3	BY MR. REYNOLDS:	12:38:11
4	Q Well, I'm asking from the standpoint of a	12:38:12
5	POSITA that's analyzing the system, not from someone	12:38:14
6	who designed the system.	12:38:18
7	How would a POSITA have assessed that,	12:38:19
8	whether that system actually used distance or not,	12:38:21
9	when classifying the voices?	12:38:23
10	MR. REEVES: Same objections.	12:38:27
11	THE WITNESS: Typically by examining the	12:38:28
12	code that implemented the system, if it were in	12:38:30
13	hardware -- software, rather, or the physical	12:38:33
14	configuration or schematic, if it were implemented	12:38:36
15	in hardware, or in combination, which	12:38:41
16	components/which kinds of sensors were used.	12:38:46
17	BY MR. REYNOLDS:	12:38:51
18	Q What would a POSITA look for when analyzing	12:38:52
19	software or the logic in hardware components?	12:38:55
20	MR. REEVES: Same objections.	12:39:00
21	THE WITNESS: Does the system have a	12:39:03
22	distance sensor explicitly? Does the system have a	12:39:05

1 microphone explicitly or equivalent device? How 12:39:09
2 many? And then you can go beyond that. Once again, 12:39:15
3 look at the code or the schematic of what those 12:39:21
4 components contain. 12:39:27
5 BY MR. REYNOLDS: 12:39:31
6 Q What if the system didn't have a distance 12:39:31
7 sensor, it only had a microphone? How would a 12:39:34
8 POSITA have determined whether the system was using 12:39:39
9 distance to classify voices or not? 12:39:42
10 MR. REEVES: Objection. Form. Calls for 12:39:47
11 speculation and incomplete hypothetical. Outside 12:39:48
12 the scope. 12:39:52
13 THE WITNESS: If you had two microphones, 12:39:52
14 you could estimate the time delay between the two 12:39:56
15 microphones and use that to estimate the angle of 12:39:59
16 arrival from the two, and that would give you some 12:40:08
17 information about where -- you know, through 12:40:10
18 trigonometry, where the voice source might be 12:40:14
19 located. 12:40:19
20 On the other hand, if there were nothing 12:40:21
21 but a microphone, more than likely, the -- I'm 12:40:23
22 sorry. This is terrible, but I've forgotten the -- 12:40:37

1	the tail end of the original question. Would you	12:40:41
2	mind repeating it?	12:40:43
3	BY MR. REYNOLDS:	12:40:43
4	Q Sure. Yeah. No, not a problem.	12:40:44
5	What I'm trying to get at is how would a	12:40:47
6	POSITA have determined whether the device the POSITA	12:40:50
7	was looking at used distance in its classification	12:40:52
8	process or not. So the POSITA is looking at a	12:40:56
9	device that has one microphone and no distance	12:40:59
10	sensor.	12:41:03
11	How would a POSITA determine whether that	12:41:04
12	device or system is using distance when it	12:41:06
13	classifies voices?	12:41:09
14	MR. REEVES: Same objections.	12:41:11
15	THE WITNESS: Most likely the system would	12:41:16
16	be -- once again, are we trying to detect loudness	12:41:22
17	or -- or distance using just the single microphone?	12:41:25
18	That's the part that I've lost track of because	12:41:29
19	it's --	12:41:32
20	BY MR. REYNOLDS:	12:41:35
21	Q Well, all we know -- I'm sorry. Go ahead.	12:41:35
22	I thought you were done. Please, go ahead.	12:41:37

1 A You were asking how does the system -- how 12:41:41
2 do we know how the system detects something if it 12:41:45
3 just has a microphone and no additional sensors, and 12:41:49
4 I was asking what is that additional something. 12:41:52

5 Q Oh, well, the -- so we -- we have a system 12:42:00
6 with a microphone, but no distance sensor, and the 12:42:04
7 POSITA knows that the system classifies voices and 12:42:10
8 the POSITA knows that the system measures volume. 12:42:13
9 How would a POSITA have determined whether the 12:42:17
10 system also uses distance to classify voices or 12:42:18
11 whether it doesn't use distance to classify voices? 12:42:23

12 A Okay. 12:42:28

13 MR. REEVES: Objection. Form. Incomplete 12:42:29
14 hypothetical. Outside the scope. 12:42:30

15 THE WITNESS: Thank you. 12:42:32

16 As I alluded to before, more than likely 12:42:32
17 the system wouldn't use distance at all because 12:42:41
18 that's the simple way of doing it. It would base 12:42:44
19 the determination on energy and intensity, et 12:42:47
20 cetera, et cetera. 12:42:49

21 You could, again, infer some information 12:42:51
22 about distance by assessing the amount of 12:42:56

1 reverberance in the signal coming in. Typically, 12:42:59
2 the more reverberance, the farther -- the farther 12:43:06
3 the source is from the microphone. 12:43:08

4 So nothing is absolute, but the more likely 12:43:11
5 thing would be you're not using distance at all 12:43:24
6 because it's simpler, a lot simpler. 12:43:26

7 BY MR. REYNOLDS: 12:43:29

8 Q How would a POSITA confirm that it doesn't 12:43:29
9 use distance at all? I think you said more likely, 12:43:31
10 but how would a POSITA confirm that fact? 12:43:33

11 A You would look at the code or the hardware 12:43:37
12 implementation of that code to determine what the 12:43:43
13 algorithm was. Are you assessing anything beyond 12:43:45
14 mere energy, power, amplitude, intensity, or is that 12:43:50
15 all that's being considered? 12:43:55

16 Q When you say "energy, power, amplitude, 12:44:02
17 intensity," you mean variables associated with 12:44:07
18 volume, right? 12:44:10

19 A That's correct. 12:44:11

20 Q In 2018 would a POSITA have known how to 12:44:16
21 measure distance using only volume? 12:44:19

22 MR. REEVES: Objection. Form. That calls 12:44:23

1	for speculation. Outside the scope.	12:44:25
2	THE WITNESS: Even today, distance	12:44:29
3	measuring only volume is difficult, but not	12:44:32
4	impossible.	12:44:36
5	BY MR. REYNOLDS:	12:44:43
6	Q How would a POSITA have done it in 2018 if	12:44:44
7	it's not impossible?	12:44:46
8	MR. REEVES: Objection. Form. Calls for	12:44:48
9	speculation. Outside the scope.	12:44:49
10	THE WITNESS: Most common thing is the	12:44:54
11	estimation of how -- how reverberant the signal is,	12:45:00
12	coupled with relative intensity. With no	12:45:05
13	information at all and with no reliance at all on	12:45:12
14	volume, it's a very, very difficult problem. People	12:45:15
15	are trying to address that now, but it's much more	12:45:22
16	difficult than assessing where a source is, left,	12:45:25
17	right, up, or down.	12:45:32
18	The reason --	12:45:36
19	BY MR. REYNOLDS:	12:45:37
20	Q I think you said -- oh, I'm sorry. I keep	12:45:37
21	doing that.	12:45:39
22	A Well, it's also -- I keep pausing.	12:45:40

1 If you don't use volume at all, that's very 12:45:46
2 restrictive, but in general, because of the way 12:45:50
3 sound is propagated, the farther the source -- the 12:45:56
4 farther away the source is, the lower the volume of 12:45:59
5 the stuff coming in. You know, unfortunately, 12:46:04
6 that's a relative measure because that's also 12:46:08
7 affected by the loudness with which a person speaks. 12:46:10

8 Q So my question was if a POSITA in 2018 12:46:26
9 would have known how do you -- to measure distance 12:46:36
10 using only volume, not excluding volume, but only 12:46:39
11 using volume. 12:46:43

12 A That sounded like half a question. There 12:46:51
13 was an if, but what followed? 12:46:53

14 Q Sure. Let me -- let me start over. 12:46:56

15 In 2018 would a POSITA have known how to 12:46:57
16 measure distance using only volume? 12:47:02

17 MR. REEVES: Objection. Form. Calls for 12:47:05
18 speculation. Outside the scope. 12:47:07

19 THE WITNESS: That's something that a 12:47:21
20 POSITA -- a POSITA in 2026 is not going to be able 12:47:23
21 to do accurately, but it could be done using, you 12:47:27
22 know, relative volume. You'd make an estimate, but 12:47:35

1	it wouldn't be super accurate.	12:47:38
2	BY MR. REYNOLDS:	12:47:51
3	Q You mentioned in terms of 2026. Would the	12:47:52
4	answer have been different in 2018?	12:47:54
5	A Well, I guess what I was trying to imply	12:47:56
6	was that if we can't do it in 2026, we would not	12:48:01
7	have been able to do it in 2018.	12:48:05
8	Q You mentioned using relative volume. That	12:48:11
9	would still require some sort of a priori starting	12:48:15
10	point, right?	12:48:21
11	MR. REEVES: Objection. Form. Calls for	12:48:22
12	speculation. Incomplete hypothetical. Outside the	12:48:26
13	scope.	12:48:30
14	THE WITNESS: Not necessarily. Normally,	12:48:30
15	you look at the average volume over a period of time	12:48:34
16	in the past and compare it to the present volume,	12:48:37
17	and, again, that'll give you an indication, not	12:48:42
18	without some variability, of whether you're	12:48:46
19	talking -- whether the signal is more intense or	12:48:52
20	less intense.	12:48:55
21	But that's confounded by the fact that	12:48:56
22	volume can also change when the loudness with which	12:48:58

1	a speaker vocalizes changes as well, and that's why	12:49:03
2	this is a hard problem.	12:49:08
3	BY MR. REYNOLDS:	12:49:17
4	Q And I understand, I think, why it's a hard	12:49:17
5	problem, but what I guess I don't understand is how	12:49:20
6	it's even possible if a device gets two different	12:49:24
7	volumes and it doesn't know where the -- either the	12:49:30
8	first or second volume are located, then how can it	12:49:36
9	use just that ratio alone to make a distance	12:49:40
10	determination?	12:49:43
11	MR. REEVES: Objection. Form. Calls for	12:49:46
12	speculation. Outside the scope.	12:49:49
13	THE WITNESS: You would compare volume	12:49:57
14	measurements made over a period of time and assume	12:50:00
15	that -- or not assume, but have your algorithm make	12:50:07
16	a determination that the ones that are lower are	12:50:12
17	farther away, but as I said, and as you've	12:50:18
18	reiterated, that is confounded by the fact that the	12:50:23
19	intensity of a speaker can change. That is, the	12:50:27
20	volume of the sound emitted by the speaker could	12:50:38
21	change.	12:50:41
22	BY MR. REYNOLDS:	12:50:41

1 Q I understand that it's confounded, but two 12:50:41
2 different changes in distance from user starting at 12:50:50
3 different starting points could show the device the 12:50:56
4 exact same change in volume, depending on how loud 12:51:01
5 each is speaking, right? 12:51:07

6 MR. REEVES: Objection. Form. Calls for 12:51:09
7 speculation. Incomplete hypothetical. Outside the 12:51:10
8 scope. 12:51:17

9 THE WITNESS: Just to make sure I can 12:51:17
10 answer this, would you mind repeating the question? 12:51:18

11 BY MR. REYNOLDS: 12:51:18

12 Q Sure. 12:51:21

13 If we have two users who start at two 12:51:22
14 different locations -- one starts very far from the 12:51:26
15 device, one starts very close to the device -- and 12:51:29
16 the device measures these two individuals at 12:51:34
17 different times, if the user very far from the 12:51:37
18 device was speaking much louder, and then later, the 12:51:43
19 user closer to the device was speaking much softer 12:51:46
20 and then both started to move, such that the volume 12:51:51
21 received at the device changed, it is possible that 12:51:55
22 the device can see the exact same starting and final 12:51:57

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Conducted on April 8, 2026

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1	volumes from both speakers, right?	12:52:00
2	MR. REEVES: Same objections.	12:52:04
3	THE WITNESS: That is correct.	12:52:06
4	BY MR. REYNOLDS:	12:52:07
5	Q So would there have been any way in 2018,	12:52:07
6	using just that information, to differentiate	12:52:10
7	between the two speakers?	12:52:13
8	MR. REEVES: Same objections.	12:52:17
9	THE WITNESS: I think that your question as	12:52:30
10	you're posing it unrealistically overconstrained.	12:52:33
11	You're asking me to determine whether a system could	12:52:37
12	discriminate, just paying attention to volume.	12:52:42
13	In truth, a POSITA or a well-informed	12:52:45
14	system designer would want to make use of every	12:52:52
15	aspect of the signal that's available coming in	12:52:55
16	through the microphone. I've already mentioned	12:52:59
17	reverberation. You can look for other attributes of	12:53:02
18	the speech: Is it a male or a female? Is the	12:53:05
19	location different? You can try to identify, you	12:53:09
20	know -- you know, accents. Is the person a French	12:53:17
21	speaker or Latino speaker?	12:53:22
22	So if you were truly trying to do that and	12:53:26

1	that were an important goal of the system, using	12:53:29
2	only microphone input, then you would use more than	12:53:32
3	just volume.	12:53:35
4	BY MR. REYNOLDS:	12:53:36
5	Q But what if we didn't have a well-informed	12:53:36
6	designer and they demanded that we just use volume.	12:53:40
7	Could it be done?	12:53:45
8	A As I --	12:53:46
9	MR. REEVES: Same objections.	12:53:48
10	THE WITNESS: As I already told you, that	12:53:49
11	would be very difficult. It's a hard problem.	12:53:51
12	You've identified the important elements, that the	12:53:53
13	relative loudness could change, based both on the	12:53:57
14	intrinsic force with which the user vocalizes, and	12:54:05
15	the distance between the speaker and the -- and the	12:54:11
16	device.	12:54:15
17	BY MR. REYNOLDS:	12:54:18
18	Q So you say, "very difficult," but you're	12:54:18
19	not willing to say, in my unrealistically	12:54:23
20	overconstrained hypothetical, that it would be	12:54:28
21	possible?	12:54:30
22	MR. REEVES: Objection. Form. Asked and	12:54:31

1	answered. Calls for speculation. Incomplete	12:54:33
2	hypothetical. Outside the scope.	12:54:35
3	THE WITNESS: Not impossible if you're	12:54:43
4	looking -- if you take one measurement and have one	12:54:45
5	number coming in, you'd not be able to do it, but by	12:54:48
6	looking at sequences of measurements over time, you	12:54:53
7	might be able to do -- you might be able to get some	12:54:57
8	performance out of that.	12:55:02
9	And as I said, it's a hard problem. A	12:55:03
10	POSITA today would have a hard time with it, but	12:55:10
11	everybody recognizes that. Nobody tries to do it	12:55:13
12	that way.	12:55:16
13	BY MR. REYNOLDS:	12:55:19
14	Q How would looking at sequences of	12:55:19
15	measurements over time assist in allowing one to	12:55:21
16	determine distance, where just looking at a single	12:55:28
17	measurement they wouldn't be able to?	12:55:31
18	MR. REEVES: Objection. Form. Outside the	12:55:34
19	scope.	12:55:38
20	THE WITNESS: First of all, I'm assuming	12:55:38
21	there's only one person talking at a time.	12:55:39
22	Occasionally you've raised the possibility of two	12:55:44

1 speakers, and that confounds the problem, but I 12:55:46
2 don't believe that was the question -- the problem 12:55:49
3 you were originally addressing. 12:55:51
4 Sequences over time would enable you to -- 12:55:54
5 again, with the assumption that the person is 12:56:03
6 speaking with more or less constant vocal effort, 12:56:06
7 but comparing that, that would enable you to infer, 12:56:11
8 or the machine to infer, whether the user is 12:56:15
9 becoming closer or -- or farther from the device. 12:56:18
10 BY MR. REYNOLDS: 12:56:29
11 Q I'm sorry. Go ahead. 12:56:29
12 A Oh, yeah. I was debating whether to add 12:56:31
13 this, but I will anyhow. 12:56:34
14 That will still make rendering an absolute 12:56:40
15 determination, you know, difficult, but that's 12:56:42
16 always a problem. 12:56:47
17 MR. REEVES: Counsel, would now be a good 12:57:02
18 time for a break? 12:57:04
19 MR. REYNOLDS: Sure. Five? 12:57:06
20 MR. REEVES: Sure. 12:57:09
21 THE VIDEOGRAPHER: Okay. Stand by. 12:57:11
22 Going off the record. The time is 12:57. 12:57:12

1	(Recess.)	12:57:15
2	THE VIDEOGRAPHER: Back on the record. The	13:02:39
3	time is 13:02.	13:02:41
4	BY MR. REYNOLDS:	13:02:43
5	Q All right. Dr. Stern, I apologize for keep	13:02:44
6	coming back to this, but I just want to try to put a	13:02:47
7	finer point on it, if for no other reason than I'm	13:02:50
8	just having a tough time myself.	13:02:54
9	Let's set up a hypothetical where we have a	13:02:57
10	user that's ten feet from a device that's speaking	13:03:00
11	at ten decibels.	13:03:03
12	A Okay.	13:03:06
13	Q If that user steps one foot closer to the	13:03:06
14	device, speaking at the same ten decibels, the	13:03:09
15	device is going to register a change in volume,	13:03:13
16	right?	13:03:16
17	MR. REEVES: Objection. Form. Calls for	13:03:18
18	speculation and incomplete hypothetical. Outside	13:03:21
19	the scope.	13:03:23
20	THE WITNESS: That's correct.	13:03:23
21	BY MR. REYNOLDS:	13:03:27
22	Q Now, if another user was a hundred feet	13:03:27

1	from the device speaking at ten decibels, there is a	13:03:30
2	distance at which that user could move closer to the	13:03:38
3	device and still speak at a hundred decibels, for	13:03:41
4	which the device would measure the exact same change	13:03:47
5	as with the first user, right?	13:03:50
6	MR. REEVES: Same objections.	13:03:54
7	THE WITNESS: That's correct, and the	13:03:54
8	distance would be the same distance as the first	13:03:56
9	user was at.	13:03:59
10	BY MR. REYNOLDS:	13:04:04
11	Q And that's because volume decreases with	13:04:04
12	the square of distance and decibels are measured on	13:04:06
13	a logarithmic scale.	13:04:09
14	Is that roughly why?	13:04:14
15	A No. That's correct.	13:04:15
16	Q Okay. So --	13:04:17
17	A And it's actually amplitude or pressure	13:04:18
18	that decreases with the square of distance, but it	13:04:21
19	doesn't matter. The principles are correct as you	13:04:24
20	state them.	13:04:27
21	Q Understood. I'm an aerospace engineer, so	13:04:27
22	I will have to let my school know that I made that	13:04:30

1	mistake.	13:04:32
2	A No, you don't.	13:04:34
3	Q So two users at two different devices cause	13:04:37
4	the same decrease in volume by moving, and so I	13:04:42
5	guess that's what leads me to believe that it might	13:04:46
6	be impossible for a device to use just volume to	13:04:48
7	determine distance because I don't see how it would	13:04:51
8	have been able to differentiate between the -- those	13:04:54
9	two users.	13:04:58
10	Is there a way a device -- or how would a	13:05:01
11	device -- or how would a POSITA in 2018 been able to	13:05:06
12	program a device to distinguish between the two	13:05:08
13	users in that hypothetical?	13:05:11
14	MR. REEVES: Objection. Form. Calls for	13:05:13
15	speculation and incomplete hypothetical. Outside	13:05:14
16	the scope.	13:05:21
17	THE WITNESS: Just working from the audio,	13:05:21
18	there are other means by which you could attempt to	13:05:23
19	identify which individual it was. These are all of	13:05:27
20	the various things that go into speaker	13:05:31
21	identification.	13:05:33
22	BY MR. REYNOLDS:	13:05:38

1	Q	What's one means by which you could have	13:05:39
2		done so just using the volume measurements?	13:05:41
3	MR. REEVES:	Objection. Form. Calls for	13:05:45
4		speculation. Outside the scope.	13:05:46
5	THE WITNESS:	Just using the value	13:05:51
6		measurement -- the volume measurements, no. But in	13:05:53
7		the previous question that I responded to, there	13:05:56
8		wasn't a volume measurement constraint in the	13:05:59
9		question. So I answered using the more general	13:06:01
10		analysis.	13:06:07
11	BY MR. REYNOLDS:		13:06:07
12	Q	Okay. But just using the volume, a POSITA	13:06:08
13		would not have been able to program a device that	13:06:11
14		could distinguish between the two users in that	13:06:13
15		hypothetical, in terms of distance?	13:06:17
16	MR. REEVES:	Same objections.	13:06:21
17	THE WITNESS:	Well, if I remember how you	13:06:23
18		constructed the situation, the first user was at a	13:06:24
19		distance -- some distance, speaking at, shall we	13:06:30
20		say, 10 dB SPL and the second user was also at the	13:06:36
21		same distance speaking at 10 dB SPL, and under those	13:06:42
22		circumstances, you would not be able to distinguish	13:06:49

1 them, but, in fact, they were speaking from the same 13:06:52
2 distance. 13:06:56
3 BY MR. REYNOLDS: 13:06:59
4 Q You said 10 dB SPI or SPL? 13:07:00
5 A SPL. That's for sound pressure level. 13:07:04
6 Q Okay. The hypothetical I set up was one 13:07:07
7 user was at ten feet and the other user was at a 13:07:11
8 hundred feet beginning point, and then they each 13:07:14
9 moved enough of a distance that the device 13:07:16
10 registered the same change in volume. 13:07:21
11 In that circumstance, would it be possible 13:07:26
12 to differentiate between -- and the users did so at 13:07:28
13 different times in that circumstance. 13:07:31
14 A You mean -- 13:07:34
15 Q I'm sorry. Go ahead. 13:07:35
16 A Object? 13:07:37
17 MR. REEVES: Yeah. I guess, to the extent 13:07:39
18 there's a question here, objection. Form. Calls 13:07:41
19 for speculation. Outside the scope. 13:07:45
20 THE WITNESS: Just being very careful, you 13:07:51
21 said first speaker starts at, you know, close to, 13:07:53
22 say, ten feet at ten -- 10 dB SPL is just absolute. 13:07:56

1 Second user starts at a hundred feet, also speaking 13:08:04
2 at 10 dB SPL -- that's just the units for decibels 13:08:09
3 that specifies the reference -- and at that point 13:08:19
4 everything is constrained. 13:08:22

5 Indeed, the system would recognize that the 13:08:26
6 closer speaker would come in as louder, more 13:08:29
7 intense, and you'd be -- you'd be able to identify 13:08:32
8 the -- which individual was speaking. 13:08:37

9 Now, beyond that, I kind of got lost 13:08:40
10 because I think that you were interchanging change 13:08:47
11 in volume with volume, and I wasn't sure which was 13:08:49
12 which. 13:08:53

13 But just moving ahead for a moment, you 13:08:53
14 were suggesting that one of them could change his or 13:08:58
15 her position, say the far one moves closer, and if 13:09:01
16 he or she continues to speak at 10 dB, then the 13:09:06
17 point at which the two volumes become -- the two 13:09:12
18 measurements become equal should, from the physics, 13:09:16
19 be the point at which they're at equal distance. 13:09:20

20 BY MR. REYNOLDS: 13:09:20

21 Q Okay. I understand the confusion and how I 13:09:53
22 was not -- well, let me start over. 13:09:56

1 Let's assume that the speaker at ten feet 13:10:00
2 speaks at a volume of, say, 10 decibels, but that 13:10:07
3 the speaker at a hundred feet speaks at a volume, 13:10:11
4 perhaps, 30 decibels, for which the device would 13:10:14
5 receive the same volume of both speakers. 13:10:18

6 Does that make sense if we make that 13:10:21
7 assumption? 13:10:23

8 A Yeah. I'm not sure the right number's 30 13:10:23
9 decibels, but there will be some louder intensity 13:10:25
10 with which the farther speaker would speak that 13:10:30
11 would result in the volume measurement, shall we 13:10:33
12 say, being the same for the two speakers. 13:10:39

13 Q Okay. So in that hypothetical, if both 13:10:45
14 users speaking to the device at separate times moved 13:10:48
15 distances toward the device such that the ending 13:10:55
16 volume of their -- the volume at their second 13:10:59
17 position was also received to be the same at the 13:11:02
18 device -- in that instance, could the device 13:11:05
19 determine -- distinguish between the two -- the 13:11:09
20 distance of the two users? 13:11:11

21 MR. REEVES: Objection. Form. Calls for 13:11:14
22 speculation. Incomplete hypothetical. Outside the 13:11:16

1	scope.	13:11:25
2	THE WITNESS: Well, let's back up a step.	13:11:25
3	The -- if you knew exactly what the	13:11:28
4	intensity was from the speech coming from the	13:11:38
5	speakers, then, in principle -- and if your	13:11:44
6	microphone were absolutely calibrated, which	13:11:51
7	normally it wouldn't be, but if it were, then in	13:11:53
8	principle, you should be able to infer the -- the	13:11:58
9	distance using calculations related to the inverse	13:12:02
10	square law that you cited. The acoustics have an	13:12:08
11	equation that tell you what the number should be.	13:12:15
12	I'm not going to attempt to calculate it, but we	13:12:19
13	don't need to do that.	13:12:22
14	The way you set the problem up originally	13:12:31
15	is that you have a speaker at ten feet, shall we	13:12:34
16	say, and at a hundred feet, another one, and the	13:12:39
17	first one speaks at 10 dB and the second one speaks	13:12:43
18	at some louder volume such that the signal receiving	13:12:46
19	by the microphone is the same volume.	13:12:52
20	Even under those circumstances, before we	13:12:54
21	start moving the speakers around, you're not --	13:12:57
22	unless the system knows the intensity of each of the	13:13:02

1	two speakers, you're not going to be able to infer	13:13:07
2	the distance. You're just going to know that you	13:13:10
3	have two numbers and that they're the same number.	13:13:14
4	BY MR. REYNOLDS:	13:13:14
5	Q Okay. And then if the device can't infer	13:13:24
6	if the distance from the starting point, then if	13:13:26
7	there's a sequence of volumes measured, how would	13:13:31
8	the device be able to infer the distance using	13:13:34
9	additional volume measurements?	13:13:38
10	A Well, it would be --	13:13:40
11	MR. REEVES: Sorry.	13:13:42
12	Objection. Form. Calls for speculation.	13:13:43
13	Outside the scope.	13:13:46
14	THE WITNESS: It would not. It would be	13:13:58
15	able to infer that you're moving closer or moving	13:14:00
16	farther away.	13:14:03
17	BY MR. REYNOLDS:	13:14:41
18	Q All right. I have put your reply	13:14:41
19	declaration into the Chat. I understand you have it	13:14:43
20	in front of you, but would you take a moment to look	13:14:46
21	at the one in the Chat and just confirm that they're	13:14:48
22	the same?	13:14:50

Transcript of Richard Stern, Ph.D.
Conducted on April 8, 2026

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1	A	How do I access the Chat here? Looks like	13:15:10
2		it's different. I'm clicking on the icon that says:	13:15:14
3		"Chat," on the bottom. Oh, have to have a	13:15:19
4		professional.	13:15:31
5	MR. REEVES:	Can we go off the record for a	13:15:44
6		minute and just fix this technical issue?	13:15:46
7	MR. REYNOLDS:	Yeah.	13:15:50
8	THE WITNESS:	Yeah, I think what's going on	13:15:51
9		is I have to download it.	13:15:54
10	THE VIDEOGRAPHER:	Stand by.	13:15:55
11		Going off the record. The time is 13:15.	13:15:56
12		(Recess.)	13:16:01
13	THE VIDEOGRAPHER:	Back on the record. The	13:17:20
14		time is 13:17.	13:17:21
15	BY MR. REYNOLDS:		13:17:23
16	Q	Dr. Stern, is the exhibit I put into the	13:17:24
17		Chat the same as the reply declaration of Richard	13:17:26
18		Stern, Ph.D. that you have in front of you?	13:17:34
19	A	I only looked at a few pages, but it looks	13:17:37
20		like it's the same.	13:17:40
21	Q	They're both marked as Exhibit 1202 on the	13:17:41
22		front?	13:17:43

1	A	Correct.	13:17:44
2	Q	All right. I'd like you to look at	13:17:47
3		paragraph 5 of your declaration.	13:17:49
4	A	Okay.	13:18:01
5	Q	Is it your opinion that the voice	13:18:07
6		classifying unit recited in the claims of the six --	13:18:08
7		'675 patent may classify the user's voice based	13:18:12
8		solely on user-to-device distance?	13:18:17
9	A	As I say in the declaration, beginning on	13:18:44
10		paragraph 6: "The '675 patent...confirms my opinion	13:18:48
11		that the classification can be based solely on the	13:18:53
12		measured distance."	13:18:55
13		In other words, you don't need anything	13:18:57
14		else besides distance.	13:18:59
15	Q	And in paragraph 5, you rely on paragraph	13:19:01
16		59 of your opening declaration, right?	13:19:08
17	A	That appears to be the case. I don't have	13:19:19
18		a copy of the opening declaration in front of me.	13:19:21
19		You want to put it in the Chat if you're	13:19:29
20		going to ask about that?	13:19:31
21	Q	Yes.	13:19:36
22	A	Can I get a copy here?	13:19:37

Transcript of Richard Stern, Ph.D.
Conducted on April 8, 2026

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1	MR. REEVES: Yeah, we have a paper copy of	13:19:40
2	this as well, without objection, Counsel.	13:19:42
3	MR. REYNOLDS: No objection.	13:19:45
4	MR. REEVES: And could I also note for the	13:19:50
5	record that both of these declarations are for the	13:19:51
6	IPR2025-00673.	13:19:55
7	BY MR. REYNOLDS:	13:20:02
8	Q Dr. Stern, can you confirm that the paper	13:20:02
9	you've just been given is -- bears the same exhibit	13:20:04
10	stamp as the one I put in the Chat, that is	13:20:08
11	Exhibit 1002?	13:20:12
12	A Yeah, I'm working on that.	13:20:17
13	Both of the -- both of the documents that	13:20:24
14	are in the Chat -- oh, this is 1002.	13:20:27
15	It's downloading right now.	13:20:41
16	Yes, it also has the -- yeah, Exhibit	13:20:45
17	No. 1002.	13:20:51
18	Q Okay. In Exhibit 1002, would you please go	13:20:54
19	to page 28 and look at paragraph 59?	13:21:11
20	A Yes. One second. I'm trying to -- I'm	13:21:15
21	trying to --	13:21:26
22	THE COURT REPORTER: I can't hear you.	13:21:27

1	THE WITNESS: Which paragraph?	13:21:29
2	BY MR. REYNOLDS:	13:21:29
3	Q 59 in Exhibit 1002.	13:21:31
4	A Okay. I'm there now.	13:21:41
5	Q And in -- in paragraph 59 of 1002, you cite	13:21:46
6	to two portions of the '675 patent. The first is	13:21:51
7	column 10, lines 32 to 38, and the second is column	13:21:56
8	10, lines 42 to 46, right?	13:22:00
9	A Yes. All I can say is that's what the text	13:22:03
10	says. Would you like me to look at the patent	13:22:08
11	itself?	13:22:10
12	Q No. I'm just confirming that the portions	13:22:11
13	of the '675 patent you cite in paragraph 59 of	13:22:13
14	Exhibit 1002 are the same portions you rely on in	13:22:18
15	paragraph 6 of your reply declaration, Exhibit 1202.	13:22:22
16	Can you tell me if that's the case?	13:22:30
17	A That is correct.	13:22:39
18	Q You said you don't have the -- the '675	13:22:49
19	patent in front of you; is that correct?	13:22:53
20	A It's here, but it hasn't been presented to	13:22:55
21	me.	13:22:58
22	Q I just put it in the Chat.	13:22:58

1	When you're downloading it and taking a	13:23:19
2	look at it, could you please confirm that	13:23:21
3	Exhibit 1001 in the Chat is the same as Exhibit 1001	13:23:24
4	in front of you, based on the exhibit stamp on the	13:23:28
5	front page?	13:23:41
6	A Yes, it is the same.	13:23:41
7	Q Where in column 10 of the '675 patent does	13:23:48
8	it disclose an embodiment in which only distance is	13:23:57
9	used to classify voices?	13:24:00
10	MR. REEVES: Objection. Form.	13:24:07
11	THE WITNESS: Well, as I state in the	13:24:40
12	declaration -- in -- in the reply declaration,	13:24:42
13	the -- the claim language says classifying the voice	13:24:59
14	into either first voice or second voice based on the	13:25:02
15	calculated distance, and in column 10, I go on to	13:25:05
16	say: "The claims do not require the classification	13:25:11
17	to be based on anything other than distance.	13:25:13
18	Nothing in the claim precludes calculation [sic]	13:25:16
19	based on distance alone," and in the specification	13:25:20
20	in 32 to 38, column 10, also explicitly discloses	13:25:25
21	classifying based on distance alone.	13:25:30
22	BY MR. REYNOLDS:	13:25:35

1	Q	Where does it say that in column 10 of the	13:25:35
2		'675 patent?	13:25:37
3	MR. REEVES:	Objection. Form. Asked and	13:25:41
4		answered.	13:25:59
5	THE WITNESS:	The text in the specification	13:25:59
6		of this patent refers only to distance and nothing	13:26:00
7		else.	13:26:03
8	BY MR. REYNOLDS:		13:26:05
9	Q	Which text are you referring to?	13:26:06
10	A	I'm looking at the patent itself, column	13:26:09
11		10, 32 to 38, up to the end of the sentence there.	13:26:12
12	Q	Can you read the portion you're relying on?	13:26:24
13	A	Of course.	13:26:26
14		"Furthermore, a proximity sensor can be	13:26:28
15		provided in" -- actually, let me go back up to 32.	13:26:30
16		Yeah.	13:26:35
17		"Furthermore, a proximity sensor can be	13:26:35
18		provided in the output-content-control device 1, a	13:26:39
19		distance between the user H and the	13:26:44
20		output-content-control device 1 is calculated from a	13:26:46
21		detection result of the proximity sensor, and in	13:26:49
22		[sic] the distance can be used as a feature value to	13:26:54

1 perform the classification to the first voice V1A 13:26:57
2 and the second voice V1B," or V-1-A and V-1-B. 13:27:02
3 "Moreover" -- that's it. 13:27:10
4 Q Okay. So the part you read says the 13:27:12
5 distance can be used as a feature value, right? 13:27:15
6 A Yes. 13:27:17
7 Q So what does the article -- does the 13:27:18
8 article "a" mean only -- the only feature value, or 13:27:20
9 does it mean one or more feature values? 13:27:26
10 A It means one -- 13:27:28
11 MR. REEVES: Objection. Form. 13:27:29
12 THE WITNESS: It means one or more, but the 13:27:31
13 specification discloses a method by which the 13:27:34
14 classification can be performed using distance 13:27:40
15 alone, and then it's what I declare in declaration. 13:27:46
16 BY MR. REYNOLDS: 13:27:54
17 Q Which portions -- which portions of this 13:27:54
18 column 10 state -- disclose an embodiment where only 13:27:56
19 distance is used? 13:28:03
20 MR. REEVES: Objection. Form. Asked and 13:28:05
21 answered. 13:28:09
22 THE WITNESS: It doesn't say only, but I 13:28:09

1 don't claim that either. 13:28:12

2 The supposition on the table is that the 13:28:14

3 distance -- I'm sorry -- the classification can be 13:28:18

4 performed based only on distance. I do not assert 13:28:20

5 that that's the only way that the classification can 13:28:26

6 be performed. 13:28:30

7 BY MR. REYNOLDS: 13:28:49

8 Q Supposition aside, is there anywhere in the 13:28:50

9 patent where the patent expressly discloses a 13:28:52

10 bodiment [sic] that makes a classification of voices 13:28:55

11 using only distance? 13:28:59

12 MR. REEVES: Objection. Form. Asked and 13:29:02

13 answered. 13:29:04

14 THE WITNESS: I'm not sure. I don't 13:29:09

15 remember. 13:29:15

16 BY MR. REYNOLDS: 13:29:15

17 Q Would you look at paragraph 9? 13:29:20

18 A Yes. 13:29:22

19 Q Is there a distinction in your mind between 13:29:22

20 classifying inputs on one hand and adjusting outputs 13:29:28

21 on the other hand in output-content control devices? 13:29:33

22 MR. REEVES: Objection. Form. 13:29:42

1 THE WITNESS: The '67 [sic] patent, as in 13:29:43
2 the case of the prior art references that we cite, 13:29:47
3 disclose adjusting output content based on the 13:29:51
4 classification decision of the distance measurement. 13:29:59
5 BY MR. REYNOLDS: 13:30:09
6 Q Those are two different processes, right? 13:30:09
7 MR. REEVES: Objection. Form. 13:30:13
8 THE WITNESS: No. It's a single process. 13:30:16
9 You measure the distance, and based on the results 13:30:19
10 of that calculation, you output one of two -- or 13:30:22
11 it's usually more than two -- forms of output. 13:30:33
12 BY MR. REYNOLDS: 13:30:40
13 Q So a POSITA in 2018 would have understood 13:30:41
14 that the process of classifying inputs in 13:30:44
15 output-content control devices is always a single 13:30:51
16 process with the process of adjusting outputs? 13:30:54
17 MR. REEVES: Objection. Misstates 13:30:59
18 testimony. Form. 13:31:01
19 THE WITNESS: That goes well beyond what I 13:31:06
20 said. 13:31:10
21 What I said was that the -- the '675 13:31:10
22 patent, as well as the relevant prior art, disclose 13:31:18

1 modifying content in a device using speech based on 13:31:26
2 estimated distance. It certainly does not say that 13:31:33
3 that's the only way you can do all that. 13:31:37

4 BY MR. REYNOLDS: 13:31:45

5 Q Understood. And I'm not trying to twist 13:31:46
6 what you've said because my initial question was 13:31:48
7 outside the context of -- was not limited to just 13:31:51
8 the '675 patent or the prior art. 13:31:54

9 I asked, in general, in 2018, what -- is 13:31:57
10 there a distinction in your mind between the process 13:32:01
11 of classifying inputs and the process of adjusting 13:32:03
12 outputs in output-content control devices. 13:32:06

13 MR. REEVES: Objection. Form. Calls for 13:32:12
14 speculation. Outside the scope. 13:32:14

15 THE WITNESS: Okay. I'm sorry. I 13:32:15
16 appreciate the greater range of the question, but 13:32:17
17 what we're -- I think what your question is leading 13:32:27
18 to, and maybe I should ask you to repeat it -- 13:32:33
19 actually, please repeat the question. 13:32:36

20 BY MR. REYNOLDS: 13:32:42

21 Q Maybe I'll try it in a different way. 13:32:43

22 Would a POSITA have been able to determine 13:32:45

1	how a device classifies inputs simply by looking at	13:32:48
2	how the device adjusts outputs?	13:32:53
3	MR. REEVES: Objection. Form. Incomplete	13:32:59
4	hypothetical. Outside the scope.	13:33:01
5	THE WITNESS: I think, in general, the	13:33:21
6	answer would be no. I don't believe that that's	13:33:22
7	relevant to the claims of the present patent or the	13:33:24
8	'337 patent.	13:33:31
9	BY MR. REYNOLDS:	13:33:32
10	Q And we are just talking in general. Why	13:33:32
11	would the answer be no?	13:33:34
12	MR. REEVES: Objection. Form.	13:33:40
13	THE WITNESS: Well, it's as we talked	13:33:51
14	before.	13:33:54
15	There are multiple ways of performing	13:33:55
16	classifications. There are different things that	13:33:57
17	can be measured, and what we're looking at is	13:33:59
18	content modification based on a classification	13:34:07
19	decision. The patents and prior arts' sources teach	13:34:11
20	the measurement of distance as one way or	13:34:17
21	accomplishing that, but it's not the only way.	13:34:20
22	And since the classification decisions	13:34:24

1 are -- result in discrete outcomes, you don't know 13:34:27
2 what the mechanism was by which the class -- 13:34:37
3 classification decision was obtained. 13:34:40
4 BY MR. REYNOLDS: 13:35:06
5 Q I'd like to discuss a hypothetical 13:35:07
6 output-content control device that I came up with 13:35:15
7 this morning. 13:35:18
8 A We're always inventing. 13:35:19
9 Q I'm going to -- I'll call it a new 13:35:20
10 motivational output-content control device, and it's 13:35:23
11 pretty simple. When a user asks a question, it 13:35:26
12 measures the volume detected, and then it uses, you 13:35:30
13 know, a language model to develop an answer, and it 13:35:35
14 responds at twice the volume at which the user was 13:35:39
15 speaking. 13:35:43
16 So my logic would say output volume of the 13:35:46
17 device, call it OV, equals two times the input 13:35:49
18 volume of the device, IV. 13:35:54
19 In that hypothetical, is my device 13:36:00
20 classifying input voices? 13:36:05
21 MR. REEVES: Objection. Form. Calls for 13:36:11
22 speculation. Incomplete hypothetical. Outside the 13:36:12

1	scope.	13:36:17
2	THE WITNESS: No.	13:36:17
3	BY MR. REYNOLDS:	13:36:24
4	Q Why not?	13:36:24
5	MR. REEVES: Same objections.	13:36:30
6	THE WITNESS: Classifying the device, as I	13:36:30
7	see it, or classifying anything as I see it,	13:36:34
8	describes taking an input measurement that, in	13:36:39
9	general, is continuous in nature and producing an	13:36:45
10	output that's one of a discrete number of categories	13:36:48
11	in the patents in question. Is the speaker closer	13:36:54
12	or is the speaker farther?	13:37:01
13	The system that you described really is --	13:37:03
14	takes the input, measures the volume and outputs at	13:37:06
15	twice the volume, but there are no discrete	13:37:12
16	categories that are the results of the	13:37:15
17	classification decision.	13:37:17
18	BY MR. REYNOLDS:	13:37:23
19	Q What if I told you that my device processes	13:37:23
20	everything digitally? Would that change your	13:37:25
21	opinion?	13:37:28
22	A No.	13:37:29

1	MR. REEVES: Objection. Form. Incomplete	13:39:00
2	hypothetical. That outside the scope.	13:39:01
3	THE WITNESS: Classification happens when	13:39:05
4	you take a series of measurements, a measurement,	13:39:06
5	and analyze and make a decision about it.	13:39:12
6	And for classification, at least in the	13:39:16
7	context of the patents and the relative prior art,	13:39:20
8	the decision is in the form of a relatively small	13:39:29
9	number of alternatives, typically two or a small	13:39:31
10	number of additional alternatives, not a much larger	13:39:34
11	number of alternatives.	13:39:41
12	In this case, the patent discloses reducing	13:39:42
13	all of the possible things that are coming in into	13:39:49
14	two -- two groups, close to the device and far from	13:39:52
15	the device, and modifying the content based on that	13:39:56
16	classification.	13:40:01
17	BY MR. REYNOLDS:	13:40:10
18	Q You said the -- the decision is in the form	13:40:11
19	of a relatively small number of alternatives. So in	13:40:13
20	your opinion, the number of alternatives determines	13:40:18
21	whether a classification has been made or not?	13:40:20
22	MR. REEVES: Objection. Form. Outside the	13:40:23

1	scope.	13:40:30
2	THE WITNESS: In principle, it's the number	13:40:30
3	of possible outcomes and also the extent to which	13:40:32
4	some analysis is performed on the input.	13:40:40
5	BY MR. REYNOLDS:	13:40:56
6	Q But in my hypothetical there was an	13:40:57
7	analysis on the input, right? We took input volume	13:40:59
8	and multiplied it by two. So would that be	13:41:02
9	sufficient analysis --	13:41:05
10	MR. REEVES: Objection.	13:41:08
11	BY MR. REYNOLDS:	13:41:10
12	Q -- analysis --	13:41:11
13	MR. REEVES: Sorry, Counsel.	13:41:12
14	BY MR. REYNOLDS:	13:41:13
15	Q -- to create a classification?	13:41:14
16	MR. REEVES: Objection. Form. Outside the	13:41:15
17	scope. Calls for speculation. Incomplete	13:41:16
18	hypothetical.	13:41:20
19	THE WITNESS: Certainly not in the way	13:41:20
20	classification is considered in the teachings of the	13:41:26
21	patents we're discussing today. They all specify	13:41:29
22	two or close to two outcomes, not a potentially	13:41:31

1	infinite number of outcomes.	13:41:35
2	BY MR. REYNOLDS:	13:41:40
3	Q So what is the number at which -- of	13:41:40
4	outcomes at which we switch from a	13:41:43
5	non-classification to a classification having been	13:41:47
6	made?	13:41:49
7	MR. REEVES: Objection. Form. Outside the	13:41:51
8	scope. Calls for speculation. Incomplete	13:41:53
9	hypothetical. Asked and answered.	13:41:55
10	THE WITNESS: Depends on the context.	13:41:59
11	For speech recognition, for example, back	13:42:01
12	in the 1980s, being able to classify, say, a	13:42:04
13	thousand words was considered a big deal. Now we	13:42:12
14	routinely recognize and classify many more words in	13:42:17
15	a contemporary system. But in the context of	13:42:25
16	today's systems -- I'm sorry.	13:42:27
17	In the context of the discussions in the	13:42:30
18	disclosures of the two patents at issue here, there	13:42:37
19	are only two outcomes, and that's clearly different	13:42:40
20	from, you know, all the various amplitudes your	13:42:42
21	system could obtain.	13:42:47
22	BY MR. REYNOLDS:	13:42:52

1 Q I wasn't asking about the prior art. I was 13:42:53
2 just asking: In general, what number serves as the 13:42:55
3 boundary line of outcomes between whether a 13:42:57
4 classification has been made and a classification 13:43:01
5 has not been made? 13:43:03

6 MR. REEVES: Same objections. 13:43:04

7 THE WITNESS: It's difficult to apply an 13:43:18
8 absolute number because, as technology advances, the 13:43:19
9 things that we can do in practice become 13:43:26
10 increasingly complex. The systems at issue here, 13:43:29
11 which, of course, were 2018 or so, all only have two 13:43:38
12 outcomes, and that's quite clear. 13:43:44

13 BY MR. REYNOLDS: 13:43:51

14 Q So how many outcomes would a POSITA have 13:43:51
15 had to add to the systems at issue here to make it 13:43:53
16 so that, in your opinion, no classification would 13:43:59
17 have been made? 13:44:02

18 MR. REEVES: Objection. Form. Calls for 13:44:03
19 speculation. Outside the scope. 13:44:07

20 THE WITNESS: I don't see how that's within 13:44:09
21 the scope of the claims of either patent. 13:44:11

22 BY MR. REYNOLDS: 13:44:21

1 Q Well, I'm trying to figure out, you assert 13:44:21
2 that a classification has been made in part based on 13:44:23
3 the number of outcomes. 13:44:27

4 So if you were looking at the same art, how 13:44:28
5 many classifications would it have taken before your 13:44:32
6 opinion changed that there is -- sorry -- how many 13:44:34
7 outcomes would it have taken before, in your 13:44:38
8 opinion, the -- these systems, the prior art, no 13:44:41
9 longer rendered a classification of voices? 13:44:47

10 MR. REEVES: Objection. Form. Calls for 13:44:50
11 speculation. Incomplete hypothetical. Outside the 13:44:51
12 scope. 13:44:53

13 THE WITNESS: Yeah, I'm not going to 13:44:53
14 further speculate along those roads. I was asked to 13:44:56
15 opine about the disclosures of the two patents that 13:45:00
16 we're discussing today and the relevant prior art, 13:45:05
17 and in those cases, it's certainly only two outcomes 13:45:09
18 in the case of the patents, maybe slightly greater 13:45:15
19 number in some of the prior art. 13:45:19

20 BY MR. REYNOLDS: 13:45:25

21 Q But you don't have an opinion as to what 13:45:25
22 the upper bound would be of outputs that could 13:45:27

1	remain a classification?	13:45:30
2	MR. REEVES: Same objections.	13:45:32
3	THE WITNESS: I might, but it's not	13:45:33
4	relevant to the patent.	13:45:34
5	BY MR. REYNOLDS:	13:45:35
6	Q Yeah. But I'm entitled to know if you have	13:45:35
7	it. Your lawyers will decide if it's relevant or	13:45:37
8	not when it comes to, you know, submitting it in	13:45:40
9	evidence.	13:45:44
10	So could you tell me what it is?	13:45:47
11	MR. REEVES: Same objections.	13:45:49
12	THE WITNESS: Do I have to come up with a	13:45:54
13	number? It's -- it's -- I -- I'm pushing back here	13:45:56
14	because it's really a moving target and very context	13:46:07
15	dependent.	13:46:11
16	As I indicated before, for example, in a	13:46:12
17	field that, you know, is close to my own experience,	13:46:20
18	the number of classifications that we could make in	13:46:22
19	speech recognition has really increased very	13:46:24
20	substantially, perhaps even exponentially over the	13:46:28
21	years with advances in the things that we can do.	13:46:32
22	So the best I can say is that there's no	13:46:37

1 fixed number. It really depends on what you're 13:46:41
2 doing. But the key thing is whether you're binning 13:46:44
3 everything into a discrete number of decision 13:46:51
4 outcomes, and in this technology, you use those 13:46:55
5 decisions -- use those to do something substantially 13:47:03
6 different based on results of the classifications. 13:47:05
7 In the example that you cite, you're really 13:47:10
8 just outputting a signal, you know, taking something 13:47:15
9 coming in, analyzing it, and then displaying an 13:47:19
10 output without -- without anything bound that. 13:47:23
11 BY MR. REYNOLDS: 13:47:42
12 Q If you'd look at paragraph 10 of your reply 13:47:43
13 declaration, that's back on Exhibit 1202. 13:47:47
14 A Yes. 13:47:58
15 Q Is it your opinion that Shin, Shimomura, 13:47:58
16 and the '675 patent all disclose voice 13:48:02
17 output-content device -- devices that operate in the 13:48:05
18 same way? 13:48:08
19 MR. REEVES: Objection. Form. 13:48:10
20 THE WITNESS: Well, they don't do exactly 13:48:23
21 the same thing. They all modify their output based 13:48:25
22 on the estimated distance between the speaker and 13:48:28

1	the device, and as I state in paragraph 10, the	13:48:31
2	references disclose classifying voice input by	13:48:40
3	distance in the same way as the '675 patent and,	13:48:43
4	therefore, in the same way as each other.	13:48:48
5	BY MR. REYNOLDS:	13:48:55
6	Q Is it your opinion that Shin, Shimomura,	13:48:55
7	and the '675 patent all classify voice input in the	13:48:59
8	same way?	13:49:03
9	MR. REEVES: Objection. Form.	13:49:03
10	THE WITNESS: That is what I state in	13:49:04
11	paragraph 10 of the reply declaration.	13:49:07
12	BY MR. REYNOLDS:	13:49:08
13	Q So there are no differences in the three of	13:49:09
14	those in how they classify voice input?	13:49:13
15	MR. REEVES: Objection. Form. Asked and	13:49:17
16	answered.	13:49:24
17	THE WITNESS: Only perhaps differences in	13:49:24
18	the low level implementation.	13:49:26
19	THE COURT REPORTER: I'm sorry.	13:49:28
20	"Differences in the"? I didn't hear you.	13:49:29
21	THE WITNESS: My apologies. The low level	13:49:33
22	implementation.	13:49:36

1	BY MR. REYNOLDS:	13:49:37
2	Q What is low level implementation?	13:49:38
3	A How the algorithms are actually realized.	13:49:41
4	Q Can you explain a bit more what you mean by	13:49:51
5	"how the algorithms are realized"?	13:49:54
6	A Well, we disclose, in all cases, comparing	13:49:58
7	the estimated distance from the input to a	13:50:08
8	threshold, and how that's done may vary from system	13:50:19
9	to system. Would differ, for example, in the nature	13:50:22
10	of the sensors that are used and how they	13:50:34
11	communicate with the rest of the system.	13:50:36
12	MR. REEVES: Counsel, can we take a break?	13:50:54
13	MR. REYNOLDS: Yeah. I'd just like to	13:50:58
14	clarify, unless the witness would rather take a	13:51:00
15	break, but if I could just clarify his answer first,	13:51:02
16	that'd be my preference, but of course, I won't --	13:51:05
17	THE WITNESS: No, go ahead and clarify.	13:51:09
18	Is that okay?	13:51:11
19	BY MR. REYNOLDS:	13:51:11
20	Q Yeah, I appreciate that.	13:51:13
21	So you said, "in the nature of the	13:51:14
22	sensors," but I'm not exactly sure how the nature of	13:51:17

1	the sensors relates to how algorithms are realized.	13:51:22
2	Could you explain that a bit?	13:51:25
3	MR. REEVES: Objection. Form.	13:51:27
4	THE WITNESS: The original question was	13:51:29
5	what did I mean by low level details -- or low level	13:51:31
6	implementation, I think is what the original phrase	13:51:35
7	was. You have the transcript; I do not.	13:51:37
8	What I was thinking of was that the sensors	13:51:43
9	themselves would have different operating	13:51:45
10	principles, or at least could. The way in which the	13:51:52
11	information from the sensors interfaces with the	13:51:55
12	rest of the system could vary from sensor to sensor,	13:51:57
13	and, hence, the way that information is integrated,	13:52:01
14	the algorithms themselves, as we discussed	13:52:06
15	previously, are all quite simple.	13:52:08
16	BY MR. REYNOLDS:	13:52:32
17	Q So initially I asked about low level	13:52:32
18	implementation. I believe you gave me an answer	13:52:34
19	that asked how the algorithms are realized, and so	13:52:38
20	my attempt was to kind of focus on that language,	13:52:41
21	when you're talking about how algorithms are	13:52:45
22	realized, and I believe -- and I'm not trying to put	13:52:47

1	words in your mouth. I believe you just said that	13:52:53
2	the algorithms are all simple between the prior art	13:52:56
3	and the '675 patent, but now I'm curious if you	13:53:00
4	could tell me what you meant by differences in how	13:53:03
5	the algorithms are realized.	13:53:05
6	MR. REEVES: Objection. Form, to the	13:53:07
7	extent it misstates testimony.	13:53:10
8	THE WITNESS: Yeah, I apologize. I think I	13:53:11
9	misunderstood the question. We'd already discussed	13:53:13
10	the fact that the algorithms all involve taking a	13:53:16
11	measurement of distance and comparing it to a	13:53:18
12	threshold. That would be the algorithm.	13:53:20
13	The question, as I heard it, focused on the	13:53:26
14	low level implementation details about how you build	13:53:29
15	a system around that, including the interaction of	13:53:33
16	the sensors and everything else -- everything else	13:53:37
17	that goes in -- in that system.	13:53:39
18	BY MR. REYNOLDS:	13:53:46
19	Q Okay. So is there a difference in how the	13:53:46
20	algorithms are realized in the '675 patent, Shin,	13:53:48
21	and Shimomura?	13:53:53
22	MR. REEVES: Objection. Form.	13:53:56

Transcript of Richard Stern, Ph.D.
Conducted on April 8, 2026

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1	THE WITNESS: I don't know. I'd have to	13:53:57
2	look at the code or the hardware of the device to be	13:54:02
3	able to answer that.	13:54:04
4	MR. REYNOLDS: Okay. We can take a break.	13:54:14
5	THE VIDEOGRAPHER: Okay. Stand by.	13:54:17
6	Going off the record. The time is 13:54.	13:54:18
7	(Recess.)	13:54:21
8	THE VIDEOGRAPHER: Back on the record. The	14:05:44
9	time is 14:05.	14:05:47
10	BY MR. REYNOLDS:	14:05:49
11	Q Dr. Stern, I'd like to talk a little bit	14:05:49
12	about Section 2(B) of your declaration, which begins	14:05:51
13	on page 16 in your reply declaration, to be clear.	14:05:54
14	A Which patent?	14:06:00
15	Q '675 patent.	14:06:01
16	A Page 16?	14:06:06
17	Q Yeah. So that'd be Exhibit 1202.	14:06:08
18	A Okay.	14:06:23
19	Q Here you offer your opinion that proposed	14:06:26
20	substitute claim 8 is indefinite, right?	14:06:28
21	A That's correct.	14:06:32
22	Q And the reason being is that the	14:06:33

1	term "predetermined voice," in your opinion, is	14:06:36
2	indefinite?	14:06:41
3	A That's also correct.	14:06:42
4	Q Would you have the same opinion as to the	14:06:44
5	original claim, not claim 8, that use of the	14:06:48
6	term "predetermined voice" is indefinite?	14:06:53
7	MR. REEVES: Objection. Form.	14:06:56
8	Counsel, to clarify, you're asking about	14:07:12
9	claim 5, correct?	14:07:18
10	BY MR. REYNOLDS:	14:07:18
11	Q Well, let me start over and be a little	14:07:19
12	more clear.	14:07:21
13	Could you look at claim 1 of the '675	14:07:22
14	patent, please?	14:07:25
15	A Yes.	14:07:26
16	Q Is it your opinion that use of the	14:07:26
17	term "predetermined voice" also renders that claim	14:07:33
18	indefinite?	14:07:36
19	MR. REEVES: Objection. Form. Misstates	14:07:38
20	the exhibit. Outside the scope.	14:07:40
21	THE WITNESS: Yes.	14:07:44
22	BY MR. REYNOLDS:	14:07:45

1	Q	Oh, I'm sorry. I did mean claim 5.	14:07:46
2		Would you look at claim 5 and let me know	14:07:49
3		if the use of the term -- your counsel's right -- if	14:07:51
4		the use of the term "predetermined voice" in that	14:07:56
5		claim renders it indefinite?	14:08:00
6	MR. REEVES:	Objection. Form. Outside the	14:08:03
7		scope.	14:08:44
8	THE WITNESS:	There is a small difference	14:08:44
9		in that the original claim 5 referred to the	14:08:48
10		predetermined voice, and the proposed revised claim	14:08:52
11		8 refers to a predetermined voice.	14:09:00
12	BY MR. REYNOLDS:		14:09:04
13	Q	Does that difference affect your opinion as	14:09:04
14		to whether use of the term "predetermined voice" in	14:09:07
15		either of those claims renders it indefinite?	14:09:10
16	MR. REEVES:	Objection. Form. Outside the	14:09:14
17		scope.	14:09:18
18	THE WITNESS:	Well, it could. As I say in	14:09:18
19		the declaration Section 1, I have multiple concerns	14:09:22
20		with the phrase "a predetermined voice." Basically,	14:09:29
21		in paragraph 43, I note that we don't really know	14:09:39
22		what that means. We don't know whether it's the	14:09:41

1 first voice or the second voice or something else, 14:09:44
2 nor does it state how the voice is predetermined, 14:09:50
3 and as 44 states, the statement -- the specification 14:09:59
4 does not clarify that. 14:10:02

5 BY MR. REYNOLDS: 14:10:07

6 Q Is the confusion surrounding the 14:10:08
7 word "predetermined," the word "voice," or when 14:10:11
8 they're used together? 14:10:18

9 MR. REEVES: Objection. Form. 14:10:19

10 THE WITNESS: For me, the big problem is I 14:10:22
11 don't know what that points to. In other words, 14:10:25
12 what is meant by "a predetermined voice." 14:10:27

13 BY MR. REYNOLDS: 14:10:40

14 Q But it's clear what the term "voice" means 14:10:40
15 in the claims, right? 14:10:44

16 A Yes. 14:10:45

17 Q Okay. So it seems that the confusion 14:10:48
18 you're alluding to is really surrounding focused on 14:10:51
19 the term "predetermined." 14:10:55

20 MR. REEVES: Objection. Form. 14:10:57

21 THE WITNESS: But also the context. Again, 14:11:00
22 is it the first voice? the second voice? based on 14:11:05

1	distance? Is it something else?	14:11:11
2	BY MR. REYNOLDS:	14:11:11
3	Q Well, you don't have a first voice or a	14:11:23
4	second voice until someone starts talking to the	14:11:25
5	device, right?	14:11:27
6	MR. REEVES: Objection. Form.	14:11:29
7	THE WITNESS: That's correct.	14:11:37
8	BY MR. REYNOLDS:	14:11:39
9	Q So a predetermined voice, wouldn't that	14:11:39
10	mean something that the device has predetermined,	14:11:42
11	that has built in before it begins operation?	14:11:48
12	MR. REEVES: Objection. Form.	14:11:54
13	THE WITNESS: In principle it could, but I	14:11:58
14	learned nothing from the specification.	14:12:00
15	BY MR. REYNOLDS:	14:12:28
16	Q Paragraph 44 of your reply, you say: "The	14:12:29
17	specification provides no clarification. It	14:12:33
18	discloses an embodiment in which '[t]he first voice	14:12:38
19	V1A corresponds to a predetermined voice'..."	14:12:45
20	Do you see that?	14:12:53
21	A I do.	14:12:53
22	Q So determining whether an incoming voice	14:13:01

1	corresponds to a predetermined voice, that doesn't	14:13:04
2	give you an indication of what a predetermined voice	14:13:07
3	is?	14:13:11
4	MR. REEVES: Objection. Form.	14:13:12
5	THE WITNESS: Are you suggesting that the	14:13:18
6	patent teaches that the predetermined voice is	14:13:20
7	always V1A?	14:13:22
8	BY MR. REYNOLDS:	14:13:25
9	Q Well, it says it makes a determination as	14:13:26
10	to whether a voice corresponds to a predetermined	14:13:29
11	voice. Isn't that what it -- the quoted portion	14:13:32
12	says?	14:13:36
13	MR. REEVES: Objection, to the extent it	14:13:38
14	misstates the exhibit. Form.	14:13:39
15	THE WITNESS: Well, it looks like in the	14:14:21
16	system, as discussed in the original specification	14:14:26
17	in column 9, at the bottom of the column, it looks	14:14:29
18	like the predetermined voice is the first voice, but	14:14:36
19	in the context of whisper detection, which is what I	14:14:43
20	believe this part of proposed revised claim is all	14:14:47
21	about, we don't know whether -- we don't know	14:14:50
22	whether the predetermined voice or whether a	14:15:01

1	predetermined voice is a voice with whisper or	14:15:03
2	without whisper.	14:15:08
3	So it's just not stated in -- in the	14:15:10
4	proposed claim or anywhere else.	14:15:16
5	BY MR. REYNOLDS:	14:15:23
6	Q Isn't that the point of the disclosed	14:15:23
7	embodiment, is to use a predetermined voice when	14:15:25
8	assessing whether an incoming voice is a whisper or	14:15:31
9	not?	14:15:36
10	MR. REEVES: Objection. Form. Calls for	14:15:40
11	speculation.	14:15:45
12	THE WITNESS: No. You can make an	14:15:45
13	assessment whether an incoming voice is whispered or	14:15:48
14	spoken naturally simply based on the analysis of the	14:15:52
15	input without anything to do with a predetermined	14:15:57
16	voice.	14:16:00
17	BY MR. REYNOLDS:	14:16:02
18	Q But could you also do that using a	14:16:02
19	predetermined voice?	14:16:04
20	MR. REEVES: Objection. Form. Calls for	14:16:07
21	speculation. Outside the scope.	14:16:10
22	THE WITNESS: In principle, yes, but the --	14:16:13

1	neither the claim nor the specification tells me	14:16:15
2	how.	14:16:18
3	BY MR. REYNOLDS:	14:16:39
4	Q So you said you can make an assessment	14:16:41
5	whether an incoming voice is whispered or spoken	14:16:44
6	naturally simply based on the analysis of the input	14:16:49
7	without anything to do with a predetermined voice,	14:16:51
8	right?	14:16:55
9	A That's correct.	14:16:56
10	Q How would you determine whether the system	14:17:00
11	is using a predetermined voice or not to make that	14:17:02
12	assessment?	14:17:07
13	MR. REEVES: Objection. Form. Calls for	14:17:08
14	speculation. Outside the scope. Incomplete	14:17:10
15	hypothetical.	14:17:22
16	THE WITNESS: Repeat the question again.	14:17:22
17	BY MR. REYNOLDS:	14:17:24
18	Q How would you determine whether a system	14:17:24
19	uses a predetermined voice or not when making that	14:17:27
20	assessment?	14:17:32
21	MR. REEVES: Same objections.	14:17:34
22	THE WITNESS: Well, I don't know and I	14:17:43

1	don't need to, and the existence of a predetermined	14:17:45
2	voice does not help in any way in terms of the	14:17:49
3	detection of whisper.	14:17:51
4	BY MR. REYNOLDS:	14:17:55
5	Q Why not?	14:17:55
6	MR. REEVES: Same objections.	14:17:58
7	THE WITNESS: We talked about whisper	14:18:00
8	earlier today. Whisper detection would be	14:18:01
9	accomplished by -- yeah, at least I think we did.	14:18:06
10	A whisper detection would be accomplished	14:18:09
11	by looking for a peak in the autocorrelation	14:18:12
12	function, looking for a peak in -- or looking for a	14:18:15
13	peak above a threshold magnitude in the	14:18:20
14	autocorrelation function in the right place, looking	14:18:24
15	for a peak in the cepstral representation in the	14:18:26
16	right place of a certain magnitude.	14:18:30
17	None of that has anything to do with a	14:18:34
18	predetermined voice.	14:18:36
19	MR. REYNOLDS: For the court reporter, all	14:18:38
20	those "peaks" are P-E-A-K.	14:18:40
21	THE WITNESS: Thank you.	14:18:46
22	BY MR. REYNOLDS:	14:18:46

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1	Q	Wouldn't it possible to store those	14:18:53
2		characteristics as representations of a	14:18:55
3		predetermined voice in a device?	14:18:57
4	MR. REEVES:	Objection. Form. Calls for	14:18:58
5		speculation. Outside the scope. Lacks foundation.	14:18:59
6	THE WITNESS:	Anything is possible, but it	14:19:04
7		would not be particularly helpful.	14:19:05
8	BY MR. REYNOLDS:		14:19:10
9	Q	Why not?	14:19:10
10	MR. REEVES:	Same objections.	14:19:13
11	THE WITNESS:	As I stated a moment ago,	14:19:13
12		determination of whisper would be accomplished by	14:19:16
13		assessing the characteristics of the wave coming in	14:19:21
14		without resource to the predetermined voice.	14:19:25
15	BY MR. REYNOLDS:		14:19:33
16	Q	So you said it wouldn't be helpful. Are	14:19:33
17		you aware of anyone else or any other system or	14:19:36
18		paper disclosure that -- well, let me start over.	14:19:39
19		Are you saying that there's no system or	14:19:42
20		other disclosures out there that would describe	14:19:45
21		using a predetermined voice to assess whether an	14:19:47
22		incoming voice is a whisper or not?	14:19:50

1	MR. REEVES: Objection. Form, to the	14:19:53
2	extent it misstates testimony. Scope.	14:19:55
3	THE WITNESS: I am not aware of any such	14:19:57
4	system.	14:19:59
5	BY MR. REYNOLDS:	14:20:06
6	Q In your reply declaration, you make a	14:20:06
7	determination as to whether substitute claim 8 reads	14:20:08
8	on prior art, right?	14:20:12
9	A Where do I do that?	14:20:19
10	Q Well, I'll represent that in the kind of	14:20:23
11	patent law parlance, if you determine prior art	14:20:25
12	discloses -- let's say determine whether prior art	14:20:29
13	anticipates a claim or renders it obvious, the	14:20:33
14	process of doing that is determining whether the	14:20:35
15	claim reads on that prior art. So, I guess, maybe	14:20:38
16	I'll ask it a different way.	14:20:42
17	You rendered a determination as to whether	14:20:43
18	prior art renders obvious substitute claim 8, right?	14:20:46
19	A I do say that, and, yes, I believe that.	14:20:52
20	Q Okay.	14:20:57
21	A That's section beginning on paragraph 50.	14:20:58
22	Q And that process involves comparing	14:21:02

1	substitute claim 8 to the prior art, right?	14:21:06
2	MR. REEVES: Objection. Form.	14:21:11
3	THE WITNESS: Yes.	14:21:15
4	BY MR. REYNOLDS:	14:21:16
5	Q That process involves looking at each of	14:21:16
6	the limitations of claim 8 and determining whether	14:21:18
7	that limitation is disclosed in the prior art,	14:21:22
8	right?	14:21:24
9	A That's correct.	14:21:27
10	MR. REEVES: Objection. Form.	14:21:28
11	BY MR. REYNOLDS:	14:21:31
12	Q If you don't understand or if you were	14:21:31
13	confused by what a predetermined voice is, how were	14:21:34
14	you able to determine that the prior art disclosed	14:21:39
15	it in the same context as claim 8?	14:21:40
16	MR. REEVES: Objection. Form.	14:21:44
17	THE WITNESS: There's no prior art that I'm	14:21:49
18	aware of concerning whisper detection that makes use	14:21:51
19	of a predetermined voice.	14:21:54
20	BY MR. REYNOLDS:	14:22:39
21	Q Could the voice disclosed in the '675	14:22:39
22	patent be classified based on a slope of the peak	14:22:44

1	frequency of an incoming signal?	14:22:52
2	MR. REEVES: Objection. Form. Calls for	14:22:55
3	speculation and outside the scope.	14:22:57
4	THE WITNESS: One of the prior art	14:23:02
5	references suggests that. I believe it was Raitio.	14:23:06
6	Since we're looking at a series of peaks	14:23:24
7	over frequency and the slope of those points, and,	14:23:27
8	again, we're looking at the amplitude values of the	14:23:32
9	peaks of the spectrum over a series of frequencies	14:23:41
10	and looking at the slope of those points.	14:23:44
11	MR. REYNOLDS: For the court reporter's	14:23:59
12	benefit, I believe the pronunciation is Raitio, I	14:24:01
13	think. Either way it's pronounced -- or it's	14:24:05
14	spelled R-A-I-T-I-O.	14:24:08
15	THE WITNESS: Yes, thank you.	14:24:13
16	BY MR. REYNOLDS:	14:24:30
17	Q Could that determination be made by	14:24:30
18	comparing the slope to a threshold?	14:24:32
19	MR. REEVES: Objection. Form.	14:24:36
20	THE WITNESS: That's what the Raitio	14:24:55
21	reference suggests.	14:24:57
22	BY MR. REYNOLDS:	14:25:11

1	Q	What would the units of that threshold have	14:25:12
2		been?	14:25:16
3	MR. REEVES:	Objection. Form. Outside the	14:25:16
4		scope.	14:25:19
5	THE WITNESS:	Well, because the vertical	14:25:19
6		axis would be decibels and the horizontal axis would	14:25:26
7		be a measure of frequency such as hertz, it could be	14:25:32
8		something like decibels per kilohertz.	14:25:36
9	BY MR. REYNOLDS:		14:25:44
10	Q	But you didn't mention that possibility in	14:25:44
11		paragraph 45 of your declaration, right?	14:25:45
12	A	No.	14:26:03
13	Q	Is it -- would it have been possible for a	14:27:14
14		POSITA to use a dimensionless threshold when	14:27:16
15		classifying voices?	14:27:20
16	MR. REEVES:	Objection. Form. Outside the	14:27:23
17		scope. Calls for speculation. Incomplete	14:27:25
18		hypothetical.	14:27:44
19	THE WITNESS:	Are you talking about	14:28:07
20		calculating a threshold or comparing thresholds?	14:28:08
21	BY MR. REYNOLDS:		14:28:08
22	Q	I'm talking about making use of the	14:28:14

1	threshold where the value of the threshold has no	14:28:18
2	units.	14:28:21
3	MR. REEVES: Same objections.	14:28:24
4	THE WITNESS: Well, I've previously stated	14:28:32
5	that in order for the threshold determination to be	14:28:36
6	meaningful, the units of the input must be the same	14:28:39
7	or perhaps similar to the units of the threshold.	14:28:48
8	Here we're talking about comparing different --	14:28:54
9	different measurements, and the comparisons are	14:29:04
10	always, in the case of the -- the peaks of the --	14:29:07
11	the peaks of the spectrum measurement, and I'm	14:29:20
12	looking at, for example, figure -- figure 8B and 8C	14:29:24
13	on page 22 of the declaration, which is from Raitio.	14:29:30
14	You asked me what the dimensions were.	14:29:36
15	Those were decibels per -- per hertz. Those you	14:29:39
16	could compare with each other. So there's no	14:29:45
17	inconsistency with what I said previously.	14:29:55
18	This question was about would you do the	14:29:58
19	comparison if the quantities were dimensionless, and	14:30:00
20	in principle, yes, although I'm struggling to think	14:30:06
21	of a relevant example.	14:30:09
22	BY MR. REYNOLDS:	14:30:23

1	Q	Well, outside the context of Raitio, could	14:30:23
2		a POSITA have used a threshold for the coefficients	14:30:28
3		associated with a signal after a Fourier transform	14:30:36
4		or cepstral analysis?	14:30:42
5	MR. REEVES:	Objection. Form. Calls for	14:30:46
6		speculation. Incomplete hypothetical. Outside the	14:30:48
7		scope. Asked and answered.	14:30:50
8	THE WITNESS:	Yes, I believe that one of	14:30:58
9		the prior art references -- I think it might have	14:31:00
10		been Chen -- talks about estimating the presence of	14:31:02
11		whisper but through spectral tilt, and they propose	14:31:10
12		using the ratio of the first cepstral coefficient	14:31:18
13		divided by the zero cepstral coefficient as an	14:31:24
14		estimate of spectral tilt and use that as a whisper.	14:31:30
15		So in principle, yes, those -- those would	14:31:40
16		be normalized -- those would be dimensionless,	14:31:42
17		rather.	14:31:49
18	BY MR. REYNOLDS:		14:31:49
19	Q	You didn't mention that dimensionless	14:31:49
20		possibility in paragraph 45 of your reply	14:31:52
21		declaration, right?	14:31:55
22	A	Paragraph 45 was talking about something	14:32:16

1 different. Paragraph 45 was talking about how the 14:32:18
2 comparison to a threshold would be accomplished, and 14:32:27
3 what I was stating in that paragraph was that in 14:32:31
4 order to do that comparison, you have to have the 14:32:34
5 same units. 14:32:36

6 Here we're looking at two different -- two 14:32:44
7 different peaks that are already measured, rather 14:32:50
8 than comparing a single peak to a threshold. 14:32:56

9 Q I understand your explanation as to why, 14:33:04
10 but just for clarity, the dimensionless threshold 14:33:07
11 possibility is not mentioned in paragraph 45, right? 14:33:10

12 A That is correct, and in paragraph 45 I'm 14:33:20
13 saying that if there is dimension, it has to be the 14:33:24
14 same dimension. 14:33:29

15 Q I'd like to talk about Section 2(C) in your 14:33:53
16 declaration, beginning on paragraph -- page 19, 14:33:59
17 rather. 14:34:02

18 A Yes. 14:34:03

19 Q In this section you discuss written 14:34:08
20 description and enablement, right? 14:34:10

21 A That's correct. 14:34:12

22 Q What's your understanding of the difference 14:34:15

1	between enablement and written description?	14:34:17
2	MR. REEVES: Objection. Form. Calls for a	14:34:21
3	legal conclusion.	14:34:27
4	THE WITNESS: Well, as we all know, I'm not	14:34:27
5	an attorney, so this will be fuzzy.	14:34:29
6	But as I state, my understanding is that	14:34:32
7	the written description has to be detailed enough so	14:34:41
8	that a person of ordinary skill in the art could	14:34:49
9	actually implement that. And, again, paragraph 47:	14:34:52
10	"...the [sic] claimed invention lacks adequate	14:35:00
11	written description if the patent's specification	14:35:02
12	does not convey with reasonable clarity to a person	14:35:04
13	of ordinary skill in the art that the inventor had	14:35:08
14	possession of the claimed invention at the time the	14:35:09
15	patent application was filed."	14:35:12
16	I go on to say that: "...a claim is	14:35:15
17	enabled only if a person of ordinary skill" -- as we	14:35:19
18	stated before -- "reading the specification, could	14:35:24
19	actually [sic] practice the claimed invention	14:35:27
20	without undue experimentation."	14:35:29
21	So the specification, and not the knowledge	14:35:32
22	of the person of ordinary skill, which we already	14:35:38

1	assume, must supply novel aspects of the invention	14:35:40
2	to adequately enable it.	14:35:44
3	BY MR. REYNOLDS:	14:35:53
4	Q I've put in the Chat what's previously been	14:35:54
5	marked Exhibit 1016. Would you open that and let me	14:35:56
6	know when you have it up?	14:36:03
7	A So that's the Schuster reference, and the	14:36:35
8	exhibit that was passed through the Chat is the same	14:36:38
9	and labeled the same as my local copy of it.	14:36:41
10	Q Thank you.	14:36:57
11	Would you look at column 3, lines 1 to 11?	14:36:57
12	A Yeah, give me one second. I'm trying to	14:37:00
13	get the page off my screen.	14:37:03
14	Ah, finally. I'm sorry. It's my ineptness	14:37:45
15	with PCs.	14:37:56
16	Now I'm ready for the question.	14:37:59
17	Q Okay. Would you please read column 3,	14:38:06
18	lines 1 through 11 and let me know when you're done	14:38:08
19	reading it to yourself?	14:38:13
20	A Yes, I've done that.	14:38:48
21	Q Does that portion -- is that portion of	14:38:51
22	Schuster an enabling disclosure of a method for	14:38:55

1	detecting whispered input?	14:39:01
2	MR. REEVES: Objection. Form. Calls for	14:39:05
3	speculation. Calls for a legal conclusion. Outside	14:39:06
4	the scope.	14:39:12
5	THE WITNESS: Well, as noted, I'm not an	14:39:12
6	attorney, and when I read that section of Schuster,	14:39:15
7	I was surprised and disappointed that it did not	14:39:25
8	have more explicit description disclosure. But I	14:39:30
9	think that's out of scope of what we're talking	14:39:40
10	about today. Schuster, you know, does disclose the	14:39:46
11	use of cepstral analysis.	14:39:52
12	BY MR. REYNOLDS:	14:39:58
13	Q Does the '675 patent also disclose use of	14:39:58
14	cepstral analysis?	14:40:01
15	MR. REEVES: Objection. Form. Calls for a	14:40:05
16	legal conclusion.	14:40:38
17	THE WITNESS: I'm looking for my -- I'm	14:40:38
18	first looking for a copy of the proposed -- here it	14:40:40
19	is.	14:40:46
20	So a cepstral analysis is not part of the	14:40:54
21	proposed claim language for the revised claim 8.	14:41:00
22	Cepstral analysis may be disclosed somewhere in the	14:41:12

1	'675 patent, but I'd have to read through the patent	14:41:16
2	to -- to look for it. If you wanted to ask me a	14:41:20
3	question about that, you could point me to the place	14:41:23
4	in the -- in the spec.	14:41:26
5	BY MR. REYNOLDS:	14:41:35
6	Q Well, the -- you know, you assessed the	14:41:36
7	'675 patent to determine whether it contains an	14:41:38
8	enabling disclosure for claim 8, right?	14:41:42
9	A That's right.	14:41:50
10	Q That assessment focuses on the	14:41:50
11	specification, whether the specification enables the	14:41:53
12	claim, right?	14:41:55
13	A That's also correct.	14:41:57
14	Q So what I'm trying -- sorry.	14:42:00
15	A My assessment of the specification of the	14:42:02
16	'675 patent is that it does not -- when used in	14:42:06
17	conjunction with the revised proposed or the	14:42:14
18	proposed revised claim 8 does not enable the	14:42:20
19	detection of the whisper detection.	14:42:23
20	Q Okay. So I'm asking: Based on a similar	14:42:30
21	analysis, does column 3, one to 11 of Schuster	14:42:32
22	provide an enabling disclosure of detecting	14:42:39

1	whispers?	14:42:43
2	MR. REEVES: Objection. Form. Outside the	14:42:44
3	scope. Calls for a legal conclusion.	14:42:45
4	THE WITNESS: I was not asked to opine	14:43:00
5	about whether the Schuster reference is valid or	14:43:02
6	not. We just cite it.	14:43:07
7	BY MR. REYNOLDS:	14:43:07
8	Q Okay. But looking at column 3, lines 1 to	14:43:20
9	11, can you envision how that could constitute an	14:43:24
10	enabling disclosure based on the level of	14:43:30
11	specificity and detail in it, but the specification	14:43:33
12	of the '675 patent could not constitute enabling	14:43:35
13	disclosure -- disclosure?	14:43:40
14	MR. REEVES: Objection. Form. Outside the	14:43:41
15	scope. Calls for a legal conclusion. Asked and	14:43:43
16	answered.	14:43:49
17	THE WITNESS: The only thing that I can say	14:43:49
18	here is that I've only been asked to opine about the	14:43:51
19	proposed claim language and lack of description in	14:43:54
20	the specification for the proposed revised claim 8,	14:44:03
21	and in my opinion, there's not enough adequate	14:44:13
22	specification. I wasn't asked to opine about	14:44:18

1	Schuster, so I won't.	14:44:24
2	BY MR. REYNOLDS:	14:44:26
3	Q Can you identify anything in these 11 lines	14:44:26
4	of Schuster that would have provided adequate	14:44:29
5	description or enabling disclosure if it had been	14:44:36
6	included in the '675 patent?	14:44:40
7	MR. REEVES: Objection. Form. Outside the	14:44:42
8	scope. Calls for a legal conclusion. Calls for	14:44:43
9	speculation.	14:44:48
10	THE WITNESS: No.	14:44:48
11	BY MR. REYNOLDS:	14:45:08
12	Q Is it true that in 2018 only two options	14:45:08
13	existed for determine -- to determining whether a	14:45:12
14	received voice was a whisper based on a threshold?	14:45:16
15	MR. REEVES: Objection. Form. Outside the	14:45:21
16	scope.	14:45:34
17	THE WITNESS: There were more. The two	14:45:34
18	that I described -- and, in fact, Raitio and Chen	14:45:35
19	disclose several others, but the two that I	14:45:43
20	described were the best ways of performing that	14:45:46
21	detection.	14:45:51
22	BY MR. REYNOLDS:	14:46:32

1 Q So you talk about the two that you describe 14:46:32
2 were the best ways. How many other ways were there? 14:46:34
3 How many other options? 14:46:36
4 MR. REEVES: Objection. Form. Outside the 14:46:42
5 scope. 14:46:46
6 THE WITNESS: Well, there are many. It 14:46:46
7 depends on what you'd call a different option. 14:46:51
8 As I mentioned, Raitio and Chen list a few 14:47:01
9 addition -- additional ones. I think the -- that 14:47:04
10 some of those are not nearly as effective as the two 14:47:09
11 that I've mentioned, but if you wish, I can count 14:47:15
12 the number of options listed in Raitio and Chen. 14:47:18
13 There was a lot of them. 14:47:30
14 BY MR. REYNOLDS: 14:47:32
15 Q That's okay. We can put that aside for 14:47:32
16 now. 14:47:35
17 In Section 2(D) of your declaration, you 14:47:37
18 discuss additional prior art that is raised for 14:47:46
19 the -- for the first time in your reply declaration 14:47:56
20 that was not raised in your original declaration, 14:47:58
21 right? 14:48:00
22 A That's correct. This is prior art that's 14:48:01

1	relative to the proposed revised claim.	14:48:04
2	Q Who located that additional prior art?	14:48:09
3	MR. REEVES: Objection. Outside the scope.	14:48:16
4	Form.	14:48:18
5	THE WITNESS: Well, I looked for some	14:48:22
6	additional sources. The attorneys representing	14:48:30
7	myself and Amazon looked for some others. These	14:48:36
8	prior art sources were identified by somebody at	14:48:43
9	Morgan, Lewis. It could have been a paralegal, a	14:48:52
10	researcher. I just don't know.	14:48:55
11	BY MR. REYNOLDS:	14:48:59
12	Q Does your declaration -- does your reply	14:48:59
13	declaration address any prior art that you found?	14:49:03
14	MR. REEVES: Objection to form.	14:49:06
15	THE WITNESS: Well, I spent a lot of time	14:49:08
16	talking about the two methods that I believe are the	14:49:15
17	most useful and effective for performing whisper	14:49:19
18	declaration -- I'm sorry -- for performing whisper	14:49:25
19	detection. These are all methods that I've known	14:49:28
20	about for years. I can't recall when I originally	14:49:32
21	found those methods, but they're in the literature	14:49:36
22	and widely disseminated.	14:49:40

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1	BY MR. REYNOLDS:	14:49:46
2	Q Does your reply declaration address any	14:49:46
3	prior art document that you were able to find?	14:49:50
4	MR. REEVES: Objection. Form. Outside the	14:49:54
5	scope.	14:50:03
6	THE WITNESS: No. I did not consider that	14:50:03
7	to be necessary. When I talked about my concerns	14:50:05
8	about the description of whisper detection, that was	14:50:13
9	based on my own background and expertise.	14:50:18
10	BY MR. REYNOLDS:	14:50:27
11	Q Does any of the prior art addressed in your	14:50:28
12	reply declaration include the words "peak	14:50:31
13	frequency"?	14:50:36
14	MR. REEVES: Objection. Form.	14:50:39
15	THE WITNESS: I would have to look.	14:50:41
16	The Raitio reference, although it does	14:50:44
17	not -- it may or may not use the term "peak	14:50:56
18	frequency," refers to something that basically is	14:50:59
19	peak -- peak frequency.	14:51:04
20	And, again, as I argue in the declaration,	14:51:06
21	the phrase "peak frequency" is a misnomer. I state	14:51:09
22	that by that, a POSITA would understand the	14:51:14

1	amplitude at a frequency for which the -- for which	14:51:19
2	the magnitude or intensity, whatever, is maximum.	14:51:24
3	We would understand that to be the peak frequency,	14:51:29
4	but it really is not -- it's not -- when we talk	14:51:32
5	about the -- the amplitude there, even though the	14:51:36
6	frequency is the frequency.	14:51:39
7	BY MR. REYNOLDS:	14:51:43
8	Q We lawyers can sometimes be semantic, and	14:51:44
9	so I understand your opinion on that front. But	14:51:46
10	what I want to know is whether you identified the	14:51:49
11	phrase "peak frequency," that exact phrase, in any	14:51:52
12	of the prior art you address in your reply	14:51:59
13	declaration.	14:52:02
14	MR. REEVES: Objection. Form. Scope.	14:52:04
15	Asked and answered.	14:52:05
16	THE WITNESS: I don't remember. I can	14:52:05
17	look, but -- but I don't remember.	14:52:08
18	BY MR. REYNOLDS:	14:52:13
19	Q In fact, none of them even include the	14:52:14
20	word "peak"; isn't that right?	14:52:16
21	MR. REEVES: Same objections.	14:52:21
22	THE WITNESS: They might not, but if you --	14:52:21

1 if we turn our attention to the figures on page 22, 14:52:26
2 Raitio does disclose that the difference between the 14:52:35
3 spectrum that's observed for speech that's not 14:52:40
4 whispered, which is on the left, and the whispered 14:52:43
5 speech, which is on the right, is characterized by, 14:52:46
6 shall we say, those cyclic variations in what's 14:52:51
7 labeled as amplitude on -- on the chart, and those 14:52:53
8 cyclic variations actually are a reflection of the 14:53:02
9 periodicity in the voicing. 14:53:08

10 And what he's calling attention to is the 14:53:10
11 fact that the first peak that you observe is not at 14:53:13
12 zero -- is not at zero on the frequency axis, but is 14:53:18
13 somewhere else. 14:53:25

14 Now, he doesn't use the word "peak," but 14:53:25
15 that's what Raitio -- and I don't know if it's a he 14:53:29
16 or a she, but that's what Raitio is talking about -- 14:53:34
17 or even a they. 14:53:38

18 MR. REEVES: Counsel, would now be a good 14:54:01
19 time for a break, or are you wrapping up? 14:54:03

20 MR. REYNOLDS: We can take a break. 14:54:06

21 THE VIDEOGRAPHER: Okay. Stand by. 14:54:11

22 We are going off the record. The time is 14:54:12

1	14:54.	14:54:13
2	(Whereupon, at 2:54 p.m., the	14:54:20
3	proceedings in the above-entitled matter were	14:54:20
4	recessed, to reconvene at 3:29 p.m., this same day.)	14:54:20
5	AFTERNOON SESSION	14:54:20
6	(3:29 p.m.)	15:28:59
7	THE VIDEOGRAPHER: Back on the record. The	15:29:05
8	time is 15:29.	15:29:06
9	CONTINUED EXAMINATION BY COUNSEL FOR THE	15:29:06
10	PATENT OWNER	15:29:10
11	BY MR. REYNOLDS:	15:29:12
12	Q Dr. Stern, I'd like to talk about the '675	15:29:13
13	patent.	15:29:17
14	A Okay.	15:29:17
15	Q What is the '675 patent directed to,	15:29:18
16	generally speaking?	15:29:22
17	MR. REEVES: Objection. Form.	15:29:24
18	THE WITNESS: Understand that it is voice	15:30:56
19	input-output devices modified by distance	15:30:59
20	calculations.	15:31:05
21	BY MR. REYNOLDS:	15:31:11
22	Q Does the specification in the '675 patent	15:31:12

1	describe any problems that the inventor sought to	15:31:13
2	solve?	15:31:17
3	MR. REEVES: Objection. Form.	15:31:22
4	THE WITNESS: Well, stated in paragraph 44	15:32:02
5	of the original declaration: "The '675 patent	15:32:04
6	describes an 'output content control device' that	15:32:07
7	analyzes a user's voice and generates a response."	15:32:13
8	BY MR. REYNOLDS:	15:32:22
9	Q Does the patent describe -- I'm sorry.	15:32:22
10	A Go ahead. No, I didn't say anything.	15:32:25
11	Q Does the patent describe any particular	15:32:27
12	problem -- problem that it attempted to improve upon	15:32:30
13	in connection with those devices?	15:32:32
14	MR. REEVES: Objection. Form.	15:32:36
15	THE WITNESS: I'm sorry. I was reading the	15:34:08
16	wrong reference.	15:34:09
17	In the background section of the '675	15:34:52
18	patent -- this would be column 1, lines 28 to 37 or	15:34:54
19	so -- the inventor describes a desire to create a	15:35:02
20	system with outputs that aren't known to people	15:35:15
21	other than the users. In other words, modifying the	15:35:21
22	output so as to make the output difficult to be	15:35:28

1	understood by people other than the user content of	15:35:35
2	the content of notification of is output.	15:35:43
3	BY MR. REYNOLDS:	15:35:51
4	Q Do the claims of the '675 patent cover that	15:35:51
5	system?	15:35:53
6	MR. REEVES: Objection. Calls for a legal	15:36:00
7	conclusion. Form.	15:36:01
8	THE WITNESS: Yes.	15:37:03
9	BY MR. REYNOLDS:	15:37:03
10	Q Do the claims extend beyond output-content	15:37:13
11	control devices?	15:37:18
12	MR. REEVES: Objection. Form. Calls for a	15:37:22
13	legal conclusion.	15:37:45
14	THE WITNESS: Claims 1 through 5 explicitly	15:37:45
15	begin with a description of output-content control	15:37:47
16	devices, claim 6 refers to an output-content control	15:37:53
17	method, and claim 7 refers to a storage medium that	15:37:58
18	stores an output-content control program.	15:38:06
19	BY MR. REYNOLDS:	15:38:26
20	Q Are the inventions described in the '675	15:38:27
21	patent used to improve devices or systems other than	15:38:30
22	output-control devices or systems containing	15:38:37

1	output-control devices?	15:38:40
2	MR. REEVES: Objection. Form.	15:38:42
3	THE WITNESS: I believe that the patent	15:38:50
4	discloses various different forms or embodiments of	15:38:53
5	output-content control devices.	15:38:59
6	BY MR. REYNOLDS:	15:39:37
7	Q But could the inventions that the inventor	15:39:37
8	recited in the claims -- could that technology be	15:39:40
9	used to improve devices other than output-content	15:39:44
10	control devices?	15:39:50
11	MR. REEVES: Objection. Form.	15:39:50
12	BY MR. REYNOLDS:	15:39:51
13	Q Does it apply to any other type of devices?	15:39:51
14	A Well, I don't know. That's outside the	15:39:55
15	scope of the patent.	15:40:00
16	Q Can you, as you sit here today, think of	15:40:00
17	any other device that can be improved using the	15:40:04
18	claimed inventions, other than an output-content	15:40:07
19	control device?	15:40:11
20	MR. REEVES: Objection. Form. Outside the	15:40:13
21	scope.	15:40:17
22	THE WITNESS: Excuse me.	15:40:17

1	I imagine I could, but I haven't been asked	15:40:21
2	to opine on that topic, so I respectfully decline --	15:40:24
3	respectfully decline.	15:40:30
4	BY MR. REYNOLDS:	15:40:32
5	Q Understood.	15:40:33
6	But how do you know you could then? If	15:40:34
7	you're declining to do it, how do you imagine that	15:40:37
8	you could? What would be the basis for saying that?	15:40:42
9	MR. REEVES: Objection. Form.	15:40:45
10	THE WITNESS: Don't know really.	15:41:03
11	BY MR. REYNOLDS:	15:41:17
12	Q If you'd go to Section 2(A) of your	15:41:17
13	declaration, please.	15:41:20
14	A This is the original declaration for the	15:41:22
15	'675 patent?	15:41:24
16	Q I'm sorry. No. I'm sorry.	15:41:24
17	Reply declaration, Exhibit 1202.	15:41:25
18	A Okay. What section again?	15:41:28
19	Q 2(A) beginning at paragraph 25.	15:41:41
20	A Okay.	15:41:59
21	Q Did you provide the opinions in Section	15:41:59
22	2(A) at the request of Amazon's counsel?	15:42:04

1 A Yes. 15:42:07

2 Q What were you asked to do in connection 15:42:08

3 with that section -- or I'm sorry. 15:42:12

4 What were you asked to do that led to the 15:42:16

5 opinions that you put in that section? 15:42:18

6 A I was asked -- 15:42:21

7 MR. REEVES: Objection. Form. 15:42:23

8 THE WITNESS: Sorry. 15:42:25

9 I was asked to opine on the -- the extent 15:42:25

10 to which or the way in which the claim recited 15:42:33

11 merely collecting information and analyzing 15:42:37

12 information and presenting results. 15:42:47

13 BY MR. REYNOLDS: 15:42:54

14 Q And how did you go about making that 15:42:54

15 assessment? 15:42:56

16 A Well, the request is pretty 15:42:57

17 straightforward. I asked, "does the system collect 15:43:07

18 information?" It does. "Does the system analyze 15:43:13

19 information?" It does. And, "Does the system 15:43:20

20 present results?" It does that as well. 15:43:24

21 And I noted, as described in paragraph 27 15:43:45

22 of the reply declaration, that the patent did not 15:43:48

1 identify the proximity sensor as the focus of the 15:44:01
2 claimed advance. They -- in classifying the voice, 15:44:04
3 the specification described only way -- one way of 15:44:15
4 doing it, by comparing the calculated distance to a 15:44:18
5 threshold value, classifying accordingly, which was 15:44:23
6 analyzing information, and that the voice 15:44:31
7 classifying compared -- disclosed comparing the 15:44:38
8 incoming data to a threshold, which was analysis of 15:44:43
9 information without providing any detail how the 15:44:46
10 analysis occurred. 15:44:53

11 The last part of the assertion concerned 15:45:13
12 generating output information, and of course, as I 15:45:15
13 state in paragraph 32 of the declaration -- the 15:45:32
14 reply declaration, the claim requires something that 15:45:34
15 generates output information, which is presenting 15:45:40
16 results. 15:45:42

17 Q Did you apply any legal standards when 15:45:58
18 rendering the opinions in Section 2(A)? 15:46:01

19 A Not beyond those sections that were 15:46:05
20 disclosed in the -- in the title, collecting 15:46:12
21 information, analyzing information, preparing 15:46:22
22 results -- presenting results. As -- as I've noted, 15:46:25

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1	by -- by not being an attorney, I don't consider	15:46:30
2	myself qualified to do that.	15:46:32
3	Q You understand why you were asked to	15:46:40
4	determine whether the claims recite collecting	15:46:43
5	information, analyzing information, and presenting	15:46:48
6	results?	15:46:51
7	MR. REEVES: Objection to the extent it	15:46:52
8	calls for privileged information.	15:46:54
9	Dr. Stern, you can answer yes or no.	15:46:55
10	THE WITNESS: I believe the question was	15:47:00
11	did you understand why?	15:47:02
12	BY MR. REYNOLDS:	15:47:02
13	Q Yes.	15:47:04
14	A And, no.	15:47:05
15	Q So I -- it sounds like, in connection with	15:47:13
16	your task, the term "collecting" -- the term, in	15:47:16
17	paragraph 25, whether the claim reflects nothing	15:47:21
18	more than collecting information, analyzing	15:47:26
19	information, presenting results was provided to you,	15:47:28
20	right?	15:47:32
21	A That phrase was, yes. I've stated that.	15:47:32
22	Q Okay.	15:47:34

1 Are you aware of any prior art or related 15:47:47
2 user content devices that do not collect 15:47:52
3 information, analyze information, and present 15:47:55
4 results? 15:47:57

5 MR. REEVES: Objection. Form. Outside the 15:47:58
6 scope. 15:48:03

7 THE WITNESS: I think the question -- I 15:48:03
8 think what I was supposed to opine on was the 15:48:08
9 question of whether the system does anything beyond 15:48:10
10 that, is their original analysis that a very generic 15:48:13
11 system wouldn't have been able to do that was 15:48:20
12 interesting in and of itself. 15:48:23

13 BY MR. REYNOLDS: 15:48:37

14 Q So a voice content-control device, in your 15:48:37
15 opinion, does nothing more than collect information, 15:48:43
16 analyze information, and present results when it 15:48:45
17 takes a user's speech, processes it, and then 15:48:48
18 outputs an audio signal? Is that your opinion? 15:48:53

19 A Well -- 15:48:57

20 MR. REEVES: Objection. Form. Outside the 15:48:58
21 scope. Incomplete hypothetical. 15:49:03

22 THE WITNESS: I'll only say that my opinion 15:49:06

1	was limited to the proposed revision -- the proposed	15:49:07
2	additional claim 8.	15:49:11
3	BY MR. REYNOLDS:	15:49:23
4	Q Okay. Well, I'm not asking about claim 8.	15:49:23
5	I'm just asking about a voice content-control device	15:49:25
6	that receives a user's speech, processes it, and	15:49:28
7	then outputs an audio signal. Would you say that	15:49:33
8	such a device does nothing more than collect	15:49:36
9	information, analyze information, and present	15:49:38
10	results?	15:49:40
11	MR. REEVES: Objection. Form. Incomplete	15:49:42
12	hypothetical. Outside the scope.	15:49:44
13	THE WITNESS: I don't know. I haven't	15:49:48
14	thought about it and wasn't asked to do so.	15:49:49
15	BY MR. REYNOLDS:	15:49:56
16	Q Could you answer now?	15:49:56
17	MR. REEVES: Same objections.	15:50:00
18	THE WITNESS: Well, I'd have to spend some	15:50:01
19	time studying the field, the available technology.	15:50:03
20	BY MR. REYNOLDS:	15:50:11
21	Q Well, it seems to me -- I'm sorry.	15:50:11
22	A I prefer not to -- and just would prefer	15:50:13

1 not to speculate. 15:50:15

2 Q Okay. Well, it seems to me that looking at 15:50:18

3 the device -- there's an Alexa down there or 15:50:22

4 something -- 15:50:27

5 A Mm-hmm. 15:50:27

6 Q -- that listens to me talk, processes 15:50:29

7 something, determines an output, and presents an 15:50:32

8 audio signal back to me. It seems to me to be a 15:50:34

9 little reductionist to say that device merely -- 15:50:39

10 merely collects information, analyzes information, 15:50:42

11 and presents results. It seems like a pretty 15:50:43

12 reductionist way to describe that. 15:50:46

13 Would you agree with that statement or 15:50:48

14 would you disagree with that statement? 15:50:51

15 MR. REEVES: Objection. Form. Incomplete 15:50:53

16 hypothetical. Outside the scope. 15:50:54

17 THE WITNESS: There's a lot of -- I don't 15:51:11

18 want to say too much because anything I say is 15:51:18

19 really speculation without real analysis. 15:51:22

20 But I will say that when the first Echo 15:51:25

21 appeared, the first demo that we had was very 15:51:32

22 impressive to all of us speech researchers in my 15:51:38

1 research group, and what was most impressive was 15:51:41
2 that the speech recognition technology at a distance 15:51:45
3 was effective. 15:51:51

4 And there was something in there that 15:51:53
5 wasn't in the prior art, and -- which I assume -- I 15:51:57
6 don't know, but I assume has been disclosed by other 15:52:05
7 Amazon patents. And that to me is what makes the 15:52:07
8 system behind you interesting and patentable in a 15:52:12
9 way in which the proposed system disclosed here is 15:52:20
10 not. 15:52:26

11 BY MR. REYNOLDS: 15:52:40

12 Q You described something that makes a system 15:52:40
13 patentable. Are you aware that Amazon routinely 15:52:42
14 argues that any discussion of whether something is 15:52:45
15 novel or patentable has nothing to do with whether 15:52:47
16 it merely collects information, analyzes 15:52:50
17 information, and presents results? 15:52:52

18 MR. REEVES: Objection. Form. Outside the 15:52:54
19 scope. 15:53:02

20 THE WITNESS: I was not aware and don't 15:53:02
21 consider it relevant to this discussion, which 15:53:04
22 concerns my comments on the '675 and '337 patents. 15:53:06

1	BY MR. REYNOLDS:	15:53:27
2	Q Are you aware that Amazon filed briefs in a	15:53:28
3	District Court action that addressed some of the	15:53:31
4	similar copies to which you raise in Section 2(A)?	15:53:34
5	A yes or no is fine.	15:53:38
6	A No. No, I was not aware. No is the	15:53:40
7	answer.	15:53:44
8	Q Is it your opinion that a POSITA would not	15:54:22
9	have known how to use a threshold in connection with	15:54:24
10	making a whisper/non-whisper determination without	15:54:27
11	more information?	15:54:31
12	MR. REEVES: Objection. Form. Incomplete	15:54:34
13	hypothetical.	15:54:54
14	THE WITNESS: My opinions were merely that	15:54:54
15	there was not enough specificity in the claim	15:54:58
16	language and enough support in the specification in	15:55:01
17	the patent to enable a POSITA to realize the	15:55:09
18	invention unambiguously.	15:55:12
19	BY MR. REYNOLDS:	15:55:17
20	Q I'm not asking if a POSITA would realize	15:55:18
21	the invention unambiguously. I'm just asking if in	15:55:21
22	your opinion -- in your opinion, whether a POSITA	15:55:25

1 would not have known how to use a threshold in 15:55:28
2 connection with making a whisper/non-whisper 15:55:31
3 determination without more information. 15:55:36

4 MR. REEVES: Objection. Form. Incomplete 15:55:38
5 hypothetical. 15:55:55

6 THE WITNESS: Well, I believe we've already 15:55:55
7 discussed this, especially in the beginning of the 15:55:57
8 day. We talked about a couple of methods that -- 15:55:58
9 for whisper detection that both involved comparing 15:56:04
10 something to a threshold. My concern about the 15:56:08
11 proposed claim language was that -- I don't want to 15:56:15
12 use -- define the phrase "non-obvious" since it's a 15:56:21
13 term of art here. 15:56:27

14 My concern with the proposed language was 15:56:29
15 that I didn't know exactly what I was to measure or 15:56:31
16 how I would take the measurement, again, from the 15:56:34
17 claim language and the support from the spec in 15:56:37
18 order to do that measurement. 15:56:41

19 BY MR. REYNOLDS: 15:56:49

20 Q So if I asked a POSITA to create a device 15:56:50
21 that determines whether input speech is a whisper or 15:56:56
22 non-whisper and to do it using a threshold, could a 15:57:00

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1	POSITA -- could a POSITA have figured that out	15:57:05
2	without a lot of experimentation, or would a POSITA	15:57:07
3	have not known how to do that?	15:57:11
4	MR. REEVES: Objection. Form. Incomplete	15:57:14
5	hypothetical.	15:57:35
6	THE WITNESS: A POSITA could have read the	15:57:35
7	references that described the methods that I talked	15:57:37
8	about, and as I talk about in the declaration, the	15:57:43
9	claim language is very specific.	15:58:12
10	A POSITA would not know what predetermined	15:58:17
11	voice meant, whether the voice is classified as a	15:58:20
12	first voice or second voice based on distance. The	15:58:24
13	spec doesn't clarify the POSITA would not know, as I	15:58:27
14	state in paragraph 45, the boundaries of the claim	15:58:34
15	limitation. Relevant limitation only being the text	15:58:39
16	that's reprinted on the top of page 18. And a	15:58:46
17	POSITA would have the difficulties that I list of	15:59:02
18	implementing the disclosures of the proposed revised	15:59:08
19	claim 8.	15:59:14
20	So I would say, no, the -- the proposed	15:59:17
21	amended claim wouldn't lead the POSITA to that -- to	15:59:37
22	that -- to that invention.	15:59:41

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1	BY MR. REYNOLDS:	15:59:52
2	Q Can you look at paragraph 36 of your reply	15:59:53
3	declaration?	16:00:01
4	A Yes, one page away.	16:00:02
5	Q I'm sorry?	16:00:06
6	A Yes.	16:00:07
7	Q Okay. When you've had a chance to look at	16:00:07
8	that, can you explain to me generally what you're	16:00:11
9	stating in that paragraph?	16:00:15
10	MR. REEVES: Objection. Form.	16:00:19
11	THE WITNESS: What I'm stating is that what	16:00:32
12	the proposed invention does is a process that you	16:00:40
13	and I routinely do when we're -- when we're talking	16:00:47
14	to somebody else.	16:00:54
15	Sometimes the things that we're discussing,	16:01:00
16	like the weather or state of traffic downtown or	16:01:03
17	non-controversial other things, for example, health	16:01:09
18	or money, are sensitive in one fashion or another.	16:01:14
19	And in talking about sensitive topics, if you're	16:01:22
20	close to the other person that you're talking to,	16:01:33
21	you would -- you know, you might speak normally	16:01:36
22	assuming that you would not be overheard; whereas,	16:01:39

1	if you're farther away, you're likely to speak more	16:01:43
2	vaguely or in a code of some sort.	16:01:46
3	And I say that, that's -- the invention	16:01:49
4	disclosed in the patent is similar to what you and I	16:01:57
5	would do as humans.	16:01:59
6	BY MR. REYNOLDS:	16:02:03
7	Q Does the invention do it in the same way	16:02:03
8	humans do it?	16:02:06
9	A Of course not.	16:02:08
10	MR. REEVES: Objection. Form.	16:02:11
11	THE WITNESS: I'm sorry.	16:02:12
12	Of course not. We're humans and they're	16:02:12
13	machines. The hardware is very different.	16:02:16
14	THE COURT REPORTER: I'm sorry. I missed	16:02:16
15	that.	16:02:17
16	THE WITNESS: The hardware is very	16:02:18
17	different. We are humans and they are machines.	16:02:20
18	The hardware is very different. That's what I	16:02:24
19	stated.	16:02:26
20	BY MR. REYNOLDS:	16:02:38
21	Q Who came up with the analogy described in	16:02:38
22	paragraph 36?	16:02:41

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1 A I was asked to address the question in the 16:02:45
2 headline and the label of the section, I came up 16:02:51
3 with the analogy. It's just, like, an easy thing to 16:02:57
4 characterize. 16:03:04

5 Q Are you aware that this analogy bears 16:03:06
6 striking resemblance to an analogy Amazon included 16:03:10
7 in its briefing to the court? 16:03:13

8 A No. 16:03:16

9 Q So you guys each came up with it 16:03:16
10 separately? 16:03:19

11 A Yeah. I -- I've had no exposure to the 16:03:20
12 Amazon documents beyond this case -- well, and 16:03:24
13 related to this case beyond the ones we're looking 16:03:29
14 at right now. 16:03:33

15 Q Does Shin disclose nothing more than 16:05:01
16 collecting information, analyzing information, and 16:05:04
17 presenting results? 16:05:06

18 MR. REEVES: Objection. Form. Outside the 16:05:09
19 scope. 16:05:13

20 THE WITNESS: Can I have a copy of the 16:05:13
21 reference? 16:05:14

22 BY MR. REYNOLDS: 16:05:14

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1	Q	It's in the Chat.	16:05:39
2	A	I'll grab it in a second.	16:05:42
3	Q	For the record, that's Exhibit 1003.	16:05:46
4	A	Okay. I finally have it now, and I verify	16:07:04
5		that the reference that I have is -- is the same as	16:07:06
6		the paper copy that I've been handed.	16:07:10
7	Q	Thank you. I'll restate the question.	16:07:16
8		Does Shin disclose nothing more than	16:07:21
9		collecting information, analyzing information, and	16:07:23
10		presenting results?	16:07:25
11		MR. REEVES: Objection. Form. Outside the	16:07:27
12		scope.	16:07:27
13		Counsel, are you really asking Dr. Stern to	16:11:05
14		read the entire Shin reference and render an	16:11:07
15		opinion, sitting right here, as to whether it	16:11:10
16		discloses more than -- I forget your question.	16:11:12
17		BY MR. REYNOLDS:	16:11:14
18	Q	He can decide how he wants to answer my	16:11:14
19		question. He doesn't need your instruction.	16:11:17
20	A	I'm just going to say I don't know, and I'd	16:12:04
21		have to study the document further to render a	16:12:07
22		theory or an opinion, if you wish.	16:12:09

1	Q	But you can't tell without reviewing the	16:12:18
2		document further whether Shin discloses something	16:12:22
3		more than collecting information, analyzing	16:12:24
4		information, and presenting results?	16:12:26
5	MR. REEVES:	Objection. Form. Outside the	16:12:28
6		scope.	16:12:30
7	THE WITNESS:	No.	16:12:30
8	BY MR. REYNOLDS:		16:12:30
9	Q	Can you look at paragraphs 38 to 40 in your	16:12:33
10		declaration, please?	16:12:36
11	A	Yes.	16:12:45
12	Q	It looks like you discuss hardware	16:12:48
13		components and whether they're conventional?	16:12:50
14	A	The components don't have to be hardware.	16:12:56
15		What I'm stating in that section is that the	16:12:59
16		components, either hardware or software, are	16:13:04
17		described at a very high level of functionality	16:13:09
18		without details about how to implement them.	16:13:14
19	Q	Where do you discuss software components in	16:13:19
20		those paragraphs?	16:13:21
21	A	You're correct; I do not.	16:13:32
22	Q	And you don't discuss the combination of	16:13:42

1	hardware and software components in those	16:13:44
2	paragraphs, right?	16:13:46
3	MR. REEVES: Objection. Form.	16:13:49
4	THE WITNESS: I'm only stating that the	16:13:53
5	components used are conventional with an -- with an	16:13:55
6	accepted practice of 2018.	16:14:04
7	BY MR. REYNOLDS:	16:14:09
8	Q I'm asking about paragraphs 38, 39, and 40,	16:14:09
9	though.	16:14:12
10	A Yes, I know.	16:14:13
11	Q Where do you discuss the combination or any	16:14:14
12	combination of hardware and software components?	16:14:16
13	MR. REEVES: Objection. Form.	16:14:19
14	THE WITNESS: I was only asked to opine	16:14:20
15	upon the components themselves, rather than how they	16:14:22
16	were combined, so I don't talk about that.	16:14:27
17	BY MR. REYNOLDS:	16:15:29
18	Q Can you go to paragraph 53 of your reply	16:15:29
19	declaration, please -- no. I'm sorry -- paragraph	16:15:32
20	57, and I'd like to focus on the sentence at the top	16:15:41
21	of paragraph -- sorry -- page 25 that says: "Basye	16:15:53
22	discloses detecting whispered speech when the speech	16:16:03

1	'has resonance below a threshold[.]'"	16:16:08
2	Do you see that?	16:16:12
3	A Yes, I do.	16:16:13
4	Q What does "resonance below a threshold"	16:16:14
5	mean?	16:16:17
6	A Could you pass me that document as well?	16:16:25
7	Q I've put in the Chat Exhibit 1208.	16:16:39
8	A Thank you.	16:16:43
9	I'm looking at it now, and indeed, it is	16:17:12
10	the same Exhibit 1208 that you have in the Chat, the	16:17:14
11	hard copy that I have, and now turning to paragraphs	16:17:18
12	52, 58, and 60.	16:17:22
13	What paragraphs 52, 58, and 60 refer to in	16:19:10
14	the Basye reference -- and by the way, that's	16:19:14
15	capital B-A-S-Y-E, and I'm not at all confident that	16:19:21
16	I'm pronouncing the name correctly.	16:19:26
17	But what they refer to is collecting a	16:19:28
18	bunch of patterns -- spectral patterns, frequency	16:19:37
19	patterns of whispered speech, collecting another set	16:19:41
20	of patterns of frequency analysis of non-whispered	16:19:46
21	speech, and training a classifier, and in this case	16:19:51
22	SVM classifier, support vector machine, SVM, to make	16:19:56

1	a classification decision strictly on the basis of	16:20:05
2	the examples that are presented in the system.	16:20:09
3	Q All right. What is resonance -- let me	16:20:18
4	start over.	16:20:23
5	How do you compare resonance to a	16:20:27
6	threshold, or how does Basye envision comparing	16:20:31
7	resonance to a threshold?	16:20:34
8	MR. REEVES: Objection. Form.	16:20:36
9	THE WITNESS: According to the further	16:20:39
10	disclosure of paragraph 60 of Basye, that disclosure	16:20:46
11	is not talking about comparing the resonance	16:20:52
12	directly to a threshold, but, rather, comparing the	16:20:55
13	probability that that spectral pattern, which	16:20:58
14	includes resonances, is likely to be a spectral	16:21:01
15	pattern corresponding to whisper versus a normal	16:21:05
16	speech sound, non-whispered speech sound. So we're	16:21:09
17	not comparing resonances. We're comparing	16:21:16
18	probabilities.	16:21:19
19	BY MR. REYNOLDS:	16:21:29
20	Q Now I'm even more confused.	16:21:29
21	A Sorry about that.	16:21:30
22	Q Because the part -- no. That happens all	16:21:31

1	the time.	16:21:33
2	The portion you quote from Basye said --	16:21:35
3	you mentioned just that Basye discloses detecting	16:21:42
4	whispered speech when, quote -- sorry -- when the	16:21:44
5	speech, quote, has resonance below a threshold, end	16:21:49
6	quote.	16:21:53
7	So it seems if resonance -- if speech has	16:21:53
8	resonance below a threshold, it sounds to me like	16:21:58
9	you're comparing some variable associated with the	16:22:01
10	speech to a threshold, but perhaps I'm mistaken.	16:22:04
11	Could you explain if he's doing that?	16:22:07
12	A No, I think you're not mistaken.	16:22:10
13	MR. REEVES: Objection. Form.	16:22:13
14	THE WITNESS: I'm sorry.	16:22:14
15	I think you're not mistaken -- mistaken.	16:22:15
16	That is what the patent states.	16:22:16
17	The patent goes on to state, in paragraphs	16:22:20
18	59 and 60, that it used the spectral patterns,	16:22:25
19	including the resonances to develop a model that's	16:22:30
20	used by classification -- classification system, and	16:22:32
21	they cite SVM classifier, which was the -- really	16:22:36
22	one of the best state of the art approaches to	16:22:44

1 classification for that kind of signal, at least at 16:22:46
2 the time of the filing. 16:22:52

3 And then based on the patterns that you 16:22:53
4 see, you look at a lot of different patterns for 16:22:57
5 whispered speech, a lot of different patterns for 16:23:00
6 non-whispered speech, again, without necessarily 16:23:03
7 measuring the values of the peaks and values from 16:23:09
8 the resonance -- from the resonances that were 16:23:13
9 generated. And then you make a decision based on 16:23:15
10 the -- whether it was more likely, whether it was 16:23:19
11 more probable that a particular input speech 16:23:24
12 utterance was whispered or conventional. 16:23:28

13 BY MR. REYNOLDS: 16:23:36

14 Q What would be the units of the threshold in 16:23:36
15 Basye? 16:23:38

16 MR. REEVES: Objection. Form. Outside the 16:23:42
17 scope. 16:23:45

18 THE WITNESS: So these are probabilities, 16:23:45
19 and probabilities are dimensionless. Probabilities 16:23:48
20 would lie between zero and one. 16:23:51

21 BY MR. REYNOLDS: 16:23:58

22 Q Where in Basye does it say that? 16:23:58

1 A It says, in paragraph 60 in Basye: "For 16:24:02
2 example, a model, such as an SVM classifier, may be 16:24:11
3 trained to recognize when an input speech utterance 16:24:16
4 is whispered using many different training 16:24:20
5 utterances, each labeled either 'whispered' or 'not 16:24:21
6 whispered.'" The -- I'm just going to continue to 16:24:33
7 read. 16:24:35
8 "Each training utterance may also be 16:24:35
9 associated with various feature data corresponding 16:24:37
10 to the respective utterance, where the feature data 16:24:40
11 indicates values for the acoustic and/or 16:24:43
12 non-acoustic [sic] paralinguistic features that may 16:24:46
13 be used to determine if a future utterance was 16:24:48
14 whispered. The model may be constructed...on the 16:24:51
15 training utterances and then disseminated to 16:24:53
16 individual devices...or to server(s)...A speech 16:24:57
17 quality detector...may then use the model(s) to make 16:25:01
18 decisions at runtime as to whether the utterance was 16:25:03
19 whispered." 16:25:06
20 Now, and -- and then it goes on without 16:25:07
21 saying anything relevant to the question. 16:25:10
22 The standard SVM classifier, given two 16:25:13

1 questions -- given -- given two categories, will 16:25:16
2 assess the probability of one -- one category being 16:25:21
3 present given the data and compare that to the other 16:25:25
4 category being present given the data. And 16:25:29
5 typically, this would be discussed in terms of the 16:25:33
6 likelihood of probabilities or, more commonly, the 16:25:35
7 law of the likelihood of probabilities, and that 16:25:40
8 would be compared to a threshold. 16:25:44
9 Q If you'd turn to paragraph 60, and this is 16:25:57
10 Section 2(D) (3) of your reply declaration, that 16:26:00
11 begins Section 2(D) (3) -- 16:26:08
12 A Yes. 16:26:12
13 Q -- that section contains paragraphs 60 to 16:26:12
14 65. 16:26:16
15 A That's right. 16:26:17
16 Q Okay. 16:26:17
17 What's the purpose of this section? 16:26:17
18 MR. REEVES: Objection. Form. 16:26:23
19 THE WITNESS: The -- this is part of the 16:26:26
20 general discussion that -- asserting that the 16:26:38
21 proposed substitute claim 8 would be obvious given 16:26:44
22 the existing prior art, and the first part we talk 16:26:48

1 about -- I talk about the disclosures of whisper 16:26:57
2 detection in a couple of specific papers, which 16:27:04
3 we've mentioned, Raitio and also the Chen reference, 16:27:08
4 which I'm sure you have, with some additional 16:27:12
5 references, including the Basye reference that you 16:27:20
6 just asked me about. 16:27:23

7 And then go on to say that all of these 16:27:30
8 suggest that whisper is determined already in the 16:27:32
9 prior art based on distance and peak frequency. 16:27:37
10 And, finally, Section 3 there is concerned with 16:27:42
11 motivation to combine, and we talk about the 16:27:46
12 existence of private communication modes in Chen and 16:28:07
13 Shimomura using -- combined with the methods 16:28:12
14 disclosed for detecting whispers in Raitio and Chen, 16:28:15
15 and this is precisely, in combination, the system 16:28:22
16 that is proposed in the '675 patent and the '337 16:28:26
17 patent for that matter. 16:28:33

18 BY MR. REYNOLDS: 16:28:39

19 Q So the title of that section is Motivation 16:28:39
20 to Combine, right? 16:28:42

21 A That's right. 16:28:44

22 Q So what is -- what is the combination 16:28:44

1 you're discussing that a POSITA would have been 16:28:48
2 motivated to create? 16:28:51

3 A The combination would have been, on the one 16:28:54
4 hand, detection of distance or estimation of 16:28:56
5 distance and using that to modify the output speech 16:29:03
6 device, and that was disclosed by Shin and Shimomura 16:29:07
7 on one hand. 16:29:12

8 And on the other hand was the detection of 16:29:13
9 whispers, which was disclosed, among other places, 16:29:17
10 through the teachings of -- of Raitio and Chen. And 16:29:25
11 the goal of that was that if the user is 16:29:31
12 whispering -- and this is the same, I'm sure, as for 16:29:36
13 the '337 and '675 patent -- if the user is 16:29:42
14 whispering, you also want to have a private 16:29:47
15 communication established. 16:29:50

16 Q So does the combination of prior art you're 16:29:57
17 referencing include all of those, Shin, Shimomura, 16:30:00
18 Chen, Raitio, Basye, and Jain or some subset of 16:30:07
19 those or which one -- which ones? 16:30:13

20 MR. REEVES: Objection. Form. 16:30:16

21 THE WITNESS: Well, it's stated in 16:30:17
22 paragraph 60 that you would choose one or more of 16:30:20

1 Raitio, Chen, Basye, and/or Jain to provide the 16:30:26
2 whisper detection with one of the prior art 16:30:32
3 references, most likely Shin or Shimomura, to 16:30:36
4 provide the modification of the output content. 16:30:41

5 In other words, at the end of paragraph 61, 16:31:13
6 I state: "Thus, a person of ordinary skill would 16:31:19
7 have been motivated to configure Shin and 16:31:23
8 Shimomura's devices to detect whisper, and do so by 16:31:25
9 comparing peak-frequency intensity to a threshold as 16:31:28
10 taught by Raitio or Chen, to achieve the benefits of 16:31:32
11 detecting whispered speech." 16:31:35

12 BY MR. REYNOLDS: 16:31:42

13 Q So the combination is either Shin or 16:31:43
14 Shimomura with one or more of Raitio, Chen, Basye, 16:31:45
15 and Jain. Is that -- 16:31:52

16 A Yes. 16:31:55

17 Q Okay. So that's, like, 30 possibilities of 16:31:56
18 combining these references? 16:32:00

19 A I don't know. One from column A and one 16:32:01
20 from column B would be sufficient, and that's stated 16:32:05
21 clearly in -- in the reply declaration. 16:32:10

22 Q So what's column A then? What's in column 16:32:16

1	A?	16:32:21
2	MR. REEVES: Objection. Form.	16:32:22
3	THE WITNESS: Well, let us suppose, in this	16:32:23
4	analogy, that column A would be Shin or Shimomura	16:32:25
5	and column B would be the various methods disclosed	16:32:29
6	for detecting whisper.	16:32:34
7	BY MR. REYNOLDS:	16:32:39
8	Q Okay. So in paragraph 60 you say, in a	16:32:39
9	parenthetical, Raitio, Chen, Basye, and/or Jain. So	16:32:43
10	typically I would read "and/or" to mean any	16:32:50
11	combination of those references, not just one of	16:32:53
12	each, but any pairing possible.	16:32:55
13	Is that what you meant or did you mean	16:32:58
14	something else?	16:33:00
15	A I meant that one from -- one of the	16:33:00
16	references inside the parens would be sufficient in	16:33:06
17	combination with either Shin or Shimomura.	16:33:10
18	Q Okay. So then we have two options in	16:33:12
19	column A and four in column B?	16:33:14
20	A Right. But you don't have to try them all.	16:33:18
21	Any of them should work. There's no undue	16:33:20
22	experimentation expected.	16:33:25

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1	Q	Okay. Which of those eight combinations	16:33:29
2		did you address in paragraph 60 to 65?	16:33:31
3	MR. REEVES:	Objection. Form.	16:33:37
4	THE WITNESS:	Paragraphs 60 to 65 are	16:33:57
5		intentionally agnostic about which of those I	16:34:02
6		recommended. Paragraph 62 notes that for detecting	16:34:15
7		whispered speech, probably Raitio and Chen would be	16:34:18
8		best, and then you could combine either of those	16:34:24
9		with Shin or Shimomura.	16:34:27
10		So if you're doing combinatorics, that's	16:34:29
11		only four combinations, but any of those should	16:34:33
12		work.	16:34:36
13	BY MR. REYNOLDS:		16:34:39
14	Q	In paragraph 61, you quote Shin as saying:	16:34:39
15		"...'[t]here is a growing need to detect whispered	16:34:44
16		speech'..."	16:34:46
17	A	Yes.	16:34:50
18	Q	Was that -- I'll represent that Shin was	16:34:51
19		published in 2016.	16:34:54
20		Was that true in 2016?	16:34:56
21	MR. REEVES:	Objection. Form.	16:35:00
22	THE WITNESS:	Are -- are you asking for my	16:35:04

1	general opinion or something based on the	16:35:06
2	references?	16:35:08
3	BY MR. REYNOLDS:	16:35:08
4	Q Your opinion.	16:35:09
5	A Well, I don't know. It wasn't a problem	16:35:15
6	that I was working on.	16:35:17
7	Q Are you able to determine whether that	16:35:32
8	statement by Chen is correct or not, based on your	16:35:35
9	own background and expertise?	16:35:39
10	A Well --	16:35:41
11	MR. REEVES: Objection. Form. Calls for	16:35:42
12	speculation.	16:35:52
13	THE WITNESS: I believe that that	16:35:52
14	motivation was included in some of the other prior	16:35:53
15	art references, so that would lead me to expect that	16:35:57
16	it was reasonable, but it wasn't a topic that I	16:35:59
17	addressed personally in my work.	16:36:03
18	BY MR. REYNOLDS:	16:36:07
19	Q But humans were able to detect whispered	16:36:08
20	speech in 2016, right?	16:36:11
21	A That's correct. There are many things that	16:36:15
22	humans can do even today that even the best machines	16:36:17

1	cannot do well.	16:36:20
2	Q So Chen was talking about, in the context	16:36:21
3	of a machine, there was a growing need to detect	16:36:24
4	whispered speech?	16:36:28
5	A That's why --	16:36:31
6	MR. REEVES: Objection. Objection. Form.	16:36:31
7	Calls for speculation.	16:36:33
8	THE WITNESS: I will speculate that	16:36:35
9	that's -- well, that was my interpretation,	16:36:38
10	speculative of what Chen had in mind.	16:36:41
11	BY MR. REYNOLDS:	16:36:47
12	Q So from Chen's point of view, the problem	16:36:47
13	was associated with the automated process or	16:36:50
14	electronic process of detecting whispered speech,	16:36:57
15	but the problem was not associated with humans	16:37:00
16	detecting whispered speech; is that fair?	16:37:03
17	MR. REEVES: Objection. Form.	16:37:06
18	THE WITNESS: Yes.	16:37:06
19	MR. REYNOLDS: I'll pass the witness.	16:37:40
20	MR. REEVES: Okay. Can we take a short	16:37:42
21	break?	16:37:44
22	MR. REYNOLDS: Yeah.	16:37:45

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1	THE VIDEOGRAPHER: Stand by.	16:37:48
2	Going off the record. The time is 16:37.	16:37:49
3	(Recess.)	16:37:53
4	THE VIDEOGRAPHER: Back on the record. The	16:42:30
5	time is 16:42.	16:42:31
6	EXAMINATION BY COUNSEL FOR PETITIONERS	16:42:31
7	AND THE DEPONENT	16:42:38
8	BY MR. REEVES:	16:42:38
9	Q Dr. Stern, I just have a few questions for	16:42:40
10	you. Do you recall earlier today discussing the	16:42:41
11	concept of classifying voice based on distance?	16:42:44
12	A Yes.	16:42:46
13	Q I'd like to hand you Exhibit 1212 from the	16:42:48
14	IPR 2025-00673. I'll also mark this as Exhibit 1212	16:42:53
15	is IPR 2025-00 -- I believe it's 565 is the other	16:43:02
16	one.	16:43:08
17	A Okay.	16:43:09
18	Q And I will drop a copy of this in the Chat	16:43:10
19	as well.	16:43:12
20	- - -	16:43:12
21	(Exhibit 1212 was marked for	16:43:12
22	identification.)	16:43:12

1	- - -	16:43:26
2	BY MR. REEVES:	16:43:26
3	Q On the cover of this document, Dr. Stern,	16:43:26
4	do you see that this is a complaint for patent	16:43:27
5	infringement between SoundClear Technologies LLC as	16:43:34
6	the plaintiff and Amazon.com, Inc., Amazon.com	16:43:36
7	Services LLC, and Amazon Web Services, Inc. as the	16:43:41
8	defendants?	16:43:44
9	A Yes.	16:43:46
10	Q And if you'd turn to the final page, you'll	16:43:46
11	see it's signed by plaintiffs' attorneys in this	16:43:48
12	case.	16:43:54
13	Do you see that?	16:43:54
14	A Yes.	16:43:55
15	Q Can I have you to turn paragraph 63, which	16:44:06
16	is on page 14?	16:44:10
17	A Yes.	16:44:23
18	Q Can you read the first sentence, which I	16:44:24
19	think is about six lines long?	16:44:26
20	A Okay.	16:44:31
21	"On information and belief, one or more	16:44:33
22	components of the Amazon Products and Services is,	16:44:35

1 employs, or provides a voice-content control method 16:44:39
2 comprising analyzing the acquired voice (e.g., the 16:44:42
3 signal representing the voice sound) to classify the 16:44:46
4 acquired voice as either one of a first voice (e.g., 16:44:50
5 the voice of a particular first person, or a 16:44:53
6 near/close voice) and a second voice (e.g., the 16:44:56
7 voice of a particular second person, or a 16:45:01
8 far/distant voice) based on the distance between the 16:45:05
9 user and the" voice-control content -- "and the 16:45:08
10 voice-content control device." 16:45:12

11 Q Thank you. 16:45:15

12 So that says that the first voice can be a 16:45:16
13 near or close voice, right? 16:45:19

14 A Yes. 16:45:21

15 MR. REYNOLDS: Objection. Form. 16:45:23

16 Foundation. Scope. 16:45:24

17 THE WITNESS: Sorry. Say it again, please. 16:45:27

18 BY MR. REEVES: 16:45:29

19 Q Yeah, I'll redo the question. 16:45:29

20 This says that a first voice can be a near 16:45:32
21 or close voice, correct? 16:45:34

22 MR. REYNOLDS: Same objections. 16:45:36

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1	THE WITNESS: Yes.	16:45:37
2	BY MR. REEVES:	16:45:38
3	Q And it says the second voice can be a far	16:45:38
4	or distant voice, correct?	16:45:41
5	MR. REYNOLDS: Same objections.	16:45:44
6	THE WITNESS: Yes.	16:45:45
7	BY MR. REEVES:	16:45:47
8	Q And this is consistent with your analysis	16:45:47
9	of the claims in these cases, correct?	16:45:50
10	A Yes.	16:45:54
11	MR. REYNOLDS: Same objections.	16:45:55
12	THE WITNESS: Sorry. Yes, it is.	16:45:57
13	MR. REEVES: No further questions.	16:46:01
14	THE VIDEOGRAPHER: Anything further?	16:46:04
15	MR. REYNOLDS: Give me a second, please.	16:46:08
16	No, nothing further. Thank you very much,	16:46:40
17	Dr. Stern.	16:46:44
18	THE WITNESS: Thank you.	16:46:44
19	THE VIDEOGRAPHER: All right. If there's	16:46:45
20	nothing further, this concludes the deposition of	16:46:46
21	Dr. Richard Stern. The time is 16:46.	16:46:48
22	(The following proceedings were held	16:46:48

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1	off the video record:)	16:46:51
2	THE COURT REPORTER: Counsel, may I get	16:46:51
3	your orders, please, starting with you,	16:46:53
4	Mr. Reynolds?	16:46:58
5	MR. REYNOLDS: What's standard?	16:47:00
6	THE COURT REPORTER: Ten business days.	16:47:03
7	MR. REYNOLDS: And rush would be?	16:47:08
8	THE COURT REPORTER: Anything less than	16:47:12
9	that, counting business days.	16:47:13
10	MR. REYNOLDS: Can we get it by, like, next	16:47:19
11	week, by the 14th?	16:47:22
12	THE COURT REPORTER: Yes. Did you want the	16:47:24
13	rough tonight?	16:47:27
14	MR. REYNOLDS: No.	16:47:28
15	THE COURT REPORTER: For you, Mr. Reeves,	16:47:32
16	are you purchasing a copy of the transcript?	16:47:36
17	MR. REEVES: Yeah, we -- we would like the	16:47:38
18	rough and expedited transcript as well.	16:47:41
19	THE COURT REPORTER: On the 14th as well?	16:47:48
20	MR. REEVES: Sure.	16:47:52
21	(Signature having not been discussed,	16:47:53
22	the deposition of Richard Stern, Ph.D. was concluded	16:47:53

1 at 4:47 p.m. EDT.)

16:47:55

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1 CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

2
3 I, JOAN V. CAIN, court reporter and Notary
4 Public within and for the Commonwealth of Virginia
5 do hereby certify:

6
7 That Richard Stern, Ph.D., the
8 witness whose deposition is hereinbefore set forth,
9 was duly sworn by me before the commencement of such
10 deposition and that such deposition was taken before
11 me and is a true record of the testimony given by
12 such witness.

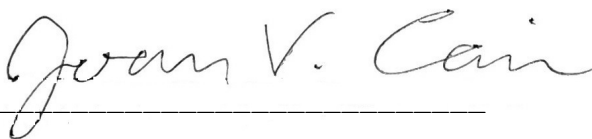
13
14 I further certify that the adverse
15 parties, Amazon.com, Inc.; Amazon.com Services LLC;
16 and Amazon Web Services, Inc., were represented by
17 counsel at the deposition.

18
19 I further certify that the deposition of
20 Richard Stern, Ph.D., was conducted remotely over
21 Zoom on WEDNESDAY, April 8, 2026, commencing at
22 12:07 p.m. to 4:47 p.m..

1 I further certify that I am not related to
2 any of the parties to this action by blood or
3 marriage, I am not employed by or an attorney to any
4 of the parties to this action, and that I am in no
5 way interested, financially or otherwise, in the
6 outcome of this matter.

7
8 IN WITNESS WHEREOF, I have hereunto set
9 my hand and affixed my notarial seal this 12th day
10 of April 2026.

11
12 My Commission Expires: May 31, 2029

13
14 
15 _____

16 NOTARY PUBLIC IN AND FOR

17 THE COMMONWEALTH OF VIRGINIA

18 VIRGINIA NOTARY REGISTRATION NO. 107144
19
20
21
22

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