UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., and

SAMSUNG ELECTRONICS AMERICA, INC.,

Petitioners,

vs.

CERENCE OPERATING COMPANY,

Patent Owner.

Case No. IPR2024-01267

U.S. Patent No. 9,026,428

REMOTE VIRTUAL DEPOSITION OF

ERIC KOSKINEN, Ph.D.

Wednesday, July 9, 2025

10:04 a.m.

Stenographically reported by:

Josephine H. Fassett, RPR, CCR

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Wednesday, July 9, 2025

10:04 a.m.

T R A N S C R I P T of the stenographic remote virtual deposition of ERIC KOSKINEN, Ph.D., taken pursuant to notice and held virtually from multiple locations via Zoom, on Wednesday, July 9, 2025, commencing at approximately 10:04 a.m., before Josephine H. Fassett, a Registered Professional Reporter, Certified Court Reporter, and Notary Public of the states of New York and New Jersey.

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(On the record 10:04 a.m.)

ERIC KOSKINEN, Ph.D.

the witness, having been duly sworn, was examined and testified under oath as follows:

EXAMINATION

BY MR. CLARK:

Q. Good morning, Dr. Koskinen. It's good to see you again via Zoom.

A. Good morning. Nice to see you again, too.

Q. So for the court reporter and the transcript, can you please introduce yourself by giving us your full name and address.

A. Sure. My name is Eric Koskinen, and my address is 1278 Blossom Street, Suffield, Connecticut.

Q. And can you confirm you are here to offer your opinions on a declaration you submitted in this IPR matter IPR2024-01267 regarding the validity of U.S Patent No. 9,026,428?

A. Yes, IPR2024-01267.

Q. And will you understand if I reference this patent as just the '428 patent?

A. Yes.

Q. Do you have any documents with you

today?

A. I have with me printed copies of the exhibits.

Q. Is there anything in addition to those exhibits that I've sent you ahead of time in front of you?

A. No.

Q. And do you have any of your personal notes or your attorney's notes with you today?

A. No.

Q. Is anyone else with you there in the room?

A. No.

Q. And have you ever been deposed before, Dr. Koskinen?

A. Yes.

Q. Approximately how many times?

A. Somewhere in the neighborhood of maybe 30 times.

Q. And were those for IPRs, for district court litigation, or both?

A. Both.

Q. Do you know the approximate breakdown for IPRs versus district court?

A. I think most of them were in district

court cases, and a few were IPRs.

Q. And when was the last deposition that you took? Or, sorry. When was the last deposition that you did?

A. I think a couple of months ago.

Q. In what matter was that?

A. I think it was a claim construction, Cerence versus Samsung.

Q. So the parallel proceeding for this IPR, correct?

A. I think that's right. Although I should say, I'm not quite sure what is considered exactly a parallel proceeding, but it was, it seemed somehow related.

Q. Okay. So other than that deposition, when was the prior deposition to that that you attended?

A. I think I was deposed a year or two ago in a different proceeding. I don't remember the exact date.

Q. Other than the dep, the claim construction, that deposition with Cerence versus Samsung, did any of those depositions involve handwriting recognition?

A. With regard to the particular

depositions that I have done, there was, as you mentioned, the claim construction deposition that pertained to handwriting. I can't remember if previous ones involved handwriting specifically or were in other technical areas.

Q. I'm sorry, what was that last part?

A. They were in other technical areas.

Q. Okay. Did any of those other depositions involve user interfaces that incorporate online recognition technologies?

A. With regard specifically to depositions that, as we had mentioned, the previous claim construction deposition, as I recall, pertained to user interfaces. And certainly other depositions in the past have pertained to user interfaces. I'm not sure if they pertained specifically to handwriting recognition, but certainly there were some related to user interfaces.

Q. Yeah. I mean, do you understand when I ask user interfaces that incorporate online recognition technologies, do you understand what that means?

A. I understand. I have a general understanding of what that means, yeah.

Q. So what does online recognition

technologies encompass?

A. Well, as mentioned in a discussion of what a person of ordinary skill in the art, what their area of knowledge would include, there's the discussion of user interfaces for online recognition -- just to make sure I say the words exactly as they are -- online recognition technologies.

So online recognition technologies -- or, sorry -- user interfaces incorporating online recognition technologies pertain to, as it says, user interfaces that involve components that use some kind of recognition.

Q. And so how would that be different than offline recognition technologies?

A. Well, typically the online recognition refers to making decisions in realtime as compared to offline just sort of, yeah, generally.

Q. So at a high level can you just explain like online handwriting recognition versus offline handwriting recognition?

A. It's a fairly broad term. But generally it refers to systems or algorithms that perform handwriting recognition and do so with some -- in response to a user in a sort of inactive way with

a user, so that's like the analysis can happen while interacting with the user, user interface.

Q. So that was the online handwriting recognition you were just describing, right?

A. Yes.

Q. And so what would offline recognition, handwriting recognition be?

A. I don't know if we have exactly a definition of offline recognition, but roughly speaking, offline recognition could involve more sort of slower processes or processes that don't happen with a user immediately involved.

Q. Okay. So to be clear, none of your depositions, other than perhaps the last claim construction deposition you mentioned, involved user interfaces that incorporate online recognition technologies?

A. With regard specifically to online recognition technologies, there's the previous deposition claim construction deposition. And I don't know if I specifically had other depositions that pertained to online recognition technologies, but I certainly have a great deal of experience in related fields, such as -- well, first of all, I have a background in computer science. I have an

undergraduate degree, a master's degree and a Ph.D.

I have worked as a software engineer at Amazon for three years, and I lecture on parsing which involves recognizing words and -- recognizing words and symbols and streams of characters.

So I have a lot of experience in related areas, even if I've not specifically had a deposition in the field of online recognition technologies.

Q. But you said, you talked about, you're talking about lecture parsing which involves recognizing words. Can you tell me a little bit more about that, was this a class or a one-time lecture?

A. I lecture regularly on parsing. I teach the compilers course, which is a course at my university. And one of the major components of compilers is the parsing aspect of a compiler, and that involves considering a stream of characters and recognizing words and symbols and constructing what's called an abstract syntax tree from them.

Q. Can you tell me a little bit more about how like does it -- strike that.

Is that the same sort of recognizing that occurs in handwriting recognition technologies?

MR. HYDE: Objection to form.

A. Well, parsing and recognizing preventing languages shares some commonality with generally recognizing languages. Typically in computer programming you don't have handwriting or handwritten symbols, instead you have typed symbols, but there's still the aspect of it that involves considering a stream of symbols and from them detecting words or other symbols that are relevant to the program.

Q. So parsing now takes the -- would you say that parsing takes interface value what's typed in there, it doesn't try to correct what the programmer types out to see what the programmer meant to type?

MR. HYDE: Objection to form.

A. Well, parsing as part of the process can not only recognize symbols that are valid and are part of the language, but also detect when the programmer has written something that is incorrect or not part of the language.

Q. And how does it know if it's incorrect

or not part of the language?

A. It fails to construct a parse tree, and fails to discover a derivation of the grammar.

Q. So if the programmer has a typographical error, then it will not be able to properly compile; would that be fair?

A. Well, parsers are pretty sophisticated and they can cope with some mistakes that a programmer would have made and sometimes generate errors to respond to the programmer or other times accept partially parsable inputs.

Q. But it's not really recognizing the words from the standpoint of the sentence for handwriting recognition but rather it's more recognizing commands or objects that it's looking for; would that be correct?

MR. HYDE: Objection to form.

A. Well, parsing does look for words. For example, it looks for keywords. It considers a sequence of characters or symbols and identifies when one of those constitutes a keyword, for example, or an identifier.

Q. And how does parsing know what words or symbols to look for?

A. Parsing is informed by the language that

it's attempting to parse. So a parser uses, is built for a language, and so it knows what words are in the language.

Q. And when you say language, do you mean the programming language or like English, Japanese, Chinese?

MR. HYDE: Objection to form.

A. I mean the programming language, but the programming language could be -- could be written in a different -- the words that are used in the programming language could also be from other non-English languages.

Q. So other than lecturing on parsing, you said your experience, you had experience in a related field. What other related fields?

A. Well, certainly user interfaces. I have extensive experience in user interfaces having built user interfaces myself as a software engineer at Amazon. I also have been a testifying expert on cases that involve user interfaces, and probably in other settings, too.

Q. So it's your opinion that user interfaces is a related technology to user interfaces incorporating online recognition technologies?

MR. HYDE: Objection.

Mischaracterizes the testimony.

A. Well, I was speaking broadly about user interfaces and some of my experience there. A user interface that I've built in the past has involved parsers, so in a sense it's a user interface that involves some online recognition for programming languages.

Q. Okay. So other than parsing, any other experience in related fields to either handwriting recognition or user interfaces incorporating online recognition technologies?

A. I have certainly used handwriting technologies as a user. And I also have as an academic attended many lectures that involve various kinds of recognition including, I recall some lectures on handwriting recognition.

I have colleagues in my department that work on computer vision and machine learning.

I've been on tenure track hiring committees where I've evaluated candidates for machine learning positions and attended their lectures and learned about their research.

So through my academic experience have been exposed to a lot of machine learning and

vision which sometimes involves handwriting recognition.

Q. And when you said you recall some lectures on handwriting recognition, approximately how many lectures do you recall?

A. I remember a few lectures maybe. I mean, it's been probably maybe five years ago that I remember there were a collection of lectures that were related. Typically there is every year during tenure track faculty search, there are some candidates from machine learning. It depends on the year. Some years we're not hiring in that area. But those candidates, I attend their lectures, and so a lot of those lectures are in machine learning and sometimes they involve handwriting recognition. I don't think there are any this year, but I remember there were a collection of them maybe about five years ago, and then there have been a few over the years subsequently.

Q. You said maybe five years ago you remember a few lectures regarding handwriting recognition, can you tell me more about those?

A. Yeah. So a portion of machine learning and computer vision is devoted to handwriting,

like recognizing handwriting, and I don't remember the specific details of what those lectures were about. But I am -- I remember them discussing different algorithms for discovering or maybe disambiguating handwriting. I don't remember specifically because it's been five years, but...

Q. And you said "a few." Can you be more specific than a few?

A. Well, typically we have anywhere from maybe 12 to 20 candidates per year, and often half of them are machine learning talks and of those maybe a couple could pertain to vision. So, you know, it's hard to estimate. But over the years maybe a dozen pertained to handwriting recognition. At least --

Q. And that would be -- and that would be starting about five years ago to the present day?

A. I'd say that's between maybe more like the past eight years. Prior to that in my -- in my job as an academic, it's typical that I would attend lectures on machine learning. In other circumstances as well. For example, during conferences or as a graduate student prior to that. So I'm sure I've seen many lectures that pertain to computer vision and handwriting

technologies over the years. It's hard to put a number on it since my career in academia spans like 15, 20 years.

Q. Do you remember anything, like what is the most recent then when you say lecture that you attended that involved handwriting recognition?

A. Well, maybe about, maybe about two or three years ago. I don't remember exactly. But I remember more clearly some lectures about five years ago, but I think there have also been others subsequently.

Q. And do you remember anything specific about those lectures five years ago regarding handwriting recognition?

A. I don't remember specifically what they -- what it was covering, no.

Q. Any sort of lectures spanning back -- strike that.

Any lectures regarding handwriting recognition that you recall like, say, 15-plus years ago?

A. Again, I'm sure I've attended numerous lectures that involve handwriting recognition over the past 15 or so years. I don't remember specifically what each lecture pertained to about

handwriting recognition, but I've certainly been exposed to it through those lectures.

Q. Can you identify any specific lectures that you attended on handwriting recognition prior to the date of the '428 patent filing or issuance?

A. Well, specifically which date are you referring to?

Q. Well, let's just do October, before October 2012.

A. So in October 2012 I was completing my Ph.D. in computer science at Cambridge, and at that point I already had a master's degree from Brown University, and I remember lectures at Brown on machine learning. This is now going back close to 20 years, so I don't remember exactly what those lectures were, but I remember there were machine learning lectures that I attended as a graduate student at Brown.

Q. But as you sit here today, you don't recall if any of those machine learning lectures involved handwriting recognition?

A. Again, going back 20 years, I don't. I know I attended machine learning lectures as a graduate student at Brown. I don't remember specifically, but I suspect that they, at least

some of them, involved some handwriting recognition. At Brown there were people that worked on machine learning, as well as computer graphics and user input technologies like touchscreen, and some of my fellow graduate students worked in those areas, so I certainly would have attended lectures on those topics.

Q. So the -- I know you've had about 30-plus depositions, so you probably already know these, but I still want to do a quick brief review of the sort ground rules to make sure you're familiar with those.

So when I ask a question, obviously, if you do not understand or you need any sort of clarification, just please ask, otherwise, I will assume that you understood my question.

And then I'd just ask that you answer these to the best of your ability.

And you understand you are under oath today?

A. Yes, I do.

Q. And you understand that you must answer truthfully and to the best of your ability, correct?

A. Yes.

Q. And the court reporter here is taking down your testimony, so I ask that you try to enunciate, talk clearly, have verbal responses to all the questions, so -- she can't take down head shakes or head nods, so I'll just ask that you say it out loud.

We'll take a break about every hour to hour and a half, but if you need a break, however, just please ask me. I'll just ask that if we're in the middle of a question, we'll wait until you finish responding and then we can take the break after. Is that fair?

A. That sounds good.

Q. And then counsel may object from time to time. You understand that unless instructed not to answer, you are -- even after he objects, you should answer the question. Is that fair?

A. I understand.

Q. Is there any reason you can't testify truthfully here today?

A. No.

Q. Are you on any medication that would hamper your ability to testify either completely or truthfully today?

A. No.

Q. Dr. Koskinen, what did you do to prepare for today's deposition?
A. I reviewed the patents that were involved in this case, I reviewed the IPR, and I reviewed my declaration.
Q. When you say "the patents," you mean the '428 patent and then the prior art patents related to the IPR petition?
A. Yes.
Q. Did you meet with any attorneys?
A. I think I met with Bradley Hyde.
Q. Any other attorneys?
A. I don't think so.
Q. You don't recall?
A. I believe I didn't speak with anyone other than Bradley.
Q. And when did you talk with Mr. Hyde?
A. A couple times over the past few days.
Q. And how long did you guys meet for?
A. Typically for an hour or two, something like that.
Q. Did you meet with anyone else other than your attorney for today's deposition?
A. No.
Q. Did you speak to anyone else other than

your attorney for today's deposition?

A. No.

Q. Did you correspond by email with anyone for today's deposition other than your attorney?

A. Perhaps another attorney James Tsuei, but I don't think I spoke with him in the past couple days.

Q. So any non-attorneys that you emailed regarding today's deposition?

A. No.

Q. Have you ever spoke with any inventor for the '428 patent before today?

A. I don't think I've ever spoken with any inventor of the '428. I've read the declaration of Mr. Andersson, but I don't think I spoke with him.

Q. Did you communicate with Mr. Andersson in any sort of form?

A. I don't think so, apart from reading his declaration.

Q. Other than the documents you previously mentioned that you reviewed for today's deposition, were there any others?

A. Maybe Mr. Andersson's declaration. I think that's it.

Q. And you submitted a declaration in support of the patent owner in this matter, correct, that is, Cerence Operating Company?

A. I submitted a declaration in response to the IPR, yes.

Q. And that was in support of the patent owner's response to the petition, right?

A. I think so.

Q. And you understand the patent owner to be Cerence Operating Company?

A. Yes, I understand that.

Q. And if I just use Cerence as a short form, will you understand that to mean the patent owner in this matter?

A. Yes.

Q. And did you write this declaration yourself?

A. Yes, I did.

Q. How long approximately would you say you worked on it?

A. I spent a fair bit of time on this declaration. Over the course of a couple weeks, I spent a lot of hours working on it. I don't remember the total number of hours, but I definitely spent a lot of time working on it.

Q. Did you do the first draft of this declaration?

A. Yes. I wrote this declaration and over the course of putting it together there were periods of time where attorneys would have made suggestions of prose to add to it, which I reviewed and decided whether or not to incorporate in it.

But yes, this is my document that I wrote.

Q. And so I'd like to introduce as Exhibit 1 your declaration in this matter.

(Declaration of Eric Koskinen in Support of Patent Owner's Response to the Petition marked as Koskinen Exhibit 1, as of this date.)

BY MR. CLARK:

Q. It's currently been uploaded to the Marked Exhibit folder. I believe you have a copy of it in front of you as well.

Do you recognize this document?

A. Yes, I do.

Q. And this is your declaration. This is the Declaration of Eric Koskinen in Support of the Patent Owner's Response to the Petition, correct?

A. Yes, that's right.

Q. And that's your signature on the last page, correct?

A. Yes.

Q. Can you turn to page 2 of your declaration. Or actually page 1, the first page after the cover page.

Are you there?

A. Yes.

Q. Can you explain to me why the header lists IPR2023-00992 for Patent 9,369,081?

A. Yes. That's a mistake. It should refer to the IPR2024-01267, U.S. Patent 9,026,428.

Q. So did you work on that other IPR that's listed here?

A. I don't think so, but -- no, I don't think so.

Q. Are you familiar with that U.S. Patent number 9,369,081?

A. No, I'm not.

Q. So if you did the first draft of your declaration, why is this part of the header?

A. I think that perhaps what happened was my -- I wrote my first draft and the styles, the word styles were not exactly what I wanted, and so

perhaps it got moved to a different, a different shell that had that number on it.

Q. I'm sorry. The word styles were not exactly what you wanted, is that what you said?

A. Yeah. As I recall, I was, like the paragraph style, I was trying to get right, I couldn't get it quite right.

Q. So then your attorneys, you asked the attorneys to put this on a different template for you, or tell me about that process and how this mistake was entered.

A. I think -- I'm not sure exactly because I didn't notice it until later and -- but I would guess that, yeah, perhaps at some point I had my content moved to another shell, or maybe the attorneys provided another shell that I then moved it into and I forgot to update the header.

MR. HYDE: Yeah, Doug, there was some pretty serious formatting issues in the draft we received so we had our paralegal import his declaration into a shell and the header wasn't corrected here when we did it, so.

MR. CLARK: Okay.

BY MR. CLARK:

Q. Dr. Koskinen, do you rely on any conversations with anyone in forming your opinions in your declaration?

A. Any conversations? I don't think so. I've identified the materials that I rely on. I relied on the prior art. I relied on the '428. Yeah.

Q. Can you explain generally the process that you used to develop your opinions for this declaration.

A. Sure. So I typically spend some time first with the patents themselves and reading them and coming to understand each of them. And that includes the '428 as well as the prior art references. And then I come up with my understanding of them individually.

And then I look at the arguments that were made in the IPR, as well as in Mr. Ward's declaration, and consider them, and then start to draft my response to them.

And then that -- so that evolves into what is now my declaration.

Q. So did you review -- so you read the IPR petition in this matter?

A. Yes.

Q. And you also read Mr. Ward's declaration in support of the IPR petition?

A. Yes, I did.

MR. CLARK: So I'd like to introduce as Exhibit 2 the curriculum vitae of Dr. Koskinen, and introduce as Exhibit 3 the '428 patent.

(Curriculum Vitae of Eric Koskinen marked as Koskinen Exhibit 2, as of this date.)

(United States Patent No. 9,026,428 marked as Koskinen Exhibit 3, as of this date.)

MR. CLARK: I have added those to Exhibit Share.

BY MR. CLARK:

Q. And, Dr. Koskinen, can you just confirm Exhibit 2 is your curriculum vitae.

A. Yes, it looks like it is.

Q. And is this your most up-to-date C.V.?

A. I'm just taking a quick look at it because frequently new additions in my C.V., it gets updated with new events.

So I've subsequently given another

invited talk in May of 2025. And there was a Ph.D. student examination that I listed as being expected for February 2024, that has subsequently happened, I believe, in 2025. And perhaps there are a few other small additions.

Q. Actually, you know, my apologies, I seem to have used -- I didn't use the Exhibit 2008 from the IPR. I'm going to replace this Exhibit 2 with that one. I don't know how that -- this is a -- I think this might be from your claim construction.

Let me just replace that. Hold on.

Okay. Now you should see the correct Exhibit 2 introduced as Exhibit 2008 from the IPR that number's response. Can you verify that as your correct curriculum vitae?

A. It looks correct. I suppose this was submitted a few months ago, so naturally I've done subsequent work, but this was up to date at the time it was submitted.

Q. Is any of that subsequent work involving handwriting technology?

A. I suppose there was the deposition on the claim construction, but I can't remember whether that happened before or after this was submitted. But anyway, I don't typically list all

depositions on my C.V.

Q. Yeah, I'll represent to you that deposition occurred last in 2024, so it was before this response.

So anything else there that you can think of work-wise or lecture-wise that would be on your C.V. normally that involves handwriting recognition that has occurred since you submitted this?

MR. HYDE: Objection to form.

A. Perhaps the fact that I have lectured on compilers again in spring -- actually, I notice that I haven't listed spring 2024 in this version, but I did lecture on compilers in spring of 2024, and I also subsequently lectured this past semester of spring 2025.

Q. And that was on compilers, though, not on handwriting recognition?

A. It was on compilers, so it included sections on parsing like we talked about earlier.

Q. And do you consider parsing to be handwriting recognition or do you consider it to just be a related field to handwriting recognition?

A. Parsing is a related field to

recognition. Like we discussed earlier, there is not handwriting in particular that parsing pertains to, but it does pertain to recognizing sequences of characters and analyzing them.

And it's also worth noting that the patents in this case don't go into the details of the handwritten, how the handwritten characters are recognized, they mostly use those as sort of conventionally available black box.

Q. So the patent doesn't provide any algorithms for how to recognize handwritten characters, correct?

A. The patents in this case involve, they certainly use conventionally available components to recognize handwritten characters. They discuss them in different ways. But most of the patents is about how, how characters, how -- what to do with multiple characters.

Q. And when you say "the patents," are you talking about just the '428 or are you talking about also the prior art patents?

A. Well, yeah, it starts to depend on the specifics of each of the patents.

Q. But specifically for the '428, there's no actual algorithm on how to perform recognizing

sequencing characters through handwriting recognition?

MR. HYDE: Objection to form.

A. Well, I definitely wouldn't characterize it that way. I was just saying that the aspect of handwriting recognition that involves examining strokes and from those strokes determining which character. Some of that, some of those aspects are used as a building block in these, in these patents. And, again, it depends on the patent as to how exactly it's used, but that was, that was my point.

Q. And so when you were saying the compilers are parse -- sorry -- "parsing pertains to recognizing a sequence of characters and analyzing them," is that any different than any computer program recognizing, you know, commands, for example?

A. I'm not sure what you mean by that.

Q. Well, anytime you type anything into your computer, whether it be a user interface or anything else, the computer has to recognize your words and act on them usually, unless it's a word processing document. So isn't a compiler pretty much the same thing, it's just seeing words typed

out by the programmer and acting out on those based off of its programming language?

A. I'm sorry, I don't quite understand the question.

Q. We'll move on.

So you graduated with a BS in computer science; is that correct?

A. I had a BS in computer science as well as a BS in physics.

Q. And you graduated in 2001 from the College of William & Mary, correct?

A. I finished my undergraduate degree, yes, in 2001.

MR. HYDE: Doug, do you mind if we take a short break here when you get to a breaking -- a stopping point?

MR. CLARK: Yeah, we can go now, if you want.

MR. HYDE: Can we take a 10 minutes?

MR. CLARK: Sure.

MR. HYDE: Thank you very much.

(Off the record 10:59 a.m.)

(Resumed 11:12 a.m.)

MR. CLARK: Dr. Koskinen, are you ready to go again?

MR. HYDE: Yes.

MR. CLARK: Bradley?

MR. HYDE: Ready to go.

BY MR. CLARK:

Q. Dr. Koskinen, when we left, we were talking about your education, so I just want to confirm. You received your master's degree from Brown University in computer science in 2008; is that correct?

A. Yes, that's correct.

Q. And did you complete your -- well, what was the topic for your master's thesis?

A. In my master's I worked on a few things, but my main topic of the thesis was transactional boosting highly-concurrent transactional objects.

Q. And did you -- sorry.

And you received your Ph.D. from the University of Cambridge in computer science in 2013, correct?

A. That's correct.

Q. And what was the topic for your dissertation?

A. Temporal verification of programs.

Q. Did either your master's thesis or your Ph.D. dissertation involve handwriting

recognition?

A. My Ph.D. falls within the field of programming languages and automatic software verification, so it analyzes computer programs. So although it doesn't specifically involve handwriting, like we talked about earlier, it involves some kind of analysis, but not specifically handwriting recognition.

Q. And when you say "some kind of analysis," are you talking about parsing again or something else?

A. Yeah, it falls within a compiler and it involves some parsing and then analysis on what has been parsed.

Q. And during that process when parsing recognizes characters and sequences, can you describe to me a bit more what algorithms it's using or how -- strike that.

How does parsing perform recognizing characters and sequence?

A. Well, parsing is a well-established field and there are a wide variety of different parsing algorithms. There's bottom-up parsing, top-down parsing. There's -- I teach a whole -- I lecture a whole unit on it over the course of

several weeks, so it's hard to summarize all that in short form.

Q. What is bottom-up parsing? Let's just talk about that briefly.

A. So there's -- one kind of parsing involves exploring the language grammar in what's called a recursive descent format where you try to, as you examine a stream of characters, you traverse the possible grammar derivations and see if the sequence of characters matches the derivation in the grammar.

And then another one tries to instead take a sequence of characters and from them recognize how they -- how they are a possible sequence and a possible derivation of grammar in a so-called bottom-up way, and there's different algorithms for it.

Q. When you talk about derivation of grammar, what do you mean by grammar in that context?

A. Well, I mean a language grammar.

Q. So like verbs, nouns, pronouns, that type of stuff?

A. In -- well, grammar is a concept that applies to natural language as well as programming

languages. In natural languages there are verbs and nouns. In programming languages there are other constructs like scope. There are identifiers. There are keywords. There are different, you know, bindings. But a lot of these concepts for programming languages also appear in natural languages as well.

Q. And which one of those concepts do you say appear in natural languages as well?

A. Well, there are concepts like Boolean. Logical formulas like conjunction and disjunction that occur in natural languages as well as in programming languages. There's like sequencing of things that occur in natural languages and in programming languages, as examples.

Q. So how does it -- well, how does it recognize, in parsing, how does it recognize, for example, Boolean?

A. Well, there's a grammar of a Boolean expression that can involve like an "or" keyword, for example, between two other Boolean expressions, which is a bit akin to how we use the word "or" in natural languages.

Q. I'm sorry, but how does it recognize it?

A. Well, it uses one of these various

parsing algorithms and tries to discover a derivation in the grammar for the particular character string.

Q. I still don't follow.

It tries to discover a derivation in the grammar, how does it do that?

A. Well, for example, in recursive descent parsing it follows the grammar's productions from the start symbol and will consider the different possible derivations in the grammar and explore, and then look at the input characters and see if they match an element of the unrolled grammar.

Q. Does it do any predictive text generation?

A. In a sense, when it explores a possible derivation that it's choosing a possible -- a possible way in which the symbols can be parsed, and then will look forward to see if subsequent symbols, subsequent characters match that selected possibility.

Q. What parsing algorithm would you say is most similar to that handwriting recognition algorithm?

A. Which handwriting recognition algorithm are you referring to?

Q. Well, how many handwriting algorithms are you familiar with?

A. A few. Certainly some of the methods and techniques that are discussed in the patents in this case, for example.

Q. And so name one of those.

A. Sorry, I didn't hear the question.

Q. I said, name one of those algorithms that you say are discussed in the patents in this case.

A. Well, there's -- in Aria there is a method for considering characters and trying to correct handwriting mistakes in analyzing words.

Q. Is that an algorithm?

A. Well, it depends on what you mean by algorithm, I guess. Aria describes a sequence of steps.

Q. But let's focus on the '428 patent.

What algorithm for handwriting recognition is involved, is included in the '428 patent?

MR. HYDE: Objection to form.

A. Again, it depends on what you mean by algorithm, but in the '428 patent it describes, for example, in claim 1 some steps.

Q. Okay. And all those steps in claim 1 involved are for handwriting recognition?

A. Well, it's hard to sort of generalize them exactly that way. They are specific steps that have specific details to them. So yeah, I would characterize it so as such.

Q. So let's just take one of those steps that say "determining a first recognized sequence based on the first user input." Do you remember that step from the claim 1 of the patent?

A. I remember, and I just want to confirm the exact wording of the claim.

Okay. I'm sorry, can you repeat?

Q. Yes. Do you see the step in claim 1, "determining a first recognized sequence based on the first user input"?

A. Yeah, it goes on to say, "Wherein the first recognized sequence is the best match of the first user input," but yes, that's what has been agreed upon and labeled as limitation 1[b].

Q. And does the '428 patent provide an algorithm for how to do that step?

A. The '428 at least -- so in claim 1 it doesn't go into details about analyzing the handwritten character, except insofar as it

provides step 1B which says that there is a determining of a first recognized sequence.

Q. Right. And I'm asking about the rest of the '428 patent.

Does the '428 specification provide an algorithm for how to do this step?

A. I think it certainly discusses in the specification handwriting recognition. I don't remember if there's an algorithm for analyzing the strokes of an image, although it does talk about, a little bit about details. But off the top of my head, I can't remember exactly where.

For example, it talks about coordinates, for example, in column 12.

Q. Okay. Anything else that talks about as far as algorithms for determining the first recognized sequence?

A. Also in column 5 it talks about the user interface having a touchscreen and having each point on the display described by an X-Y coordinate.

It talks about receiving user inputs.

It talks about in column 6 receiving tactile info through the user, for example, by a fingertip or by a stylus in the form of, for

example, characters.

Q. So column 6 is about receiving, not about the determining step, though, correct?

A. Further down when it's describing Figures 3B-D, it discusses receiving user -- or receiving one or more input features that can form a first character.

Q. Are you saying that determines, that is an algorithm for determining a first recognized sequence?

A. No. I'm just saying that it is just how it's describing receiving user input events that are then used as a determination of characters, for example.

Q. So it's the input before actually the determination is done?

A. There -- well, yeah. There is a discussion in these sections of the patent of receiving user inputs and that those are used for detecting.

Q. Are you saying that the X-Y coordinates discussions on, you call them 5 and 12, provide algorithms for how to determine a first recognized sequence?

MR. HYDE: Objection.

Mischaracterizes the testimony.

A. Well, more that the discussion and the '428 spec describes user interface or ways of collecting user inputs such as from a stylus and performing some determination of up characters, and there are examples of that determination happening in the figures.

Q. So the only determination you're saying is in the -- well, strike that.

How does the figures show how the system determines the first recognized sequence?

A. The figures more show that a determination is made and goes less into detail about how. Although perhaps in other sections of the specification it talks in more detail, I don't remember off the top of my head.

Q. Okay. So the original question I'm trying to get at is how. Does the patent talk how it determines the first recognized sequence?

A. Well, the patent gives examples of handwritten characters and first recognized sequences, and it says that a determination is done in 1B, that claim 1, limitation [b], that a determination has happened, is happened.

And it does say that the first

recognized sequence is a best match of the first user input. So it gives some detail into how the determination is done specifically by employing a best match.

Q. Other than employing a best match, does the patent describe how it determines the first recognized sequence?

A. Well, in addition to employing best match and giving examples and discussing that handwritten character recognition is done, I don't recall it going into specific algorithms for, say, how a stroke is, how a series of strokes are determined to be a particular character apart from the use of a best match and the various examples in the spec and the various discussions in some of the sections that I pointed to.

Q. And those various examples in the spec and the various discussions don't go into detail about how it's determined?

MR. HYDE: Objection.

Mischaracterizes testimony.

Mischaracterizes evidence.

A. So, again, claim 1 indicates that a determination is done. It also indicates that the first recognized sequence is a best match of the

first user input. There are discussions of users providing input throughout the spec. There are figures that show also examples of users entering in written characters and sequences. And there are discussions of entering character recognition being performed.

But again, I don't think there are a specific algorithm that pertains to how a given stroke or a series of strokes can be analyzed to, together, form or decide what character those strokes represent apart from, again, what I said about that determination as best -- based on a best match and the examples described in the spec.

Q. Okay. Is there anything else that the patent talks about describing how the determination of first recognized sequence occurs?

A. I didn't understand the question.

Q. You just listed off a bunch of -- you just listed off a bunch of items about how the determination occurs. I was just asking if there's anything else in the patent that describes how the determination of a first recognized sequence occurs.

A. There might be, but I'd have to go through carefully to see if I missed anything in

my summary.

Q. Okay. But as you sit here today, you don't recall anything else?

A. Well, I provided those examples of some of what I remembered from the spec and what it described about the determination of handwritten characters. There are probably other portions of the spec that talk about it, but it would take me a little bit of time to assemble a comprehensive list of them.

Q. You said you provided those examples of some of what you remember from the spec, are you saying in your declaration or during today's testimony?

MR. HYDE: Objection to form.

A. In my answer to the previous question.

Q. So other than that, is there -- and there's nothing else you recall, as you sit here, without having to review the patent over again, there's nothing else you recall as far as how it determines first recognized sequence?

A. Again, regarding the determination of a first recognized sequence in 1B, the main things that I recall are various excerpts from the spec that I mentioned about receiving user inputs. The

examples that illustrate characters and the corresponding detected examples, figures that illustrate handwritten characters and the corresponding detected characters, and the examples in the spec and the fact that claim 1B further indicates that the first recognized sequence is a best match of the first user input.

Q. Other than what's in the patent itself, do you have an understanding of what goes into the determination of to recognize a first sequence?

MR. HYDE: Objection to form.

A. Are you talking -- so you mentioned determining a first recognized sequence. Are you referring to those words as they are in claim 1 of the patent?

Q. Let's just give an example.

So outside of the patent if someone were to enter into a handwriting recognition platform the letter R, do you know how the system would perform the determination that the R is an R?

MR. HYDE: Objection to form.

A. Yeah, I have some understanding of how those kinds of algorithms operate.

Q. And can you tell me what your understanding is?

A. Well, for example, they might take a sequence of pixels on a screen and from them determine a stroke and determine a sort of collection of strokes and match them.

Q. Anything else?

A. Yeah. There's considerations for the, like, rotation of the characters, for the slant of the characters, databases, stroke databases.

Q. I'm sorry. You just said "databases, stroke databases" at the end.

A. Yeah, databases of templates of strokes.

Q. Are you saying, so it compares it to a database of templates of strokes; is that what you're saying?

A. Yes.

Q. Okay. And so what you just described for determination, your understanding of determination of the letter R in this scenario, how is -- how's parsing similar to that?

Correction. Let me strike that.

So based off your description about how handwriting recognition does a determination of like the letter "R," can you tell me how the parsing algorithms work similar to that?

A. Well, parsing algorithms will consider a

sequence of characters in permitting languages, those characters are not handwritten but rather typed. So typically a parser does not need to convert from a handwritten character into a computer character, but then parsing will then analyze a sequence of typed characters.

Q. So parsing doesn't have to determine the characters, it only has to analyze the sequence once they've already been typed; is that correct?

A. Typically the input to a parser is a sequence of characters that have been typed or have been provided in some other way and not typically handwriting, but then subsequently parsing performs an analysis on the dot sequence character.

Q. And does it ever adjust it for slant?

A. Again, parsing with regard to computer programming languages takes as input characters that are typically not handwritten. So the process of converting from a handwritten character to a computer character is not something that parsing typically needs to do, but parsing does pertain to the subsequent process of analyzing a sequence of characters.

Q. Does it ever analyze a single character?

A. A parser can be provided a single character as input.

Q. And what goes through its analysis of that single character?

A. Parsing typically performs its same algorithm on that single character.

Q. And what's that same algorithm entail?

A. Well, for example, there's the recursive descent top-down parsing that we talked about earlier where it searches possible derivations of the grammar.

Q. And is it compared to a database?

A. What do you mean by a database?

Q. Whatever you meant by database when you're talking about the handwriting recognition.

A. So there I was referring to a database of templates of stroke -- of strokes. And parsing, as I said, doesn't need to convert from a handwritten symbol character to a computer character. So the process of parsing doesn't need to refer to a stroke template or a stroke database.

Q. Let's return to your education. I digressed a little.

You talked about your masters and Ph.D.,

did I miss any of your higher education?

A. I was a research scientist at NYU. Sometimes that's considered postdoctoral work. Sometimes it's considered part of education. Otherwise, I think those are the main things.

Q. And throughout your education did you ever take classes on handwriting recognition?

A. Like we talked about earlier, I have a significant amount of experience in related fields. I don't know that I specifically took a course on handwriting. I don't think I've taken a specific course on handwriting recognition, but have attended the various lectures that we discussed earlier and have experience in related fields.

Q. And did you take any classes on user interface incorporating online recognition technologies?

A. My experience with user interfaces, like we discussed earlier, involves building user interfaces, for example, as a software engineer at Amazon. Building my own user interfaces. Building user interfaces that use parsers. And so those have -- those pertain to user interfaces that do character sequence recognition. I don't

think I've taken any courses on user interfaces for online recognition, but I do have that related experience.

Q. So other than the user interfaces that use parsing, you have no other, you took no other classes related to user interfaces incorporating online recognition technologies, correct?

A. Again, like I said, I have a lot of experience with user interfaces, including user interfaces that perform parsing and recognition on characters. I don't think I've taken any courses that were specifically on the topic of user interfaces for online recognition, but definitely experience and education in related fields.

Q. Okay. I'm a little confused.

You just said that you have experience including user interfaces that performs parsing and recognition on characters. Can you just talk about the recognition on characters part or is that part of parsing when you say that?

A. I was referring to user interfaces that perform parsing and as part of that they will recognize sequences of computer characters.

Q. Okay. Got it.

And when did you -- so you didn't take

any -- did you take classes on -- my question was about taking classes.

Did you take classes on user interfaces involving parsing or was that just you have experience on user interfaces using parsing?

A. As I was saying, I don't think that I have taken specific classes on user interfaces that involve handwriting recognition, but I certainly have experience building user interfaces, including ones that involve parsers which recognize sequences of characters.

Q. But no classes involving parsers which recognize sequence of characters?

A. I don't, again, I don't think that I specifically took any courses that involve user interfaces for recognizing for handwriting recognition, but I have built user interfaces that involve parsers that recognize character sequences and other related experience.

Q. And the other related experiences are what you've already mentioned previously, correct?

A. Yeah, I mentioned a few related experiences earlier.

Q. Were there any other related experiences you want to talk about?

A. I think I mentioned also that I've certainly used devices that perform handwriting recognition. I've used earlier devices and more recent devices as a user.

Q. Have you ever used the device of for handwriting recognition prior to October 15, 2012?

A. I can't remember if I used a handwriting recognition device around 2012. I certainly, like we talked about earlier, was aware of some of these kinds of devices. It's possible that I even used some of them by that point. I sort of remember some of these user kind of experiences of writing and having some of the characters being recognized, but I can't place exactly which device it was that I first did that or when I first -- when that happened. But I certainly remember things in this direction.

Q. And you're currently an associate professor at Stevens Institute of Technology; is that correct?

A. Yes.

Q. And you are in the computer science department?

A. Yes.

Q. And you haven't taught courses that are

related to handwriting recognition?

A. I have taught courses related to compilers and a large unit within it pertaining to parsing, like we talked about earlier, that involved recognizing sequences of characters. I have not taught any courses specifically on handwriting, but definitely there are those relevant experience in the compilers course that I taught.

Q. Other than the compiler courses, anything else that you've taught related to user interfaces incorporating online recognition technologies?

A. I also teach graduate students that take certain special topics with me. And I think at one point one of those involved building this user interface that involved parsers. So in that sense I lectured a kind of one-on-one course, a special topics course on that, on that topic.

Q. And for how long have you been teaching graduate students?

A. I have had my own Ph.D. students since about 2018 and prior to that I had -- I mentored other Ph.D. students, for example, when I was at NYU, or at Yale, as a researcher.

Q. And you were at NYU from 2011 to 2014?

A. That sounds about right.

Just a slight modification from what I said a moment ago. I don't know if I mentored any Ph.D. students while I was at Yale. I mentored mostly postdoctoral researchers at that time, but I did mentor Ph.D. students when I was at NYU.

Q. In mentoring, did any of them involve compilers and parsing at NYU?

A. There was, we certainly used parsers in some of that mentoring, yes. It would have certainly used parsers. Even with an undergraduate student that I mentored, we used a parser, and that student learned a couple different parsers.

Q. So you used them but you didn't teach compilers and parsers to these mentored mentees?

MR. HYDE: Objection to form.

A. Well, I did teach them how, how parsers operate, yes, with an undergraduate student, in meeting with that student and explaining to that student how parsers operate. I didn't lecture a specific course on that topic, but I mentored the student on that topic.

Q. Let's move to discussing your industry

experience listed on your C.V.

So from 2001 to 2003 you worked at Daphnia; is that correct?

A. Yes.

Q. And what is Daphnia?

A. Daphnia was a small company that me and a partner founded, and we developed websites and user interfaces for a variety of clients.

Q. Did any involve handwriting recognition?

A. I don't think any of the -- during those two years we certainly built a lot of user interfaces, I don't think that any of them involved handwriting technology, no, not during that time.

Q. Did any of those websites and web applications incorporate online recognition technologies?

A. Those user interfaces that we developed during that time I don't think involved any handwriting technology, but most of my relevant experience have been at other portions of my career.

Q. Looking at your declaration now, Exhibit 1, paragraphs 16 to 17, do both of these paragraphs relate to your time working at Amazon?

A. Yes, paragraph 16 and 17 pertain to my time working at Amazon.

Q. So from 2003 to 2005 you were a software engineer at Amazon?

A. Yes.

Q. And none of your work at Amazon related to handwriting recognition, correct?

A. In my time at Amazon I worked a lot on user interfaces. I don't think that the work that I did related to handwriting recognition exactly, but definitely user interfaces. And, again, like I said earlier, most of my relevant experience came from other portions of my career.

Q. Did any of those user interfaces incorporate online recognition technologies?

A. In the user interfaces that I developed while I was a software engineer at Amazon, I don't think they involved any handwriting recognition technology, but, again, my relevant experience came from other portions of my career.

Q. So I specifically asked about online recognition technologies and you responded handwriting recognition, do you think they're the same?

A. I'm sorry, I misheard you.

With regard to my time at Amazon, I don't think I worked particularly on online recognition technology, but certainly user interfaces and, like I said earlier, most of my relevant experiences came from other portions of my career.

Q. So from 2014 to 2015 you were a researcher at IBM Watson Research Center?

A. Yes.

Q. As a researcher at IBM Watson Research Center, did any of your research relate to handwriting recognition?

A. As a researcher, I certainly used parsers. I don't think that my research specifically involved handwriting recognition algorithms, but at least in part used parsers.

Q. And did any of your research relate to user interfaces that incorporated online recognition technologies?

A. Well, when I was at IBM, I worked on user interfaces, I think, a little. I don't think they involved online recognition. But, again, most of my relevant experience came from other portions of my career that I discussed earlier.

Q. So to sum up. The Daphnia, Amazon, and

IBM Watson Research Center, those three jobs are the sum of your industrial experience on your C.V.?

A. I also was a research intern at Microsoft a few times.

Q. I don't see that under your industrial experience on your C.V. Was that a -- is that supposed to be there?

A. I list it on page 1 under Employment Summary.

Q. Okay. Yeah, I was just asking about your industrial experience listed on page 10, I think. Yeah, 10.

A. These are some of the main portions of my industrial experience. It's certainly not a completely comprehensive enumeration of everything that I did, but these are the more summaries of the more significant industrial experience. And you asked me if there was anything else, so I mentioned that I also was a research intern at Microsoft a few times as identified on page 1 of my C.V.

Q. And during your intern that's -- let's see. Strike that.

You worked as an intern at Microsoft

Research for the summer of 2006 and 2008, right?

A. I worked as a research intern during the summer of 2006 and also in the summer of 2008, yes.

Q. Did any of your experience there involve handwriting recognition?

A. During my experience as an intern at Microsoft Research, I certainly used parsers and wrote analysis within a compiler for analyzing computer programs. Specifically when I was at the Redmond location in 2008. I don't think that I worked specifically on handwriting recognition. Again, in a compiler setting the process of matching a handwritten character with a computer character is not something that is necessary, but I certainly worked on analysis and used parsers.

Q. Did any of your experiences as a research intern at Microsoft Research involve user interfaces incorporating online recognition technologies?

A. Again, during my time at Microsoft, I certainly used parsers. I don't think I built any user interfaces that performed online recognition, but building user interfaces, more relevant user interfaces, happened at other stages of my career

that we talked about earlier.

Q. So other than Daphnia, Amazon, Microsoft Research, and IBM Watson Research Center, any other industrial experience, we'll say, before October 15, 2012, that you can think of?

A. I think that covers the main ones. Yeah.

Q. Are there any other ones that you have not -- we have not mentioned that entailed or involved handwriting recognition?

MR. HYDE: Objection to form.

A. I don't think so. My C.V. captures any significant employment that I've had and any others I don't think pertain to handwriting recognition. As I said, most of the relevant experience came from other portions of my career.

Q. And any other industrial experiences involving, that's not listed on your C.V., involving user interface incorporating online recognition technologies?

A. Again, my C.V. captures the main industrial experience, and most of my relevant experience comes from other portions of my career. I don't think any other employment that is not listed on my C.V. would have been significant or

involved user interfaces or online recognition.

Q. Your C.V. also mentions you worked at NYU as a research scientist, which we briefly mentioned. Did that involve any handwriting recognition or user interface incorporating online recognition technologies?

A. When I was a researcher at NYU, I worked with parsers and published papers that used parsers, attended conferences, mentored Ph.D. students using parsers, and undergraduate students. I don't think that in particular my work involved recognizing, like identifying handwritten characters and converting them to computer characters, but certainly used a lot of parsers during that time, and that would be the most, that would some of the most relevant experience during that time.

Q. And you briefly mentioned the Yale University where you were the lecturer, lecturer and research scientist. Did any of that involve handwriting recognition or user interface incorporating online recognition technologies?

A. When I was a researcher at Yale, I did research in programming languages and using parsers as part of that. I built tools that had

parsers. I don't think that the research we did specifically involved handwriting or converting handwriting, handwritten characteristic computer characters or -- although it did involve user interfaces that had -- that incorporated parsers.

Q. And to be clear about parsers. You're not saying that it is handwriting recognition or online recognition technologies but it's a related field; would that be fair to say?

A. Well, parsers also are concerned with recognizing sequences of characters, so I think it is very closely in the same field as at least many aspects of the patents in this case insofar as it considers combinations of characters. So while it doesn't include the part about translating a single human written character into a computer character, it definitely does involve recognition across multiple computer characters or a single computer character.

Q. And can you give me an example of how it considers combinations of characters, like a specific example?

A. Sure. That the input sequence is a sequence of characters that form a keyword in a programming language, then a parser will recognize

that keyword. Or if it recognizes a Boolean expression or an algebraic expression, it will recognize that expression and build a parse tree that encompasses that expression. Those are just some examples of a parser analyzing an input sequence of characters.

Q. I was meaning it more specific than that, I guess. You said Boolean expression, so like the word "and," for example, would that be a Boolean example?

A. "And" is a Boolean connective, yes.

Q. And so if the user types the word "and," you're saying that the parser will recognize "and," the word "and," is that what you're saying it does?

MR. HYDE: Objection to form.

A. Yes, that's correct. It depends on the program language. Some languages allow the letters AND to mean "and." Others use two ampersand characters to mean Boolean AND.

Yeah, in some languages "and" means Boolean AND, a Boolean conjunction.

Q. And how does it recognize the AND or the two ampersands?

A. Well, it performs parsing algorithms,

such as top-down or bottom-up parsing. And it explores the possible derivations. And the individual characters are referred to as terminals, so the A and the N and the D would be -- or the A-N-D would be grouped together as a so-called token terminal.

Q. I'm looking in your -- turning to your C.V. -- or, sorry. Turning to your declaration again, Exhibit 1, paragraph 9.

A. Okay.

Q. So I believe we already discussed all your experiences related to that are in this paragraph, but I just want to confirm.

Would you agree with that, though, we've already gone through these experiences from paragraph 9 or is there anything you'd like to add?

A. Well, this paragraph begins, "I have work experience in all phases of commercial software design and operation, including requirements engineering, software architecture, software engineering, software development, software project management," and I don't think we talked about too many, too many of those things so far today.

Q. Okay. Well, let me ask you it this way: Is there anything in paragraph 9 related to handwriting recognition?

MR. HYDE: Objection to form.

Q. Other than what we've talked about today.

A. Paragraph 9 mentions browser-based web applications while I was at Amazon, Microsoft, and IBM. User experiences, user interfaces for web applications.

With regard to handwriting recognition, I think we mostly have covered my experience since we discussed my education. We discussed lectures that I've attended on handwriting recognition. We discussed my experience with parsing. Publications in the field of programming languages. Mentoring Ph.D. students on parsing. Lecturing the compilers course on parsing. Building user interfaces that involve parsing. Those are some of the main things that we covered.

Q. And so I'm looking at paragraphs 9 through 15, and rather than ask this for each individual paragraph, I think I might just streamline it a little faster if I ask it one time.

So do anything in paragraphs 9 through 14 include handwriting recognition?

A. For paragraphs 9 through 15 it's hard to summarize this, but they discuss various aspects of my career, including publications. Building user interfaces. Grant awards. Serving on program committees. Teaching courses. Experience. Software systems. So I'm trying to, with regard to handwriting recognition, I think, again, some of my most relevant experience would pertain to working with parsers. And these paragraphs that you referred to mention publications, and I've published in programming languages, which include compilers that, papers that I published involve compilers and parsing.

I also in paragraph 14 talk about lecturing, we discussed this earlier, how I lecture in compilers and teach a unit on parsing.

There's also a discussion of web-based user applications.

And this also spans years of time where I would have attended lectures, like we talked about earlier, that pertain to handwriting recognition such as faculty candidate lectures.

Q. And so same question for paragraphs 9

through 14 -- 15 -- sorry -- 9 through 15, did any of them include incorporating online recognition technologies other than the compilers and parsers that we talked about?

A. Paragraphs 9 through 15 with regard to online recognition, again, this covers a variety of time and experience, including user interfaces.

For online recognition, again, I believe the compilers is relevant to that since it involves analyzing sequences of characters, and that is done in many of the systems that I've developed. I've used compilers. Also has been involved in user interfaces that I built that involve those parsers and compilers.

MR. HYDE: Doug, when you get to a stopping place, do you mind if we take a short break?

MR. CLARK: Yeah, I was just about to suggest that. I have one more question and then we'll take a break.

BY MR. CLARK:

Q. So is it fair to say that your experiences to date have not involved actual handwriting recognition?

MR. HYDE: Objection to form.

A. What do you mean by "actual handwriting recognition"?

Q. Every time I ask you about handwriting recognition, you talk about related fields, which is fine because that's, you know, part of the level of ordinary skill in the art, but I'm asking you about handwriting, actual handwriting recognition, not parsers, not compilers.

Do you understand what actual handwriting recognition is?

A. Well, it depends specifically what aspect of handwriting recognition you're referring to.

Q. Well, I mean, in general, there has to be handwriting involved, correct, for handwriting recognition?

A. So you're referring to like human stroke data, for example?

Q. Yes. Correct.

So based off of that definition, does any of your experience involve handwriting recognition?

MR. CLARK: Objection to form.

A. Well, I guess, the term handwriting recognition has many facets to it, so if you want

to talk specifically about handwritten strokes and converting that to a character, I think my most relevant experience would have been lectures that I attended on computer vision or on touch input devices.

Q. Okay. And you said computer vision a few times, and I apologize, I have no idea what that means. Can you tell me what computer vision is?

A. Sure. Computer vision is concerned with the broad field where an input such as an image is analyzed so that the computer can develop an understanding of the content of that image. And it spans many different subfields, including handwritten, analyzing handwritten inputs.

Q. Okay. Great.

MR. CLARK: Let's take a break.

(Off the record 12:29 p.m.)

(Resumed 12:40 p.m.)

BY MR. CLARK:

Q. Dr. Koskinen, did any of your experience involve recognition technologies that use contextual analysis?

A. So parsers do take into account some of the context when analyzing. It's part of how like

a grammar works, so it can understand how a sequence of characters relates to other characters around it.

Q. Anything else?

A. I'd say that is my main relevant experience.

Certainly contextual analysis more generally I have a lot of, or sort of context information is a big part of many different areas. Specifically for sequences of characters, I guess, yeah, parsing would be the most relevant that I can think of at the moment.

Q. Okay. So nothing else you can think of at the moment related to contextual analysis?

A. Yeah, the main relevant experience in contextual analysis would be parsing, at least for analyzing sequences of characters.

Q. Do you have any experience with Japanese?

A. I have experience from having visited Japan. I was a visiting professor at a university in Japan for two months. And so I've certainly been exposed to the different character sets and can recognize some small set of characters.

Q. Do you have any experience with

handwriting recognition of Japanese characters?

A. I think I have seen colleagues use handwriting. Maybe not, I'm not sure.

Some of the collaboratives I work with in Japan often have like tablet-based computers and I think I have seen them do some, write some characters that were then recognized.

So I think I have had -- I think that my Japanese collaborators have used handwriting recognition in Japanese in front of me.

Q. Other than that, can you think of have any other experiences related to handwriting recognition of Japanese characters?

A. Apart from -- apart from living in Japan for a couple months and experience watching Japanese colleagues use tablet technology, maybe that's the only experience that I have in using Japanese handwriting technology, apart from more generally handwriting technology such as the patents discussed in this case and recognition that we've been discussing.

Q. Let's turn to Exhibit 3, that's the '428 patent. And look at -- let's look at claim 8 of the '428 patent. And if you don't mind, can you read it for me?

A. It says, "The method of claim 1, wherein the first user input includes at least one of a Chinese character, a Japanese character, or a Korean character."

Q. So do you see that the first user input includes at least one of a Chinese character or a Japanese character or a Korean character; is that correct?

A. Yes, I see that.

Q. And for the phrase "at least one of," that means it may include only one, for example, correct?

A. It says, "the first user input includes at least one of," in this setting of this particular claim, claim 8, first user input -- it says it could include at least one of, which could include just one in the setting of claim 8 at least.

Q. And it could also include two, for example, correct?

A. For claim 8, discussing Chinese characters versus Japanese versus Korean characters, it could include two of those characters.

Q. And it could also include all three,

correct?

A. And it could include, at least one of in claim 8, could potentially involve all three, but isn't restricted to involving all three. Again, the words are "at least one," so it discusses that there's at least one.

Q. And since claim 8 depends on claim 1, does that mean that claim 1 must also include at least one of a Chinese character, a Japanese character, or Korean character?

MR. HYDE: Objection. Calls for legal conclusion.

A. Could you repeat the question?

Q. Yes. Since claim 8 depends on claim 1, does that mean that claim 1 must also be capable to include at least one of a Chinese character, a Japanese character, or a Korean character?

A. Is there somewhere in my declaration that you are referring to regarding this question of whether claim 8 poses any requirements on claim 1?

Q. No, I'm just asking general knowledge if you are familiar with whether or not this would mean that claim 1 has to also include one of these three characters.

A. I don't think this was like part of my declaration. This kind of analysis they're referring to, generally, my understanding is that 8 is a dependent claim, but I don't -- I'm not sure what you're -- what part of my analysis or opinion you're referring to at the moment.

Q. Well, let's ask it this way: If someone was using a handwriting recognition system that met all the limitations of claim 1, but they were doing it in Japanese, would that still infringe claim 1?

MR. HYDE: Objection to form.

A. So you mentioned infringement. I don't think I have an opinion on infringement in my declaration. It's more in response to validity. So I'm not sure there's anywhere in my declaration where I go into that issue. Is there somewhere you can point me to?

Q. No, but is there any -- do you understand what infringement is?

A. I understand infringement, yes.

Q. Do you understand it enough to form an opinion on whether something would infringe?

A. Yes, I have rendered opinions on infringement in other cases in the past.

Q. Is claim 1 infringed if someone's only performing the limitations in Japanese?

MR. HYDE: Objection. Calls for speculation.

A. I don't think that I was tasked with considering infringement for this particular patent and/or, and I also don't think there's a specific system that you're referring to for me to analyze.

Q. I'm telling you that it meets all the limitations except it's just not in Japanese, would that be -- would that infringe claim 1?

A. This -- to me, I haven't performed any infringement analysis in my declaration, so I'm not sure I have an analysis of that that I can answer.

Q. Okay. Let's ask it this way then: Does anything in claim 1 require any specific language?

A. Looking at claim 1, the words of claim 1 don't refer to a specific language. For example, the words of claim 1 don't refer to -- don't use the word English or use the word Japanese. But apart from that, on this infringement question, I don't think I -- that was something that I was looking at in my report.

Q. Okay. Yeah. So we're leaving the infringement question. So we're just talking about whether claim 1 requires in it the use of any particular languages, as far as you can tell.

A. Well, claim 1 doesn't specifically discuss any particular language apart from the way that it operates and the steps that are involved pertaining to characters and sequences, but it doesn't particularly mention specific language.

Q. Does it require more than one language in claim 1?

A. Is there a particular limitation that you're referring to?

Q. Any limitation. Do any limitations require more than one language?

A. Well, again, claim 1 doesn't really discuss specific languages apart from there being some determination of characters in 1B and there being character sequences. I don't think that I have in my report analyzed whether claim 1 would require -- is specifically required to have a particular language.

Q. But it's possible that claim 1 would only relate to a single language, correct?

MR. HYDE: Objection.

Mischaracterizes testimony.

A. Again, I don't think that I have -- that my report focused on whether or not claim 1 requires any particular language. I don't think that it does require any specific language, because the words don't mention any specific language apart from there being some determination, and then there being sequences and characters, yeah.

Q. And so if it does not require any specific language, it could just require one language, it might just involve one language?

MR. HYDE: Objection to form.

A. Again, I don't think that in claim 1, at least in my report, I focused on how claim 1 operates. I don't think that I -- well, at least the language of claim 1 doesn't refer to a specific one or doesn't appear to limit it to a specific one. But I don't, also don't think that's something that I really discussed in my report.

Q. You discuss in your report that the '428 patent contemplates multiple languages, but you are silent as far as whether claim 1 can be one language, two languages, three languages, so I'm

just trying to see if there's anything else regarding claim 1 that you want to add as far as whether it can be just one language or it could be two languages or more.

A. Well, claim 1, really, just looking at the words of it, refers to there being sequences of characters. It doesn't impose it to be a particular language or a particular collection of languages, it just merely discusses sequences of characters and candidate sequences and portions and dictionaries. At least for claim 1 it doesn't specifically discuss which language it pertains to.

Q. Would you say the same is true for independent claim 9?

A. Claim 9 is the -- is the system analogue of claim 1. And in claim 9, again, the words of claim 9 don't talk about specifically what language the claim is restricted to. That's also not something that I specifically analyzed in my report, apart from saying that the patent claim being applied to isn't occasional languages.

Q. Right. So the only, the only claims that talk about languages relevant to the IPR are claims 7, 8, and 13; is that correct?

MR. HYDE: Objection to form.

A. I don't think that I specifically analyzed which claims are directed to which specific languages. My declaration is focused on responding to the petition and Mr. Ward. I've covered the topics that I've listed in the various sections of my report. I don't think that I performed an analysis to determine which claims were specifically restricted to or encompassing of which languages.

Q. Are you able to read Japanese?

A. I can recognize some characters, but I cannot read Japanese generally. I can recognize a few, and I'm aware of the different, that there are different character sets, and I have a general notion of what those character sets look like and how they look different.

Q. Do you know how to write or speak in Japanese?

A. No. Again, I could probably write a couple characters, but I do not, I'm not a Japanese speaker apart from just some few basic phrases.

Q. Well, if you'd turn to paragraph 95 of Exhibit 1, your declaration, do you see the two

Japanese characters that come from the Aria reference?

A. Yes.

Q. And are you able to pronounce those words either separately or -- I guess there's -- let me back up.

Just so I'm clear for the record. When I reference Arai, A-r-a-i, I mean the certified English translation of Japanese Patent 2006323502A that was produced as a prior reference in this IPR, will you understand it if I just call it Arai?

A. Yes.

Q. And so back to these two Japanese characters that I see. There's either two together or they're one, they're individual in this paragraph. Do you know how to pronounce those characters in Japanese?

A. I do not know how to pronounce those characters in Japanese. I can, I can look at one and see that same character if it is repeated somewhere else or notice differences between different characters, but I do not know how to pronounce those characters.

Q. Do you know what they mean in English

either together or separate?

A. I think at one point out of interest I looked up what their meaning was, but I've forgotten what it was.

Q. And do you understand that certain Japanese characters are whole words and some are only a portion of a word?

A. I understand that in Japanese you can combine characters together to form -- to form words. Again, it also sort of depends on which character set and how that operates.

Q. But do you also understand that some Japanese characters by themselves are only a portion of a word, like a syllable?

A. So you mentioned the word "portion," are you referring specifically to the word "portion" in the claim language of the '428?

Q. I just mean the plain and ordinary meaning of portion, so it's not a full word, it's a portion or a part of a word, like a syllable.

A. So could you repeat the question?

Q. Yeah. Do you understand that some Japanese characters by themselves are only a portion of a word like a syllable?

A. I understand that Japanese words can be

made up by multiple characters. This notion of a portion we have to be careful with because it is a term that comes up in the claim of the '428 patent. But I do understand that outside of the patent that a Japanese word consists of multiple characters.

Q. It may consist of multiple characters, right?

A. Yes, a Japanese word may consist of multiple characters.

Q. And you mentioned the word portion from the patent. How do you define the word portion in the patent?

A. Well, portion is, has its plain and ordinary meaning in the '428, and it's used in claim 1, for example, limitation 1[f], where it says, "Identify at least a first sequence portion of the first candidate sequence."

And it goes on to say, "Wherein the identifying is at least partially based on one or more rules or dictionaries of words accessible to the mobile device."

Q. All right. I'm sure we'll come back to that later.

I have one more question about Japanese

language, and then I'm going to introduce an exhibit really quick, and then we'll take a lunch break.

So do you understand that some Japanese characters by themselves are just a syllable so they do not make sense as a complete word?

MR. HYDE: Objection to form.

A. So I think you asked that some Japanese characters by themselves cannot form a full word, I'm not sure whether or not that is true. I think it may, again, depend on whether it's a Katagana or Kanji. And it seems possible or likely that some characters don't, aren't a complete word themselves and need to be combined with others to form a word.

Q. Did you say Katagana, K-a-t-a-g-a-n-a, or Kanji, K-a-n-j-i?

A. I said Katagana or Kanji. I'm not sure that was the exact spelling of Katagana.

Q. Okay. Are you familiar with a third language or third -- sorry.

In Japanese I believe there's like three different types of characters. Are you aware of the third?

A. Yeah, the third one is, I think,

Hiragana, but I might be saying it wrong.

Q. I think, yeah, I think it's spelled H-i-r-a-g-a-n-a, but I could be wrong on that one, but I believe that's Hiragana.

MR. CLARK: Okay. I'd like to introduce Exhibit 4.

(Chart of Japanese Characters from Japanese Patent 2006-323502A marked as Koskinen Exhibit 4, as of this date.)

MR. CLARK: It should be marked as Exhibit 4. It's something I created last night. It's a cross-reference table to hopefully facilitate any of our conversations later on today. It includes several of the Japanese characters mentioned in Arai.

The first column lists the symbol that looks like -- I'm sorry -- the first column is the reference A1, A2, A3, B1, B2, and the associated Japanese character from Arai which are called IA or A. Sorry. The first one's KOAA Joagai. I just wanted to put that in the transcript, I don't know how it will turn out.

BY MR. CLARK:

Q. But do you understand basically this chart and how we might use it to talk about these characters during this deposition?

A. Yes. I understand or believe that your intention is to introduce an English language symbol to correspond to each Japanese character, and that the one, the Japanese character that looks like the English capital I will be referred to as A, and the smaller, increasingly smaller ones will be A1, A2, A3, and then, yes, the other, the other two characters will be B1 and B2.

Q. Yes. Exactly.

All right. I don't know how much we'll be using those, but to the extent we need to, I will be referring to this exhibit.

MR. CLARK: Would you like to take a lunch break?

THE WITNESS: Yes.

(Off the record for lunch recess 1:14 p.m.)

A F T E R N O O N S E S S I O N

(Resumed.)

BY MR. CLARK:

Q. So, Dr. Koskinen, let's look at Exhibit 3, that's the '428 patent. I wanted to walk through Figure 2 with you.

And in particular, in your excerpt declaration you state that it's this Figure 2 and corresponding disclosures in the specifications show the '428 patent's recognition process.

Did you do any analysis to correlate these steps in Figure 2 with claim 1 of the patent?

MR. HYDE: Objection to form.

A. I don't think I specifically correlated Figure 2 to claim 1. But I certainly reviewed Figure 2 and, as part of my understanding generally about the '428, it also informs some of the understanding of claim 1.

Q. So does step 205 on Figure 2, does that correlate to any part of claim 1?

MR. HYDE: Objection to form.

A. Well, step 2 identifies receiving a character entry from user. I'm going now to column 4 of the '428 that provides the description

of Figure 2. It refers to the process. It begins at block 205 where the user interface receives a single character input from a user. And so this specification gives a description of 205 and that informs generally the understanding of the claims. And claim 1 discusses in 1A receiving a first user input wherein the first user input is handwritten input received on the touchscreen of the mobile device.

Q. And same question for step 210 on Figure 2, does it correlate to any part of claim 1?

MR. HYDE: Objection to form.

Q. Strike that question. Before we go to that question.

Is limitation [a] of claim 1 that you just mentioned the receiving a first user input, was there anything novel in this step?

MR. HYDE: Objection to form.

A. Receiving user, first user input, I don't think that I disputed anything about 1A in my declaration.

Q. Okay. And why was that that you didn't dispute anything?

A. Receiving first user input -- well, this

is one of the steps in 1, but the step of receiving first user input, I don't think I really went into analyzing, analyzing that, apart from not disputing the petitioner's claim that or argument that Arai discloses 1A, which I did not dispute.

Q. Okay. So does step 210 on this chart correlate to any part of claim 1?

MR. HYDE: Objection to form.

A. 210 says "performed character recognition."

Column 4 in the spec describes "At block 210, the process 200 performs character recognition on the input character from block 205."

It goes on to say, "Character recognition can take many forms such as, for example, comparing a best match between one or more strokes/gestures input at a touch-sensitive input device to a database of recognized characters."

So that relates to doing some character recognition and relates to 1B of the '428 determining a first recognized sequence based on a first user input.

Q. And was there -- was this step novel?

MR. HYDE: Objection to form.

A. I don't think I discuss specifically, but I didn't dispute the petitioner's argument that 1B is discussed in Arai. However, there are other, as with 1A, there are other elements of claim 1 that are not disclosed in Arai.

Q. So limitation 1[b] was known in the prior art before the '428 patent, correct?

MR. HYDE: Objection to form.

A. Limitation 1[b], "determining a first recognized sequence based on the first user input." I don't think I wrote a specific opinion about that, apart from just not disputing the petitioner's argument about it. Although, again, the other elements of claim 1 are not disclosed in Arai.

Q. If I were to ask you generally about claim 1 whether any of the steps in claim 1 were novel, like, would you be able to answer that or did you not analyze that?

MR. HYDE: Objection to form.

A. Well, I discussed in my report 1[f], for example, 1[g] and 1[h], and how they're not disclosed by Arai or by the combination of Arai

and Fenwick or Arai, Fenwick, and Baker. And also the claim in its entirety are not disclosed in the prior art.

Q. Other than not being disclosed by Arai, Fenwick, and/or Baker, are you aware if any of those limitations were known in the prior art?

MR. HYDE: Objection to form.

A. Well, my declaration here is focused on responding to the petition's argument regarding Arai and the combination of Arai, Baker, and Fenwick, and so my declaration focuses on that.

Q. So you're not aware based off of your experiences whether or not these existed before the '428 patent?

MR. HYDE: Objection.

Mischaracterizes testimony.

A. Again, I think it depends on specifically what limitation. I have a general understanding of this kind of recognition as are discussed in this patent and other patents. My focus in this case has been on responding to the argument that Arai in combination with Fenwick and Baker discloses these claims, and I discuss in detail my opinion why they are not disclosed by Arai, and that's been the focus of my report.

Q. Go to Figure 2, step 215 on Figure 2, does that correlate to any part of claim 1?

MR. HYDE: Objection to form.

A. Just to be clear. As we go through these, this notion of correlate, I'm not saying that they are equivalent but rather that there's some relationship between elements of Figure 2 and the elements in the claims, and the figures help inform an understanding of the claim.

With regard to 215 in Figure 2, it's discussed in column 4 around line 43, "At block 215, after finding a best match, the process adds the character to a temporary editable character buffer, which may be presented to the user."

And adding this character to the buffer bears some relation to claim 1c, "writing the first recognized sequence to a memory storage buffer."

Q. Okay. And then step 220, does that correlate to any part of claim 1?

MR. HYDE: Objection to form.

A. So claim 220 is discussed on column 4, line 47, "At block 220, based on a sequence of one or more characters in the current buffer, the process 200 determines whether at least a portion

of the sequence in temporary editable character buffer is a committable sequence."

And then it goes on to provide more discussion about box 220.

And it bears some relationship with claim 1f identifying at least the first sequence portion of the first candidate sequence.

But, again, the figure and the specification informs the understanding of the claims, so it's just a kind of relationship.

Q. Okay. Same question for step 225.

MR. HYDE: Objection to form.

A. Box 225, send committal part to application part for the buffer. It's described in column 4 starting around line 54 -- 53.

"If the sequence in the buffer is identified in block 220, the process 200 proceeds to block 225 in which the committable part of the sequence is sent to current application and removed from the buffer."

So this box, again, involved sending to the application and removing from buffer which bears some relationship with claim elements G and H that discussed removing a first sequence portion from memory storage buffer and sending the first

sequence portion to an application running on the mobile device.

Q. And same question for step 230.

MR. HYDE: Objection to form.

A. 230 is described in column 5 at line 1.

"At block 230, the process 200 updates the display of the characters if any currently in the buffer. If, for example, the process 200 did not identify a sequence in the buffer at block 200, (for example, the start of the first sequence did not match any word in the dictionary), then at block 230 the unidentified sequence may be displayed to the user in block 230. If, however, part of the sequence in the buffer was identified as a committable sequence at block 220, only the remaining unidentified part of the sequence may be displayed at block 230."

So block 230 pertains to updating the display. And there's some portions of claim 1 that refer to the display such as 1e, "presenting the first sequence candidate to the user."

And -- I'm not sure whether specifically 230 relates to a portion of claim 1.

230 discusses the display of characters in the buffer and claim 1 refers to the buffer.

For example, in 1c, "writing first recognized sequence to a memory storage buffer."

Q. I'm sorry, were you finished?

A. Yes.

Q. Okay. So same questions for step 235.

MR. HYDE: Objection to form.

A. Step 235 is described in column 5, line 12 to 13, "the process monitors a character input area for additional text input."

And so additional text input, certainly claim 1, relates to user input, even if not specifically detecting whether more input has arrived, but certainly pertains to receiving input and doing a determination of the first sequence and so on and so forth.

Q. This step 235 doesn't really pertain to any specific limitation; is that correct?

MR. HYDE: Objection to form.

A. Well, step 235 discusses a user continuing to write and produce more characters and those characters can be input that's considered in claim 1.

Q. But claim 1 only requires one input based off of its claim language; isn't that correct?

A. I wouldn't say that it's limited to one input. It's a process that can consider some input and perform the subsequent steps.

Q. I didn't mean to imply it was limited to one input, but it only requires at least one input, would that be fair to say?

MR. HYDE: Objection to form.

A. Claim 1 can be applied to a single input as well as multiple inputs.

Q. And step 240 of Figure 2, how does that correlate to claim 1?

MR. HYDE: Objection to form.

A. 240 is discussed in column 5, line 17.

"If, however, no further text is detected, the process 200 at block 240 displays one or more candidate sequences and monitors a candidate display area to receive user input indicative of a selection of one of the candidate sequences."

So this part relates to the candidate sequences that are discussed in 1d generating a first candidate sequence.

Q. So does Figure 2 connote an order so like -- yeah, just leave it at that.

Does Figure 2 connote an order of these

steps to happen in that order?

MR. HYDE: Objection to form.

A. Well, Figure 2, as it says, column 4, line 31, "Figure 2 is a flow diagram illustrating a process of creating a character sequence choice under various implementations of the disclosed technology."

So Figure 2 describe possible implementation of the technology.

Q. And as a flow diagram, are these steps in order of the step numbers?

A. The flow diagram has arrows on it and the description of the figure discusses steps and going from one to the next.

But, again, this flow diagram refers to, quote, various implementations of the disclosed technology and is not meant to restrict the order of the limitations in claim 1.

Q. Looking at step 245, Figure 2, does that correlate to any part of claim 1?

MR. HYDE: Objection to form.

A. Step 245 is discussed in column 5, line 31.

"At block 245, the process 200 detects whether the system is receiving additional input

from the user."

So, again, like we saw before, that's another -- it's a flow diagram for an implementation wherein there is detecting more possible user input, and claim 1 pertains to steps relating to an input.

Q. So the only one of these steps in Figure 2 that you mentioned involving limitation 1[d] would be step 240?

MR. HYDE: Objection to form.

A. With regard to claim element 1[g]?

Q. No. 1d.

A. 1d, "generating a first candidate sequence," and which Figure 2 identifier did you ask?

Q. Yes. The only step in Figure 2 that correlates at all to 1d is step 245?

MR. HYDE: Objection.

Mischaracterizes testimony.

A. Step 245 --

Q. Sorry. I'm sorry, my bad that is. I did mischaracterize your testimony. Let me rephrase that.

So based off of what you said, I believe the only step in Figure 2 that correlates to

limitation 1[d] is step 240; is that correct?

MR. HYDE: Objection to form.

A. Block 240, so column 5, line 17, "block 240 displays one or more candidate sequences," so that relates to 1d of generating a first candidate sequence. However, this claim 1 has multiple aspects of it that relate to 1[d], such as what happens with that candidate sequence. And similarly the discussion of the figure and what might happen subsequently, relates back to this candidate sequence discussed with reference to block 240. So it's hard to say that there's no correlation at all, as you characterized it.

Q. I think you misunderstood my question.

I just was saying that out of all the steps in Figure 2, only 240 had a correlation to limitation 1[d].

MR. HYDE: Objection. Asked and answered.

A. Well, block 240 is described in column 5, and in the flow diagram, and relate to -- and the way that block 240 operates, also relates to other blocks that occur in Figure 2, and so it's hard to say that -- it seems inaccurate to say that block 240 is the only thing

that relates to 1[d] in claim 1.

Q. Previously you did not say any of the other steps correlated to limitation 1[d], can you point to the other ones that you believe do correlate to limitation 1[d]?

MR. HYDE: Objection to form.

A. So block 240 displays one or more candidate sequences and monitors a candidate display area to receive user input indicative of a selection of one of the candidate sequences.

And in claim 1 there's the generating of a first candidate sequence and 1d is also the presenting of the first candidate sequence in 1e.

Q. Where in the specification does it talk about the generating of first candidate sequence?

MR. HYDE: Objection to form.

A. So in the specification it discusses examples such as in the figures.

In your 3D, which is described as -- which is described in column 7, line 14, it discusses the candidate sequences and refers to the example candidate sequences labeled 322 in Figure 3D.

Q. So what are the candidate sequences in Figure 3D?

MR. HYDE: Objection to form.

A. In Figure 3D it says, "one of the candidate sequences 322," and the candidate sequences are indicated in Figure 3D as including "Rar," the word "Rather," the word "Rate," the word "Art," and a word that looks like maybe "Ratio" that's cut off.

Q. So the word "Rat" that's labeled 320 on Figure D, 3D, is that not the candidate sequence?

MR. HYDE: Objection to form.

A. In the description of Figure 3D, it is described as the input candidate display 320.

Q. So is that a candidate sequence?

A. It could be a candidate sequence. This is -- this figure is illustrative. In this figure it doesn't indicate "Rat" as being a candidate sequence but rather being the input candidate display. But this is discussed even further back earlier in Figure 3A.

3B, which is discussed on column 6, "As shown first in Figure 3B, the input area receives one or more input features that can form a first character 314 (for example, by fingertip or by stylus). A user selection area 308 can display the contents of the recognized character buffer in

an input candidate display 320."

So at least in the figure there is an input candidate display of 320 and one or more candidate words or character sequences 322.

Q. So I understand your meaning to be the patent words, I'm still unclear if 320 of the word that appears in the input candidate display 320 is that a candidate sequence?

MR. HYDE: Objection to form.

A. Well, it's described as an input candidate display, and it could be a candidate sequence, but it's also given a different name in the figures as being the input candidate display.

Q. So it's safe to say you're unsure?

MR. HYDE: Objection to form.

Mischaracterizes testimony.

A. I'm simply saying that the figures that separately label the 320 as the input candidate display and 322 as one or more candidate words or character sequences, and 320 could be a candidate sequence, but in the figures it's described as with separate names.

Q. Looking at Figure 3B, do you see the 307 field pointing to the letter "R"?

A. I see the 307 field, yes.

Q. And is that letter "R" in the 307 field, is that a candidate sequence?

MR. HYDE: Objection to form.

A. What candidate sequence are you referring to?

Q. The letter "R" in field 307, is that a candidate sequence?

A. So the letter "R" is described as column 6, "R" is labeled 307, the one or more candidate words -- sorry.

"The text display 307 can display the currently selected choice in the input candidate display 320. It can also allow a user to edit the sequence shown in the text display 307 or input candidate display 320 using, for example, a virtual keyboard, additional handwriting input, and/or speech recognition."

Q. And what does it say about field 307, column 6, lines 4 to 8?

A. It says, "A highest-candidate character sequence text 307 displays text that the recognition engine has determined to be the best match or most probable candidate sequence, based on the user input, which is currently stored in the buffer." Based on -- period.

It goes on to say -- it goes on to say, "The text output in the display in the text display 307 can be modified by the recognition engine before being committed or exported to the output area."

Q. So would you agree then that the text display 307 displays text that has been determined to be a best match or most probable candidate sequence?

MR. HYDE: Objection to form.

A. Did you hear me?

Q. Now we can. You went off. We couldn't see you or heard you for the last 30 seconds or so.

A. Okay. Yeah, I lost my internet, it looks like it, but it's now coming back. It's still a little slow, I think, but it seems to be coming back.

Q. Okay. So do you want me to repeat the question, because we didn't hear any answer?

A. Yes.

Q. So would you agree then that the text 307 displays text that has been determined to be a best match or most probable candidate sequence?

MR. HYDE: Objection to form.

A. Column 6, line 4, says, "The highest-candidate character sequence text display 307 displays text that the recognition engine has determined to be the best match or most probable candidate sequence, based on the user input, which is currently stored in the buffer."

Q. So the letter "R" in Figure 3B would be a candidate sequence?

A. Are you -- which "R" in 3B?

Q. The one in field 307.

A. Well, it says on column 6 that it is -- it displays the text that the recognition engine has determined to be the best match or most probable candidate sequence. So it's at least displaying something that has been determined to be the most probable candidate sequence.

Q. How does the recognition engine determine it to be a best match or most probable candidate sequence?

A. So are you referring to the discussion of these figures now, or more generally?

Q. Does the '428 patent anywhere discuss how it determines the best match or most probable candidate sequence?

MR. HYDE: Objection to form.

A. It discusses first candidate sequences being generated in the claim language of 1[d]. It gives examples of them.

For example, 3D. It discusses that Figure 3D more in column 7. And it's discussed in other parts of the spec -- I just need to find where that was.

I recall that I can use context information but I'm just looking to find out where that was mentioned.

It discusses context information, for example, column 15.

"In this example, in an order form a user may enter his work email into an email field and the recognition engine would predict that the shipping address field would contain his work address."

Q. Is there a description in the '428 patent about how it generates first candidate sequence?

MR. HYDE: Objection to form.

A. It discusses candidates in column 3. It talks about users selecting them. It talks about selecting highest-ranking candidate.

Q. Those are examples of using the

generated candidate sequences, anything on w it generates those candidate sequences?

A. It discusses candidate sequences, the description of Figure 2, that's what we were discussing before around line 17.

Q. Line 17, what column?

A. I think column 5. Selection of the candidate sequences. Display one or more candidate sequences.

Q. But it's talking about selection of but not the generating of, anything talking about the generation of candidate sequences?

MR. HYDE: Objection to form.

A. Well, certainly the examples show candidate sequences being generated using a similar-looking prefix or a variation of the order of symbols.

For example, Figure 3D gives an example of different candidate sequence, with other possible characters. It describes generally throughout the patent using context information and it describes these candidate sequences.

I think I also talked about this specifically in my report.

I talk in Section V.A., on page 13 of my

report, I talk about the '428 patent generally.

There's other parts of '428 that talk about other context information such as in column 12, line 34.

"Context information is any information that may help inform the recognition engine of the user's intent, and may include information such as a sentence or a word-pair context, language context, application-specific context (for example, date fields/tags), user-specific context, location, time of day, et cetera, as described in greater detail herein."

So the patent describes how context information can be used.

Q. So I still don't think you answered the question how it generates a candidate sequence.

MR. HYDE: Objection to form. Asked and answered.

A. So the patent spec and figures give several examples of candidate sequences. However, like words that have -- that's the prefix entered thus far or are variants of or reordering of the characters entered thus far. It also describes how context information can be used. It describes how these candidates are then presented to the

user. I talk more about this in my paragraph 49.

Q. So it generates candidate sequences by reordering the sequences of the prefix as well as using context information, is that a correct characterization of what you're saying or what exactly did you mean?

MR. HYDE: Objection to form.

A. Well, Figure 3D in its example of a candidate sequence has generated one candidate, one possible option of "Art," which is a reordering of the characters "Rat," as well as an example of words that begin with the prefix like "Rather."

Q. Does the patent specification discuss that is how it determines those candidate sequences?

A. Well, it discusses, it gives that as an example, and so that if you can understand that possible candidates could include words that have the same prefix of what has been typed so far, or words that are spelling alterations, so it describes those.

It also discusses at length about how context information can also be used.

Q. All right. Let's turn to paragraph 104

of your report, and you state that limitation 1[d] requires an additional processing step. Do you see that?

A. Yes, I see in 104, "Moreover, even if Petitioners had not already relied on these same steps in Aria for earlier limitations, Petitioners cannot rely on these steps to satisfy limitation 1[d] of the patent," and so forth.

Q. Does the specification talk about this additional processing step?

MR. HYDE: Objection to form.

A. The specification talks about candidate sequences. Starting from claim 1, the specification talks about -- sorry -- the claim 1 refers to generating a first candidate sequence, that being a separate step from determining in 1[b] a first recognized sequence and generating also wherein the first candidate sequence is the best match of one or more recognized sequences.

So the claim language indicates that there is a step for generating and that that step has specifics to it.

Q. And the specifics were again?

A. Well, it says, "generating a first candidate sequence wherein the first candidate

sequence is the best match of one or more recognized sequences." So there has to be something that is a first candidate sequence that gets generated and back to a moment ago about the generating process.

THE WITNESS: Also, when there's a convenient moment, I'd like to take a bathroom break.

MR. CLARK: Sure, we could. We can take it now.

(Off the record 3:05 p.m.)

(Resumed 3:14 p.m.)

BY MR. CLARK:

Q. Dr. Koskinen, when we took a break, we were talking about paragraph 104 of your report, and that states that the limitation 1[d] requires an additional processing step.

Also in paragraph 104 you say that the additional processes step is, namely, I quote, "processing of the combination of characters stored in memory to generate the '428 patent's hypothetical candidate sequence." Do you see that?

A. Yes.

Q. And you bold and italicize the word

"combination" here, why is that?

A. Because the step that involves 1[d] considers the combination of characters in order to generate the possible sequence. So, for example, like we saw in Figure 3D, the candidate sequence "rather" was generated by considering the combination of "R" and "A" and "T."

Q. The limitation also states that the first candidate sequence is the best match of one or more recognized sequences, correct?

A. It says -- let me just make sure -- "The candidate sequence wherein the first candidate sequence is the best match of one or more recognized sequences."

Q. So how is the processing of a combination of characters in a scenario where there's only one recognized sequence?

A. Well, it could process -- it processes a combination of characters in order to generate sequences of the sort of potential aspect of it. The first candidate sequence is the best match of one or more recognized sequences. So it already had some recognized sequences from 1[b], in which it determined a first recognized sequence, maybe has more of them, and then it generates the

candidate sequence.

Q. But do you agree that limitation 1[d] only requires there be one recognized sequence to generate a first candidate sequence?

MR. HYDE: Objection to form.

A. 1[d] refers to generating, this process of generating by taking in some, some sequences, and those sequences are then analyzed in order to generate the candidate sequences. And it does this by -- like we talked about earlier -- the different possible ways in which those sequence can be generated. But I'm not sure I understood your question.

Q. Do you agree that limitation 1[d] only requires one recognized sequence to generate a first candidate sequence?

A. Well, 1[d] discusses generating first candidate sequences, and we've seen many examples where those sequences involve multiple characters such as "RA" or "RAT," and the sort of essence of it is the fact that it can involve analyzing those, the combination of those characters, and that -- it's that combination, even if that combination contains only one character, it still is performing an operation at the sort of

combination level.

Q. I'm sorry. Can you explain to me what you mean by, "if that combination contains only one character"?

A. Yeah, that's performing this generation of a candidate sequence based on a sequence of characters and the combination of them. And so it's an operation on a sequence of that. Regardless of whether or not that sequence is a single character, it's still a processing that happens on a combination of characters.

So, for example, if you just type -- let me just give an example.

In Figure 3B the user has written "R," in the description of 3B, 322 refers to candidate sequences. And the same 322 is also in 3D which is again candidate sequences. So all of this are operations on a sequence of characters regardless of whether or not it's a single character. The important thing is that it's an operation on the combination of characters.

Q. 322 also refers to character sequences in the same paragraph; isn't that correct?

A. Yes, it refers to character sequences.

Q. So in Figure 3B, the letter "R," is that

both the first recognized sequence and the first candidate sequence?

MR. HYDE: Objection to form.

A. Well, in 3B it says, "A user selection area can display the contents of the recognized character buffer in the input candidate display 320, which is the bold 'R.'" So that's the recognized character buffer.

"And one or more candidate words or character sequences." So that's referring to candidate words or character sequences 322.

Q. And it's displayed in field 307, which we earlier talked about, about being the most probable candidate sequence?

MR. HYDE: Objection to form.

A. With regard to 3B, the text display 307 can display the current selected choice in the input candidate display 320.

Q. Right, but the description of field 307 occurs, lines 4 to 7 on column 6, talks about it being the most probable candidate sequence that we discussed about earlier, right?

A. 307 in Figure 3B, "The text display 307 can display the currently selected choice in the input candidate display 320." So what was your

question?

Q. Column 6, lines 4 to 7, of the patent, we talked about the text display 307 displays the best match or most probable candidate sequence. Do you recall us discussing that?

A. I remember us discussing column 6, line 4, "The highest-candidate character sequence text display 307 displays the text that the recognition engine has determined to be the best match or most probable character sequence based on user input."

Q. So I'm still confused if you agree that the letter "R" can be both the recognized sequence as well as the first candidate sequence. Do you agree with that?

MR. HYDE: Objection to form.

A. With regard to Figure 3B, the user has written the letter "R" and "R" is in the input candidate display 320. Then there are also candidate words or character sequences 322 which also include IT. So IT in this example is a candidate character word or character sequence based on the character buffer.

Q. Okay. So is the letter "R," correct?

A. The letter "R" is indicated as 320, the

input candidate display.

Q. And the letter "R" is in the character buffer, correct?

A. It displays the contents of the recognized character buffer and input candidate display 320 which in this example includes the letter "R."

Q. So the letter "R" is also a candidate sequence?

A. It could be.

Q. So a single letter -- claim 1 can generate a first candidate sequence with just a single letter input; is that correct?

A. The generation happens over a combination of characters as can be seen in, for example, Figure 3D with "rather" and "rate" and "art," and that same process happens even if the sequence has just a single character. But nonetheless, it still treats that single character as a sequence and performs a generation of candidate sequence bid on the combination of characters.

Q. And would the end result for a single letter always be the single letter is the generated candidate sequence in that based off

your description there?

MR. HYDE: Objection to form.

A. Well, in the example of 3B, one of the character candidate sequences is IT, having two characters.

Q. But is that the first candidate sequence Figure 3B?

A. In Figure 3B IT is identified as 322, which is one or more candidate character sequences.

Q. That doesn't answer the question.

A. What was your question?

Q. Is IT the first candidate sequence in Figure 3B?

A. In Figure 3B there is 320 identified as an input candidate display and 322 having one or more candidate words with connected sequences.

Q. That still doesn't answer the question I asked. Is IT the first candidate sequence in Figure 3B, yes or no, or you don't know?

MR. HYDE: Objection to form. Asked and answered.

A. In Figure 3B, IT is identified as one as 322, which is one or more candidate words or character sequences. And 320 is referred to "user

selection 308 can display the content of the recognized character buffer in an input candidate display 320."

So 320 is an input candidate display and 322 is one or more candidate words or sequences.

Q. I understand from those answers that you don't know the answer to the question because none of those satisfy my question, so we can just move on to something else, unless you want to add anything.

MR. HYDE: Objection.

Mischaracterizes testimony.

A. I don't think I have anything to add.

Q. In paragraph 104 of your declaration you also say that the process, it's processing the combination of characters. Are you equating the generating of limitation 1[d] with processing?

MR. HYDE: Objection to form.

A. I am saying that 1[d] uses the specific word "generating" which refers to some kind of process, some kind of additional, additional step. As I say, it's a step beyond the initial character recognition process step. So I'm not sure what you mean by processing exactly, but I'm just saying that generating is a specific, there's a

word used in 1[d] that refers to performing a specific distinct step as compared to.

Q. You say that -- sorry.

They say that limitation 1[d] requires this additional processing step which is a processing of the combination of characters, so -- strike that.

Let's move on to paragraph -- no.

How would you define generating as used in limitation 1[d]?

A. Well, I think we talked about this very extensively. There are examples given throughout the spec of in the character sequences. There's discussions of how we can use the best match. There's discussions of how the context information can be used.

Q. I think you misunderstood my question. I'm asking how you generate a candidate sequence, which we talked about extensively before.

This time I was asking you specifically how would you define generating as it's used in limitation 1[d]?

MR. HYDE: Objection to form.

A. I'm using the plain and ordinary meaning of generating.

Q. And what is the plain and ordinary meaning of generating?

A. Well, generating refers to a process of creating something out of some -- taking some inputs and producing some outputs, and here in 1[d], that's made more specific in terms of the thing that is generated is a first candidate sequence, and wherein the first candidate sequence is the best match of one or more recognized sequences. So the process takes as input some recognized sequences and produces as output first candidate sequence that is generated and provides, for example, different contextual candidate sequences like what we talked about from Figure 3D. So, generally speaking, generating is a processing step, as I said.

Q. And you said it takes input of some recognized sequence, and you said, but it could also take as input just one recognized sequence, correct?

A. Well, it processes the combination of characters, like we discussed earlier, and we saw in the figures it processes the characters and their combination in order to produce the candidate sequences.

Q. Including a single letter like the letter "R"?

A. Well, again, the generating is over a sequence of characters such as "Rat" I've seen in the figures. And the sequence could also be a single character such as "R" shown in Figure 3B. But regardless, this is a processing that happens at the level of a combination of characters, even if there's just one character.

Q. You say that during, for example, if you include different contextual candidate contextual information, to be clear, the patent doesn't have to include contextual information, correct?

A. The patent describes, if it manages from using contextual information, and the way in which the patent operates, and the way in which claim 1, for example, operates, enables one to use contextual information at multiple steps of the process. I talk about this extensively in my report.

Q. Can you walk through claim 1 and please show me where in claim 1 it has to use contextual analysis?

MR. HYDE: Objection to form.

A. So claim 1 allows contextual information

to be used. I talk about this, for example, in my paragraph 78. I say, "For example, the specification explains that contextual analysis may be applied: 1) during the initial character recognition process; 2) during the initial selection of the predicted character sequences."

There I point in the specification to column 6 and column 13.

Also 3) during the subsequent identification of sub-portions of character candidate sequences which may be automatically committable to the application and flushed from the memory buffer. There I refer to the specification column 4 and column 9.

And, "deciding whether to clear the temporary memory buffer," I'm referring to column 3. And, "even after words are committed to the application," referring to column 3 again.

So there are multiple stages of claim 1 in which contextual information can be used, and I point to portions in the spec that discuss that.

Q. So I understand it may be used, it can be used in various steps of claim 1, do any of the limitations of claim 1 require that contextual analysis be used?

MR. HYDE: Objection to form.

A. The claim limitations enable contextual analysis to be used at multiple different stages, so when an implementation of the '428 can deploy contextual analysis at multiple different stages.

Q. Right. If you deploy, but it doesn't require contextual analysis for any stage in claim 1?

A. The '428, because of the way the claim works and the way the invention works, enables contextual analysis to be performed at multiple, at multiple steps, like I mentioned.

Q. Does the word context or contextual appear in any of the claim language?

A. The specific word "context" doesn't appear in claim 1. However, the important factor of claim 1 is that it enables context information to be used at multiple stages.

Q. When you say the word "enables," are you using that in the legal terminology for enablement with patents?

A. I'm not sure. I'm simply saying that because of the way the recognition process works, as I say in my paragraph 78, and the way it differs from prior recognition methods, includes

the fact that it can perform contextual analysis at multiple different stages.

Q. It can but it's not required?

A. The '428 claim makes it possible to perform contextual analysis at multiple different stages, which is part of how it improves over prior methods, and it's a key aspect of the invention.

Q. And before you said it enables contextual analysis, what did you mean by enables?

A. In that the '428 -- that simply meant that the '428 can perform contextual analysis at multiple different stages. That's what I meant by enables.

Q. When you say '428, you mean claim 1?

A. For example, claim 1, but also other claims.

Q. Does claim -- is it the same for claim 9 that it can perform contextual analysis at multiple different stages?

A. Similarly for claim 9, contextual analysis can be performed at different stages, and similarly for some dependent claims and so forth.

Q. But similar to claim 1, claim 9 doesn't require that contextual analysis be performed,

correct?

A. With regard to claim 9, it doesn't specifically use the word "context," but the way that claim 9 operates means that it can perform contextual analysis in multiple stages.

Q. Just because it can perform, it doesn't mean it has to perform, correct?

A. Well, claim 9, again, because of the way it's structured, it is a -- a key aspect of it is the fact that contextual analysis can be employed at multiple different stages. Maybe some of them in implementation might choose not to do it, too, but a key aspect of the invention that I talk about in my paragraph 78, that the invention allows or that contextual analysis can be performed at multiple different stages. I don't think I -- yeah, I think that's it.

Q. The only way somebody can infringe claim 9 is if they do perform contextual analysis?

MR. HYDE: Objection. Calls for speculation. Calls for a legal conclusion. Mischaracterizes testimony.

MR. CLARK: Mr. Hyde, let me remind you, you're limited to objection to form in these matters.

A. With regard to, I think you mentioned infringement, in this case I have not been involved in infringement. This declaration pertains to responding to petitioner's prior art references.

Q. Did you construe any claims -- or no, strike that.

You didn't construe any claims in your declaration, correct?

A. In my declaration I believe I use the plain and ordinary meaning on everything. I discussed this.

Q. So which terms in claim 9 impute the idea of contextual analysis?

A. Well, contextual analysis is discussed throughout the patent spec. I've cited to many sections of it, and there are many examples of it. And the way that claim 1 and claim 9 are set up, it enables multiple opportunities for contextual analysis to be used. Again, like I talk about in my report.

Q. Can you point to any terms in claims 1 and 9 that the plain and ordinary meaning includes contextual analysis?

A. Claims 1 and 9 talk about candidate

sequences being generated, and it talks about identifying first portions. And those in the context of the specification examples are given that use or it's been described that one could use contextual information. So it's clear that the claim 1 and claim 9 allow for the use of contextual information.

Q. Do any of the embodiments in the '428 specification require the use of contextual analysis?

A. Well, examples are given about using contextual analysis, like we talked about earlier, when entering -- a user entering their address, which is to the -- I believe this was column 15. They talk about the use of context information at line 25. To illustrate the use of this context information, consider an example of form filling where the recognition engine may remember what words users have entered in particular fields. So they talk about the recognition engine using context information.

Q. What does it say has to use that context information?

A. Well, it describes also, there's another example, line 40, "the character selection module

and/or the sequence list selection module may keep the user context database and/or the application context database."

And even in the figures, Figure 6, for example, there's the user context database, though, context information is really a key aspect of the invention in the spec.

Q. So you point to line 48 in column 15, but it says the words "may keep" the user context database. Is there anywhere in the patent specification that it says it does or must keep or does or must use context or is it all permissive?

A. Again, the patent talks extensively about context information and the key aspect of the claims is that they enable the use of context information. Perhaps one might skip using context information, but a key aspect of the invention is that there are multiple opportunities to use context information.

Q. Was this a novel idea at the time to use context information for handwriting recognition?

MR. HYDE: Objection to form.

A. I think my -- in this case I focused on responding to the prior references that were provided by the petitioner and focused on how '428

relates to them. I don't know if I underwent an analysis to determine what you asked with regard to context information, except for the fact that the '428 does describe this context information as being valuable. And I understand generally, based on my knowledge of -- my general knowledge that context information is useful, and that enabling the use of context information is beneficial.

Q. In paragraph 78 you also cite to column 12, lines 31 to 34, of the patent.

And lines 31 to 34 state, "The recognition engine may additionally access or receive and process context information." Do you see that?

A. Yes, I see that.

Q. And it uses the word "may," correct?

A. The word "may" occurs on line 31, yes.

Again, a key aspect of the '428 and claim 1 is that it provides opportunities to use contextual information, which can be beneficial.

Q. And if you look at column 13 -- sorry.

Paragraph 70 also cites to column 13, lines 26 to 34, and if you look to those lines, it states, "The other inputs that the sequence list selection submodule 620 may use include data from

the linguistics engine, parameters achieved from the disambiguation database," blah blah blah. Dot dot dot.

So here it's talking -- do you see that?

A. I see that.

MR. HYDE: Objection to form.

Q. And so this also is permissive and uses the word "may," correct?

A. Again, it does use the word "may" there. However, the key aspect of the '428 is the ability to employ contextual information at multiple different stages. It might be used in many stages. It might be used in some stages. And as discussed in the spec, it's beneficial to use contextual information. And many examples are given in the spec.

Q. You said you reviewed Mr. Ward's declaration earlier today. Do you recall that?

A. Yes.

Q. Did you review any of the prior art that he cited in his declaration other than the ones in the IPR petition?

A. I reviewed Arai. I reviewed Fenwick. I reviewed Baker. What other prior art specifically are you referring to?

Q. He had a bunch of prior art he listed, I just was wondering if you reviewed any other ones other than Fenwick, Arai, and Baker?

A. I may have reviewed or at least looked at some of them. Were they included as exhibits to his declaration?

Q. Yes, they would have been included as exhibits.

A. So typically I would have at least briefly looked at all of the exhibits. I don't remember specifically what the other references were, but I at least looked at them briefly.

Q. Do you recall whether any of the prior art include anything about contextual analysis?

A. I don't remember. Again, my focus was on responding to the petition about the combination of, the specific combination of Arai, Fenwick, and Baker.

Q. Would you agree that the '428 patent did not invent contextual analysis for character and word recognition?

MR. HYDE: Objection to form.

A. I don't think I performed an analysis to determine whether or not the '428 invented contextual information. I think the key aspect of

the '428 is the way in which it enables the use of contextual information at multiple stages like we discussed.

Q. Can you turn in your report to paragraph 74, first sentence.

Do you see where it says, "the '428 patent seeks to solve problems with prior art character recognition methods which did not provide contextual analysis for character and word recognition." Did I read that correctly?

A. Yes.

Q. But nowhere in the '428 patent does it say that the prior art did not provide contextual analysis, correct?

MR. HYDE: Objection to form.

A. I don't think that I -- I can't remember if it said something like that. Again, I don't think I conducted an analysis to determine regarding that. More the important thing here is that the way the '428 operates, for example, in claim 1, claim 9. It is a specific way in which, in which contextual information can be used because of the way in which the steps are organized and what the steps consist of. It provides multiple sort of entry points or multiple

places where contextual information is used.

Q. You say '428 patent seeks to solve problems with prior art that did not provide contextual analysis, and then you cite to column 1, lines 41 to 42, in support of the statement, but my question was: Does the '428 patent anywhere state the prior art does not provide contextual analysis for character and word recognition?

MR. HYDE: Objection to form.

A. So '428, column 1, 41 -- I'm sorry, what was your question?

In my paragraph 74 with my quote to column 1, I'm talking about decreases the speed of character letter input by users. So what was your question?

Q. Right. The citation was for the whole sentence, not just that quote, because that quote would not span 10 pages. I'm sorry. 10 lines, not 10 pages. My apologies.

So my question was: Where are you getting your opinion from here that the '428 patent seeks to solve problems with prior art that did not provide contextual analysis for character and word recognition? Because you're citing to

this lines 31 to 42, column 1, for that statement.

MR. HYDE: Objection to form.

A. I'm sorry, I'm just trying to understand your question. Lines 31 to 42 indeed refer to the sort of speed of user entry.

Q. Let me rephrase the question.

What is your basis for saying that the prior art did not provide contextual analysis for character and word recognition?

A. Well, as was discussed in other sections of the spec, it talks about benefits of being able to apply contextual information in multiple places. Like we've been talking about. And so my basis is that contextual information, just generally based on my general knowledge, being able to employ contextual information is useful.

And based on my understanding of the '428, and how contextual information can be used in these specific steps, and that Arai and Fenwick don't disclose the '428, based on all that information, at least the particular claim 1 is not disclosed by the prior art and that claim 1 enables the use of contextual information.

Q. So you said the other sections of the spec was part of your basis, but just to be clear,

no part of the '428 patent talks about prior art not providing contextual analysis, correct?

MR. HYDE: Objection to form.

A. Well, I don't -- I mean, certainly the spec of the '428 talks a lot about how to use contextual information such as in columns 15 -- column 15, like we talked about.

Yes, in column 15, the use of contextual information. And in the claims there are multiple opportunities to use contextual information.

So the -- so claim 1, my opinion is that claim 1 provides a specific way to tackle the problem of, some of the problems that we've laid out, and it does it in a way that can use contextual information.

And since this claim 1 has not been disclosed by Arai, Fenwick, and Baker, it provides a novel way of enabling contextual information.

Q. I'm sorry. How does what you cited to in the '428 patent relate to prior art?

MR. HYDE: Objection to form.

A. So in this, in this patent, in this case, I'm responding to the petitioner's combination of Arai, Fenwick, and Baker, and conclude that claim 1 is not disclosed by that

combination, and claim 1 enabled the use of contextual information, and so there's thus a novelty of being able to provide opportunities for using contextual information through these claims.

Q. So you still haven't pointed to me anywhere in the '428 patent where it says it seeks to solve the problems of prior art not having contextual analysis.

MR. HYDE: Objection to form.

Q. Can you point to me anywhere in the '428 patent where it uses words similar to that or implying that?

MR. HYDE: Objection to form.

A. Well, column 14, line 4, says, "To facilitate improved character and/or sequence recognition and/or selection, the user context database and the application context database may provide context information to the character selection submodule and/or the sequence list selection submodule to inform its processing."

So here is discussing how context information can be used and it's for the purposes of facilitating improved character and/or sequence recognition and/or selection.

Q. How do you know it's related -- well,

first of all, you notice it says, "it may provide context information," correct?

A. It says, "may provide context information to the character selection submodule." Again, the key aspect of this, of these claims is that it provides opportunities to use context information, which is beneficial.

Q. But isn't this sentence talking about improved character and/or sequence recognition based off the prior discussions in this patent?

MR. HYDE: Objection to form.

A. Well, it is referring to further improvements, but those improvements also employ context information which enables it to expand its improvement scope.

Q. And what here indicates it's based -- it's related to prior art?

A. Well, it's just talking generally about the '428 and how the '428 can operate better. And so broadly the goal of making improvements is to advance over, over earlier iterations or simpler versions of things, so by transitivity it improves over the prior art.

Q. Would you agree that the only important aspect of the '428 patent is to be able to commit

a series of one or more characters to an application?

MR. HYDE: Objection to form.

A. Are you referring to a specific claim?

Q. No.

A. Okay. Well, claim 1 each involves "sending the first sequence portion to an application running on the mobile device," so is that encompassed by your question?

Q. Yeah, I'm just trying to -- I'm just wondering if you think that's an important aspect or not of claim 1 and of this patent?

MR. HYDE: Objection to form.

A. Okay. Could you repeat the question?

Q. Would you agree that it's an important point of the '428 patent the ability to commit a series of one or more characters to an application?

MR. HYDE: Same objection.

A. Certainly an aspect of the invention involves identifying portions and sending them to an application. That is discussed in claim language. Often discussed in some of the descriptions of the figures such as in the description Figure 2F.

Q. Column 2 of the patent, lines 59 to 62, talking about identification of the end of one word and the beginning of the next without the need to type a space gesture between two words. Do you see that?

A. I see that.

Q. Do you think that's an important aspect of this invention?

MR. HYDE: Objection to form.

A. It's certainly an aspect of the invention and it's certainly related to how some of the steps, which is Figure 2, or aspects of claim 1.

Q. The practical use of that, does that mean that the person, the user importing handwriting would not need to leave spaces and the system would determine that for the user?

MR. HYDE: Objection to form.

A. Sorry, can you repeat the question?

Q. Yeah. In practical use -- strike that.

Would the invention of the '428 insert spaces for a user if the user just handwrites all of its words as like a run-on word?

Sorry. Strike that. That's a bad question, too, I think.

What I'm trying to get at is, if I write, "I like to write novels," would the '428 patent insert spaces between the words "I" and "like" and "to" and "write"?

MR. HYDE: Objection to form.

A. So an example along the lines of what you're talking about comes up in the spec. It's discussed in column 3. It talks about committing "I like" to the application. But I'm not sure I understand your question.

Q. I think his answer's up, but I just -- the system would insert spaces between words to distinguish the words; is that correct?

MR. HYDE: Objection to form.

A. I'm not sure about whether it would insert spaces. I think what it describes as -- well, in column 2, the example in column 2, have the candidate that has spaces in it, so that is at least in the example of a candidate having spaces in it. I'm still not sure what the question is.

Q. Are you talking about column 3, lines 48 to 49?

A. Yes. Sorry. Column 3.

Q. Yeah. So the system will take a run-on word like "I like to write" without any spaces and

it will create candidates to insert the spaces where it thinks a space should go between words, correct?

MR. HYDE: Objection to form.

A. Yes. The '428 provides an example, the spec provides an example where "I like to write" has no spaces that produces a candidate that has spaces.

Q. And it's important to do that for the '428 to determine where the end of words and the beginning of words are, correct?

MR. HYDE: Objection to form.

A. Well, they are not necessarily dependent upon each other. The process of identifying sub-portions that would require the candidate process to insert spaces.

Q. Right. As we mentioned earlier, claim 2, lines 59 to 62, it talks about the identification of the end of one word and beginning of the next about the need to detect a space gesture between two words, correct?

A. I see that sentence. What's the question?

Q. Well, I was just saying, what's important for the system to be able to determine

the beginning and the end of words?

MR. HYDE: Objection to form.

A. One aspect of the '428 involves generating candidate sequences that have spaces in them like we see in column 3. Another aspect is identifying portions of character sequence that can be removed.

Like I said, it doesn't -- removing doesn't require that spaces necessarily be added in between words during generation of a first candidate sequence, but both of these things are aspects that are involved in some way.

MR. CLARK: Do you think now is a good time for a break? Do you guys want to take another five-minute break?

MR. HYDE: Can we do 10 minutes this time?

MR. CLARK: Sure. The last one was actually 10 minutes, too, we said five but we went 10 anyway.

(Off the record 4:23 p.m.)

(Resumed 4:37 p.m.)

BY MR. CLARK:

Q. Dr. Koskinen, what is your experience with developing language recognition algorithms?

MR. HYDE: Objection to form.

A. Again, the most relevant experience would be my experience with parsers which recognize taking input sequence of characters and will recognize them.

Q. And do you have an idea how difficult it may be to combine like different languages, algorithms for different languages?

A. Combining algorithms for different natural languages, yeah. As I talk about in my report, it's very difficult to combine algorithms from different languages. I referred to not only Mr. Ward's testimony but also Mr. Andersson's declaration and some citations to literature. I talk about that starting at approximately on page 59 of my report.

Q. So I was going to ask you: What is your basis for your opinion on the challenging nature of combining multiple language models?

A. The basis of my opinion, as I laid out from pages 59 to 69, Mr. Ward testified at length about difficulties. Mr. Andersson testified about it. I referred to excerpts from the literature that discussed difficulties.

So, for example, on page 60 I refer to

the publication "Handwriting: Recognition, Development and Analysis." And I understand also generally that it's a difficult problem.

Q. When you say you understand generally that it's a difficult problem, what is that based on?

A. Just generally on my knowledge, education, and experience.

Q. And what in particular about your knowledge, education, and experience has led you to make that belief?

A. Well, my primary -- my conclusion is primarily drawn from the references that I discuss in those 10 pages of my report, as well as my general knowledge.

We talked about some of my experience in the past on just generally with handwriting recognition.

And I also understand that different languages are very different based on my experience being exposed to the Japanese language having different character sets and different shapes, different -- yeah, based on all of that information, I understand that handwriting recognition is a difficult problem.

Q. You also in your declaration talk about single character recognition SCR and multiple character recognition MCR. Do you recall?

A. Yes.

Q. And you discussed that those are, SCR and MCR, are different types of processes for language recognition; is that correct?

A. Yes, I'm -- I read Mr. Andersson's declaration where he discussed SCR and MCR and, yeah, learned from that.

Q. Are you aware that there are different types of SCR algorithms?

A. Yes. It would not surprise me that there are different types of SCR algorithms. Also -- but yes, there are, I'm aware that there are different types.

Q. And similarly there are different types of MCR algorithms?

A. Yes. I'm aware that MCR is a difficult problem and there are multiple approaches to it.

Q. Are the '428 patent claims limited to any particular SCR algorithm?

MR. HYDE: Objection to form.

A. I don't -- I don't know if I specifically analyzed specifically the '428 patent

for that purpose to determine whether it's limited to a specific SCR algorithm.

Q. So you don't recall, as we sit here today, whether or not the '428 claims are limited to any particular SCR algorithm?

A. I don't think that they are, particularly that the '428 is particularly limited to a specific SCR algorithm. The '428 uses character recognition, as we talked about earlier today, in multiple places. Off the top of my head, I don't think that it's limited to a particular type of SCR. It provides examples of inputs, but I don't think it's limited to a specific type.

Q. Are the '428 patent claims limited to any MCR algorithms?

A. So MCR refers to multiple character recognition, as I quote in the top of page 62, which attempts to recognize the sequence of strokes or represents one or more characters.

And, again, with regard to similarly for SCR, I don't think I conducted an analysis whether or not the '428 was limited to a particular type of MCR algorithm, but I think that it -- I don't think anything in particular about the '428

restricts it to a particular MCR type of algorithm.

Q. You said that you're aware that SCR and MCR have different types of algorithms, do you recall any specifics about those?

MR. HYDE: Objection to form.

A. I recall some algorithm details about taking points and inferring strokes from them, an algorithm, along those lines.

Q. Is there any knowledge of SCR and MCR other than it's based off of Mr. Andersson's declaration?

MR. HYDE: Objection to form.

A. I wouldn't characterize it that way. My knowledge of handwriting algorithms is informed by patents in this case, the '428, the Arai, Fenwick, as well as having attended lectures on computer vision and looked at other input, input devices and observed input devices being used.

Q. Can you walk through the limitation of claim 1 and tell me which limitation uses SCR and which uses MCR?

MR. HYDE: Objection to form.

A. I don't think that I conducted an analysis to determine which limitation uses SCR

versus MCR apart from the fact that they used some character recognition. In 1[a] there's the receiving user input and in 1[b] determining a first recognized sequence.

Q. So, I'm sorry, you're saying that those are, 1[a] and 1[b], are SCR, MCR, or something else?

A. I'm saying I don't -- I think I conducted an analysis to determine whether those are limited to MCR or SCR apart from knowing that they pertain to handwritten -- handwriting recognition, and they could use algorithms from MCR or SCR to do that.

Q. If you were to do an analysis to determine which limitation uses MCR and SCR, how would you conduct that analysis?

MR. HYDE: Objection to form.

A. Well, SCR and -- I think that -- so if I understand correctly, you're asking me how would I conduct an analysis to determine which limitations pertain to SCR and MCR?

Q. Correct.

A. And just so I'm clear, what do you mean by pertain to?

Q. I don't think I used pertain, I think I

used the word used, but you said that you did not conduct an analysis to determine whether any particular limitation used MCR or SCR, and my question is: How would you conduct that analysis that you were referring to?

A. I don't think that was my full testimony. I also noted that some of claim 1 uses character recognition. For example, 1[a] and 1[b]. So -- and I would probably -- is your question about identifying generally whether claim terms use MCR versus SCR? I'm still not totally sure what analysis you're asking me to design.

Q. Well, so, I guess as a preliminary question, you keep mentioning 1[a] and 1[b]. Would you say that only 1[a] and 1[b] would be involved with the use of an algorithm SCR or MCR or were those just examples and the MCR or SCR could be used for the rest of the limitations as well?

MR. HYDE: Objection to form.

A. Well, multiple character recognition -- so single character recognition, as I describe, and I quote Mr. Andersson on page 61 of my report, SCR is the process for solving the initial character recognition problem, so it focuses on an

individual character. And then there's the higher level multiple character recognition which attempts to recognize a sequence of strokes that represent more and more characters.

And multiple, multiple character recognition can involve spanning sort of, as it says, multiple characters, and so there can be elements of it that pertain to stroke analysis, but also elements about how multiple characters relate to each other. It's kind of a more sort of broad term. MCR and SCR are kind of generally talking about the problems that are being solved with character recognition and trying to delineate between single characters and multiple characters. So trying to with the goal kind of claim by claim to determine whether it's single or multiple is a little bit orthogonal.

Q. And it's not even clear that even necessarily requires or uses an SCR and MCR; is that correct?

A. I wouldn't put it that way, because some parts of SCR pertain to algorithms for single character recognition and some parts of claim 1 can pertain to using single character recognition algorithms, such as in 1[a] and 1[b].

Multiple character recognition is referring to the bigger problem of having multiple characters and that can involve trying to address it character by character or address it in across the spanning of multiple characters. And the '428 does pertain to doing recognition at kind of both those levels. I already talked about single character, but also in the context of multiple characters that also comes up. We can see that in like examples in the spec.

Q. Okay. Let's -- I'm sorry.

A. And in the candidate sequences.

Q. Let's turn to paragraph 103 of your declaration.

A. Okay.

Q. I notice that you only point to the Japanese characters A1 and B1 in this paragraph. Do you see that?

A. In this paragraph I refer to A1. In 106 I refer to B2.

Q. We're talking about 103. What's 106?

A. Yeah, I agree that in paragraph 103 I'm only referring to A1 and B1. I just noted that in 106 I refer to B2.

Q. So in paragraph 103, are you saying that

the IPR petition stated that B1 is one of the recognized characters?

A. In the petition in -- I'm sorry, what was the question again?

Q. I think you have a typo here is what I'm trying to get at. And I think when you say B1, you meant to say B2, because you're saying that petitioners assert that the recognized characters A1 and B1 form a first candidate sequence A1B1. And I think those should read A1B2, form of first candidate sequence A1B2.

A. I would have to look back at the petition to confirm that.

MR. CLARK: Can I just share the petition?

Q. So you cited to paragraph 103, pages 21 and 22, of the petition. Here's page 21.

A. Could you zoom in?

Q. Yeah. Why, is B1B2 too similar?

A. Okay. I see now the paragraph in the petition and in the first sentence it uses A1B1, that determines the recognized sequences for each, namely A1 and B2, and generates a first candidate sequence named A1B1. I'm quoting that petitioner.

Q. It says A1 but here it says A1B2.

A. Yes.
Q. So back to paragraph 103 then.
Are those typos or were you trying to say something else?
A. Yeah, I think that is a typo. I shouldn't have written "Petitioners assert that the recognized characters A1 and B2 form a first candidate sequence A1B2."
Q. Okay. Can I stop sharing the screen?
A. Yes.
Q. Before an email or something pops up that I don't want to pop up.
So does that affect then your analysis?
A. No, I think this is just a typo.
Q. Okay. So, Dr. Koskinen, if I told you that I'm going to eat at least half an apple, what does that mean to you?
A. Are you referring to the words "at least" in the context of the '428?
Q. Well, right now -- well, is there -- does the words "at least" have a different meaning in the '428 patent than it does in regular normal speak?
A. Well, the words in the '428 are -- can be interpreted under their plain and ordinary

meaning in the context of the patent. So generally "at least" refers to -- well, English language is a little bit tricky, so it depends on like the full context of the sentence. You said at least half an apple, and there I think you are indicating that there's this apple that -- and that you're going to eat, eat some of it or a portion of it that is half or more.

Q. And so half or more means I could eat the entire apple, correct?

MR. HYDE: Objection to form.

A. Well, that is -- when you say "at least half an apple," you're conveying that you're going to make a selection or there's going to be some amount that you are going to eat, which could be half or it could be three-quarters or it could be five-eighths or it could be the entire apple. But in all of those cases it's an amount that is selected that is 50 percent or more.

Q. So now going to the claim language for claim 9, if I say that something is at least a portion of the sequence, that could mean just a portion or the entire sequence, correct?

MR. HYDE: Objection to form.

A. Well, in claim 1[f], limitation 1[f] --

Q. I'm sorry, I'm sorry. I was talking about claim 9. I mentioned claim 9e.

A. In claim 9 -- did you say 9e?

Q. I think so. Did I get that wrong? Yeah, maybe I did. Where is -- it's line 13 -- sorry. Line 14 of column 21 of the patent.

A. Okay. "Automatically determining that at least a portion of the sequence mentions a word or phrase in the database of acceptable words." So I've talked about claim 9 in my report.

Q. I mean, before we go to your report, though, I just want to know the question: Does at least a portion of the sequence mean either a portion or the entire sequence?

MR. HYDE: Objection to form.

A. Well, claim 9E requires a determination, so it says, "automatically determining that at least a portion," so claim 9E requires a process of selecting a portion that could be some fraction -- that fraction could be half. It could be three-quarters. It could be the whole thing -- but there is a process by which a portion is determined.

Q. Even if the portion is, as you say, the whole thing?

A. Yeah, there's a process for determining, automatically determining what portion to consider.

Q. And it can be half, it can be three-quarters, it can be the whole thing?

A. For example.

Q. For example. And is that the same with limitation 1[f] where it talks about "At least a first sequence portion of the first candidate sequence"?

A. In limitation 1[f] there is a process of identifying at least a first sequence portion.

Q. And that first sequence portion can be the entire first candidate sequence as a possibility?

A. Well, the important thing is that there is a process of identifying, a process that is identifying or selecting, choosing in some way a portion.

Q. Are you saying it's not important if it's at least a portion or the entire first candidate sequence?

MR. HYDE: Objection to form.

A. No, I'm just emphasizing that part of the claim language is that there is an

identification that happens.

Q. Right, and an identification might be a portion of the first candidate sequence or it might be the entire first candidate sequence?

A. Well, there's a difference between simply saying the whole sequence versus identifying a portion and having that portion be the entire sequence. The important thing about this limitation is that there is an identification and a choice that is made as to what portion of the sequence is selected.

Q. So similar to claim 9, a portion can mean half, three-quarters, or a whole as an example?

MR. HYDE: Objection to form.

A. Again, with claim 9, an important aspect is that there has to be an automatically determining process by which a choice is made of what to determine that portion to be.

Q. But my question was pertaining to claim 1. When you say "at least a first sequence portion," that could be either a portion of the first candidate sequence or the entire first candidate sequence or anywhere in between?

A. Well, again, what is important here is

that there is a process of identifying a portion. As it says, the claim language says, identifying at least a first sequence portion, so a sort of selection process by which identify what portion of the first candidate sequence and that portioning process that can decide to -- makes a decision about what, which portion.

Q. So it can identify the entire first candidate sequence, for example?

MR. HYDE: Objection to form.

A. Well, again, simply using the entire candidate sequence without having a process of identifying a portion of it, it can coerce the key aspect of the claim language which is that there is an identification that happens, a choice that's happening, that as part of the method that there is an identifying at least a first sequence portion.

Q. I said nothing about removing the process for identifying, so, I guess, does it help you if I say, it's possible that the process of identifying a portion will identify the entire first candidate sequence?

MR. HYDE: Objection to form.

A. Well, again, the claim language says,

identifying at least a first sequence portion, and so that doesn't mean that you can simply say the entire thing is a portion, it says you have to go through a step of identifying a portion, and that portion could be some set of the characters or the entire thing. But regardless of what the outcome is of that choice, you went through the process of deciding on a portion and identifying that portion.

Q. You used the word predictive to describe the '428 patent throughout your declaration in different parts. For example, like in paragraph 80, you refer to the '428 patent's ability to generate predictive text. Could you just explain to me what you mean by this?

A. So in paragraph 80 when I'm referring to Arai in comparison to the '428 saying that Arai doesn't have predictive text generation, I'm referring there to some of the examples that we discussed earlier in how the '428 can generate candidate sequences that can include characters that have not yet been written.

So, for example, the '428 Figure 3D, the user has simply entered "Rat," but a candidate character was -- sorry -- a candidate sequence

included "rather" which involves more characters beyond what the user has written, so in this sense it's somewhat predictive.

Q. Does the '428 patent use the term or phrase predict effects?

A. I don't know if it uses specifically that term, but like we also talked about in column 15, when it's talking about addresses starting at line 25, the example of form filling, the recognition engine may remember words that have been entered before. So it doesn't use the predictive there but it sort of remembers and makes a possible guess as to what the user would like to complete, how they would like to complete a form field.

So it says in this example, in order form -- "in an order form the user may enter his work email into an email field and then the recognition engine would predict that the shipping address field would contain his work address." So it contains at least the word "predict."

Q. And Figure 3 also shows the user has some possible candidates that are predictive in nature based off of the input; is that correct?

MR. HYDE: Objection to form.

A. In Figure 3D this is an example of candidates that include letters that have not yet been written.

Q. Does claim 1 include predictive text generation?

A. Again, like we talked about earlier, claim 1 provides many opportunities to use contextual information and it also provides opportunities to use predictive kinds of information like in the candidate sequences, which relates to the sequences we saw on 3D and the discussion in column 15.

Q. But nothing in claim 1 talks about, specifically uses the terms predictive or types generation?

A. Well, claim 1 talks about these candidate sequences, and the spec makes clear that those sequences, those candidate sequences can be predictive or contextual.

Q. So either limitations in claim 1, you have to have a system that does predictive text generation; is that correct?

A. To meet the limitation of claim 1, you don't necessarily need to use contextual or predictive information. However, there are -- you

can, the benefit of the invention is that it enables multiple places where you can use contextual information as well as predictive information.

Q. Looking at claim 3, would you agree that claim 3 is the first time that the phrase second candidate sequence is mentioned in the claims?

A. The second candidate sequence, it could be that claim 3 is the first one that uses that. Claim 2 refers to a second recognized sequence, but not a second candidate sequence. So it's possible that claim 3 is the first claim that refers to second candidate sequence.

Was your question, the first candidate sequence claims?

Q. Yes.

A. Okay. Yeah, I'm not sure about the spec as a whole but claims probably.

Q. So to be clear, the term "second candidate sequence" does not appear in claim 1?

A. I think that the claim term "second candidate sequence" does not appear in claim 1, I think that's true.

Q. And since the second candidate sequence appears for the first time in claim 3, it's not

tied to anything in claim 1, correct?

A. Well, the fact that it's a candidate sequence relates it to candidate sequences, the notion of candidate sequence that appears in claim 1 and also appears throughout the specification.

Q. Right. So it doesn't have to be related to the first candidate sequence in claim 1, correct?

MR. HYDE: Objection to form.

A. What do you mean by related?

Q. It's not -- it's not tied to the first candidate sequence, it's not like related to it in any way, necessarily. It could be, but it's not necessarily related to the first candidate sequence.

A. I'm still not sure what you mean by related.

Q. So as long as it's a candidate sequence that's different than the first candidate sequence in claim 1, that would meet the claim limitation, correct?

MR. HYDE: Objection to form.

A. I'm not sure whether claim 2 requires the second recognition sequence to be different --

sorry -- the second candidate sequence to be different than the first candidate sequence. I don't think I have an opinion on that. But you asked about the relation and I'm not sure what you mean by relation. But they, at least in claim 3, candidate sequence, that term is used in claim 1 and throughout the spec.

Q. So claim 3, as long as it's a candidate sequence based on the first user input, as long as that -- strike that.

Besides the candidate sequence needing to be based on the first user input, is there any other requirements for this candidate sequence?

A. Well, it has to, this notion of candidate sequence is discussed in claim 1, and it is something that was generated, and the first candidate sequence is the best match of one or more recognized sequences.

Again, I don't think I conducted an analysis to determine exactly whether the claim 3, how the -- whether the claim 3, second candidate sequence, has to exactly be specifically different or the same as the first candidate sequence in claim 1. That was, I don't think, a part of my report. But claim 3 does involve the words

"candidate sequence" and the understanding of candidate sequence is informed by the spec, as well as the independent claim from which 3 depends.

Q. So I don't need you to spend time looking right now, unless you have a searchable copy, which I think the exhibit I put up there is searchable if you wanted to search for that phrase. But would it surprise you to know that the term "second candidate sequence" appears nowhere in the specification?

MR. HYDE: Objection to form.

A. Certainly candidate sequences appear many times in the spec. The specific combination of the word "second" and "candidate" and "sequence," indeed searching in this PDF, I feel may appear in claim 3. But nonetheless, that doesn't render them meaningless. The candidate sequence is already discussed in claim 1 and claim 3, it depends on claim 1, candidate sequences are discussed extensively throughout the spec.

Q. And with regard to claim 1, it talks about first candidate sequence, would you agree that first candidate sequence, that term does not

appear anywhere in the specification other than the claims?

MR. HYDE: Objection to form.

A. Well, it could be that the words first candidate sequence don't appear in the spec. I'm just confirming that.

Certainly candidate sequence appears many times in the spec.

Q. And the term "most probable candidate sequence" appears, too, correct?

Sorry. "Most probable." Did I get that right?

Yes. "Most probable candidate sequence" appears once. Do you see that?

A. Column 6, line 6, "most probable candidate sequence."

Q. Would you consider that to be the first candidate sequence in the claims?

MR. HYDE: Objection to form.

A. I'm not sure whether -- about that particular part. It says in claim 1, "generating a first candidate sequence wherein the first candidate sequence is the best match of one or more recognized sequences."

Q. We can move on to claim 9. We haven't

talked enough about claim 9 yet.

Turn to, let's see, paragraph 175 of your declaration.

A. Okay.

Q. You say that the limitation 9[c] parallels limitation 1[d]. Do you see that?

A. Yes.

Q. How would you say that these two claim limitations parallel each other?

A. Well, like I say in the previous paragraph, claim 9 is the system version of the method claim 1, and so some of the system elements in claim 9 correlate or parallel with limitations from claim 1.

Q. So when you say parallel, do you mean they mean the same thing or are they just similar?

A. Well, claim 1 is a method claim and claim 9 is a system claim, and so claim 9 talks about a non-transitory computer readable storage medium storing instructions, and so it refers -- it's describing that system. And in the description of the system it talks about those instructions performing different, different elements, and some of them are referred to performing things that are analogous to the

elements.

Q. So how is 9[c], limitation 9[c], analogous to limitation 1[d]?

(Off the record 5:33 p.m.)

(Internet issues.)

(Resumed 5:36 p.m.)

BY MR. CLARK:

Q. I don't know if you responded at all or if I asked my question before or after you dropped off.

I asked: How would the limitation 9[c] be analogous to limitation 1[d]?

MR. CLARK: The witness froze.

(Internet issue 5:37 p.m.)

(Resumed 5:38 p.m.)

MR. CLARK: And he's back.

BY MR. CLARK:

Q. I asked the question: How would the limitation 9[c] be analogous to limitation 1[d]?

A. Okay. You said 9[c] and 1[d]?

Q. Yes.

A. So I talk about this in my paragraph 175. 9[c] is determining the first sequence based on the best match of a person's second inputs, whereas the first sequence includes at least the

first input, and this parallels generating a first candidate sequence.

So 9[c] -- so just to make sure, 9[c] is determining a first sequence. So in 9[c] is sequences consider the user inputs and are then based on a best match which is like is discussed in 1[d] where the first candidate sequence is the best match of one or more recognized sequences which came from user inputs.

Q. So the language "determining a first sequence," does that parallel the language in 1[d] of generating a first candidate sequence?

A. Yes. As I say in paragraph 75, 9[c] determining a first sequence parallels 1[d] generating a first candidate sequence.

Q. So since 9[c] is the system version of claim 1, is it safe to say that generating can also mean determining and vice versa?

MR. HYDE: Objection to form.

A. Well, generating there, these words were used specifically in their different -- in the different claims. So claim 1[d] refers to generating a first candidate sequence, and in 9[c] determining a first sequence, the process of it's referring to an analogous process. The

determination in 9[c] is this analogous process as the generation of the candidate sequences in 1[c].

Q. In paragraph 178 of your declaration you state that the limitation 9[f] parallels both limitations 1[g] and 1[h]; is that correct?

A. In paragraph 178, yes, limitation 9[f] limitation 9[f] parallels 9[g] and 9[h].

9[f] refers to sending the first sequence to an application, and so on and so forth. And 1[g] and [h] refer to removing the first sequence portion ... sending first sequence portion.

Q. In the last sentence of paragraph 178 you say, "but as with limitations 1[g] and 1[h] in claim 1 discussed above, Aria failed to disclose limitation 9[f]." Did I read that correctly?

A. And as petitioners did with limitations 1[g] and 1[h] in claim 1, petitioners rely on the combination of Aria and Fenwick to disclose or suggest limitation 9[f].

Q. No, that wasn't the sentence I read. I was reading the last sentence that starts with the word "but."

I said, "But as with limitations 1[g] and 1[h] of claim 1 discussed above, Arai failed

to disclose or suggest limitation 9f." Did I read that correctly?

A. Yes, I think so.

Q. You say "discussed" above, so did you discuss 1[h] above?

A. Yeah, I discuss 1[h].

Q. Where do you discuss 1[h] above?

A. I discuss 1[h] -- let me get to it.

Q. You mention 1[h] in paragraph 161, maybe that's what you're referring to, but I'm not sure, so that's why I thought I'd ask.

A. So in paragraph 90, "As discussed further below, petitioners rely on the wrong disclosure in Arai for limitations 1[d] and 1[e]. Moreover, Arai does not disclose or suggest limitation 1[f] and Arai and Fenwick did not disclose or suggest limitations 1[g] and 1[h]."

Q. That's not discussion of 1[h], that just makes -- that's just making a statement of disclosure about suggesting a limitation about Arai -- strike all that.

Is that the entirety of your discussion of 1[h]?

A. Well, 1[h] says, "Sending the first sequence portion to an application running on a

mobile device," and so 1[h] involves a first sequence portion, and that's what I discuss in 1[f]. Arai does not disclose identifying a first sequence portion so, therefore, Arai does not disclose limitations 1[g] and 1[h].

Q. Right. But in paragraph 178 you said you discussed 1[h] above, and I'm trying to figure out where you discuss 1[h]. You discussed it in paragraph 90?

A. Paragraph 90.

Q. That's the only place you discussed it?

A. Well, 1[h] involves sending, quote, sending a sequence portion to an application running on a mobile device and involves a first sequence portion, and I talk extensively about the first sequence portion in the intervening pages. And so my opinion is that Arai in view of Fenwick does not disclose or suggest limitations 1[g] and 1[h], as I say in my paragraph 90.

Q. Any other discussion of 1[h]?

A. With regard to 1[h], that's really inherent to my discussion of 1[f]. And all of the many paragraphs that I devote to Arai's lack of disclosure with 1[f] and the lack of disclosure 1[f] in the combination of Arai and Fenwick.

Q. So nothing in limitation 1[h] requires that the sending be automatic, correct?

MR. HYDE: Objection to form.

A. Well, 1[h] says, "sending the first sequence portion to an application running on a mobile device," and there is certainly discussions in the spec about that being sent to the mobile device, and there's a big -- we see examples also with the flow diagram in Figure 2 sending committal art to the application.

Q. But the claim 1, claim 1, limitation 1[h] doesn't require that sending be automatic, correct?

MR. HYDE: Objection to form.

A. Well, the claim 1[h] discusses sending the first sequence portion to an application. The word automatic doesn't appear in that sentence, but nonetheless, the spec gives examples where the application, the first sequence portion is sent to an application such as, for example, in Figure 2.

Q. So if you had to manually send something, you would not need to limit this limitation then; is that what you're saying?

MR. HYDE: Objection to form.

A. The claim also doesn't, since it doesn't

explicitly include the word automatic, it doesn't necessarily require that the sending be done automatically.

MR. CLARK: Take a break?

MR. HYDE: Sure.

(Off the record 5:49 p.m.)

(Resumed 6:00 p.m.)

BY MR. CLARK:

Q. Dr. Koskinen, if you'd turn to paragraph 106 in your declaration.

You state in there that the petition confuses a candidate character with a candidate sequence in Arai. Do you see that?

A. Yes.

Q. And you bold and italicize the words "character" and "sequence" to highlight the petitioner confuses those two words, correct?

A. Yes.

Q. What distinctions are you trying to make between character and sequence in Arai?

A. So in this section of my report I'm discussing the petitioner's reliance on 1[b] and reliance on Arai's valuation values for 1[b].

Q. Is that 1[b]?

A. Yes. And then again relying on Arai's

valuation values for 1[d]. And as I then discussed in my paragraph 105, Arai only does processing on the combined character string in the post-processing step which happens later. And so with regard to paragraph 106, discussing that no processing on multiple characters has happened yet in the valuation values that the petition points to for 1[d].

Q. But a single character can be considered a sequence, right?

MR. HYDE: Objection to form.

A. Again, there's an important distinction between characters and sequences. And in particular also how characters and sequences are used in the '428. But generally individual characters are different, there's a different concept than sequence of characters.

Q. Yes, but a sequence can be made up of characters but characters cannot be made up of sequences, would that be a correct statement?

MR. HYDE: Objection to form.

A. Well, the sequence refers to a collection of characters that are in an order and so the elements of that collection are characters, but the sequence is not a character.

Q. And so where does it talk about character?

A. So referring to claim 1, it discusses receiving user input and having sequences, first recognized sequence, and those sequences consisting of or can consist of characters.

Q. It says that?

A. It doesn't necessarily say the word "character," but the sequences, as we can see in the various examples like we talked about earlier in Figure 3D, for example, candidate sequences.

Q. And Figure 3B as well, the letter "R", that's a character but it's also a sequence?

MR. HYDE: Objection to form.

A. In Figure 3B, again, they are sequences that consist of, possibly consist of a single character, but that's not merely a character, it's a sequence. It also in Figure 3B has sequences of multiple characters.

Q. So letter "R" is a sequence that consists of the character "R"?

A. Are you referring to Figure 3B?

Q. Yes.

A. So in Figure 3B, there are 320 described -- input candidate display described in

the column 6 around lines 55 to 65. So, again, character sequences 322 -- just flipping back -- and 307, as we talked about earlier at the top of column 6, being the best match or most probable candidate sequence.

So these are sequences, and in some cases the sequence consists or -- sequence consists of a collection of elements in an order, and it could be that in a particular sequence there's one element but that's different from a character.

Q. And so in paragraph 106 of your declaration, you're saying that the Japanese characters A1 and B1 are characters, candidate characters, not candidate sequences; is that correct?

MR. HYDE: Objection to form.

A. Well, those are, at least now if we're talking about Arai, those are individual characters that are in the Arai method given their own evaluation values individually.

Q. That means they can't be a sequence?

MR. HYDE: Object to the form.

A. Well, in Arai the evaluation values are given to them individually and they're not, at

that evaluation value phase are, not processed as a sequence. The only time that processing of the sequence of character happens is in the post-processing step that takes the entire word and performs processing on that full sequence.

Q. But didn't you previously say that you weren't disputing that Arai shows the first recognized -- determining a first recognized sequence in limitation 1[b]?

MR. HYDE: Objection to form.

A. Well, I wasn't disputing what the examiner points to, but I focus my analysis on other aspects of other limitations, other limitations such as 1[f], that are really not disclosed by Arai.

Q. So you're saying now that you do dispute but you didn't put it in your report, or your declaration, that 1[b] shows that these Japanese characters are recognized sequences?

MR. HYDE: Objection to form.

A. I don't think that I said that. I earlier said that I didn't dispute it. But it sounds like you're referring to a specific question about 1[b], so I'm not sure that this discussion is clear at the moment.

Q. So earlier today -- I mean, I'd have to look back at the transcript to be sure, and I know that Mr. Hyde will say, mischaracterizes the testimony here. But my recollection is that earlier today we were talking about limitations 1[a] and 1[b] and you said you didn't dispute those, and 1[b] is the determining of a first recognized sequence. And here you're saying that the Japanese character, in paragraph 106 of your declaration, you're saying that the Japanese characters A1 and B1 are not sequences, they're characters, so I'm just wondering why didn't you dispute that for limitation 1[b].

MR. HYDE: Objection to form.

A. I just -- I don't think I went into that in my report. I focused my opinions on 1[f] and the others. Also, to some degree 1[b] being the wrong pointed to pointing to the wrong disclosure.

Q. What do you mean "pointing to the wrong disclosure"?

A. I think I described, as I talk about in my report, the petitioner points to the evaluation values, characters of the valuation values of being 1[b] generating a first candidate sequence, and I describe that that's not -- that is not a

disclosure in Arai of a first candidate sequence.

Q. I misunderstood you. I thought you meant we pointed to the wrong disclosure for 1[b] for the first recognized sequence but you're saying we didn't. You're not saying that?

MR. HYDE: Objection to form.

A. I'm saying that the -- I can point you to where I say that in my report.

So this is the section would be in the 42, "Petitioners identify the wrong disclosure Arai for limitations 1[d] and 1[e]." Paragraph 91.

Q. Okay. But the petitioners -- but you don't have a problem with what the petitioners identify in Arai for limitation 1[b], correct?

A. I think for 1[b] that's just not something that I had disputed in my report.

Q. So in paragraph 106 the only support you have listed here for petition confusing character and sequences, you cite to Arai, paragraph 142, as saying candidate characters in quotes. Do you see that?

A. I see where that's saying that. I just also want to point out that this paragraph comes in the context of the preceding and subsequent

paragraphs. So you mentioned like a lack of support, but this is really in the context of all of the section that begins on page 45.

Q. Okay. But you realize that Arai doesn't use the term -- it uses -- it doesn't use the term sequences the way the '428 patent does, it uses the word characters instead. Did you notice that or did you agree with that?

A. You're referring to specifically Arai 142?

Q. Yes, with 142. And also in Arai it doesn't talk about candidate sequences ever, it just talks about candidate characters.

A. Well, Arai talks about candidate characters, but then also talks about the combination of characters when it discusses chain probabilities.

So, for example, Arai 146, they talk about character strings. In this case the first processing unit chain probabilities for the character strings combining these candidates were calculated using a dictionary for post-processing, and then it talks about the combinations and the candidate character string.

Q. Would you consider character string to

be a sequence?

MR. HYDE: Objection to form.

A. So a character string, again, depends on -- we're not talking specifically about the sequences that are discussed in specific claims, but strings, character strings usually refer to sequences of characters.

(Certified Translation of Japanese Patent JP2006323502A marked as Koskinen Exhibit 5, as of this date.)

MR. CLARK: And since we've been talking about Arai, I introduced Exhibit 5, the Arai reference so that the transcript will read clearly for the paragraphs you cite to that exhibit.

Q. So let's talk about the difference between characters and sequences.

In paragraph 104 you talk about generating candidate sequence by saying it's a combination of characters. So clearly there's a relationship between characters and sequence that you don't recognize as well. And can you explain to me a little bit more what that relationship is.

MR. HYDE: Objection to form.

A. Well, again, I'm not referring to

specific occurrences of the word sequences or characters. But broadly speaking, a sequence of characters is a collection of characters that also have an ordering between them, and each element of that collection is a character, and so that concept of a sequence is different from the concept of a character.

MR. CLARK: That's all I have. I guess I'll turn the witness over to you, Mr. Hyde.

MR. HYDE: Thanks. I may or may not have a couple questions. Can we take a five-minute break and I'll flush out to see whether I want to ask these or need to ask anything else?

MR. CLARK: Absolutely.

MR. HYDE: Give me five minutes.

(Off the record 6:21 p.m.)

(Resumed 6:24 p.m.)

MR. CLARK: Thank you, Dr. Koskinen. I appreciate your time today.

Do you want to talk about classification? I'm assuming this is -- is this classified?

MR. HYDE: Confidential? Sure, if

there is anything confidential in here.

MR. CLARK: Actually, you're right, I think everything was on the public record, right?

MR. HYDE: I think we're -- I'll go back and we'll send an email if that's the case, but I don't think we have anything confidential here discussed today and we have no exhibits.

With that, nothing from me, and I appreciate your time.

Thanks, Josephine.

Good to see you again, Doug.

Thank you, Dr. Koskinen. Everyone have a good day.

(Off the record.)

(Deposition adjourned 6:25 p.m.)

C E R T I F I C A T E

I, JOSEPHINE H. FASSETT, a Registered Professional Reporter, Certified Court Reporter, and Notary Public of the states of New York and New Jersey, do hereby certify that the witness, whose stenographically recorded deposition is hereinbefore set forth, was first duly sworn by me on the date indicated, and that the foregoing stenographically recorded deposition is a true and accurate record of the testimony given by such witness.

I FURTHER CERTIFY that I am not employed by nor related to any of the parties to this action by blood or marriage, and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have subscribed my hand this 11th day of July 2025.



_____

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July 11, 2025

RE: Samsung Electronics Co v. Cerence Operating Company

7/9/2025, Eric Koskinen , Ph.D., (#7471104).

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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