1075

```
 1                   IN THE UNITED STATES DISTRICT COURT
                     FOR THE EASTERN DISTRICT OF VIRGINIA
 2                             Norfolk Division

 3

 4   - - - - - - - - - - - - - - - - - - -
                                          )
 5     I/P ENGINE, INC.,                   )
                                          )
 6             Plaintiff                   )
                                          )
 7     v.                                  )
                                          )   CIVIL ACTION NO.
 8     AOL, INC., GOOGLE INC., IAC         )   2:11cv512
       SEARCH & MEDIA, INC., GANNETT       )
 9     CO., INC., and TARGET               )
       CORPORATION,                        )
10                                         )
               Defendants.                 )
11   - - - - - - - - - - - - - - - - - - -

12

                       TRANSCRIPT OF TRIAL PROCEEDINGS
13
                                    DAY 7
14
                            (Afternoon session)
15
                             Norfolk, Virginia
16
                             October 24, 2012
17

18
     BEFORE:   THE HONORABLE RAYMOND A. JACKSON, and a jury
19             United States District Judge

20

21

22

23

24

25
```

1076

```
 1   APPEARANCES:

 2           CRENSHAW, WARE & MARTIN PLC
             By:  Donald C. Schultz
 3                W. Ryan Snow
                  Counsel for the United States
 4                   AND
             DICKSTEIN SHAPIRO LLP
 5           By:  Jeffrey K. Sherwood
                  Frank C. Cimino, Jr
 6                Kenneth W. Brothers
                  Leslie Jacobs, Jr.
 7                Dawn Rudenko Albert
                  Counsel for the Plaintiff

 8

 9           KAUFMAN & CANOLES, P.C.
             By:  Stephen Edward Noona
10                   AND
             QUINN EMANUEL URQUHART & SULLIVAN LLP
11           By:  David Bilsker
                  David Perlson
12                Robert Wilson
                  David Nelson
13                Counsel for the Defendants

14

15

16

17

18

19

20

21

22

23

24

25
```

JODY A. STEWART, Official Court Reporter

```
 1                            I N D E X

 2   PLAINTIFF'S
     WITNESSES                                          PAGE
 3
       NONE
 4

 5

     DEFENDANT'S
 6   WITNESSES                                          PAGE

 7    JONATHAN ALFERNESS
           Cross-Examination (Cont'd) By Mr. Sherwood   1079
 8    BARTHOLOMEW FURROW
           Direct Examination By Mr. Nelson             1083
 9         Cross-Examination By Mr. Cimino              1118
           Redirect Examination By Mr. Nelson           1136
10    LYLE UNGAR
           Direct Examination By Mr. Sherwood           1140
11

12

13
                           E X H I B I T S
14
     PLAINTIFF'S
15   NO.            DESCRIPTION                          PAGE

16     NONE

17
     DEFENDANT'S
18   NO.            DESCRIPTION                          PAGE

19     NONE

20

21

22

23

24

25
```

JODY A. STEWART, Official Court Reporter

```
 1                          AFTERNOON SESSION

 2              (Hearing commenced at 2:31 p.m.)

 3              THE COURT:  Just a housekeeping detail.  I don't

 4   want any counsel approaching my courtroom deputy about what

 5   goes in the Court's minutes.  The Court controls the minutes.

 6   What's in there will be what this judge tells her to put in

 7   there.  She's not altering any minutes, no matter what issues

 8   you have.

 9              Second point, we have a rule on bringing in iPhones,

10   cellphones, all kinds of technology.  I don't know who did it

11   but someone has issued telephone numbers from my chambers and

12   my courtroom deputy and put those numbers out there so we can

13   all -- got all kinds of phone calls.  I trust it didn't come

14   out of this courtroom.

15              So I don't know where it came from, but it caused a

16   little problem yesterday with the whole world calling in to

17   our internal number.  So that is all I'll say about that.

18   Bring in the jury.

19              (Jury in at 2:32 p.m.)

20              THE COURT:  You may be seated.  Let the record

21   reflect that all jurors are present in the courtroom.  Does

22   counsel agree?

23              MR. SHERWOOD:  Yes, Your Honor.

24              MR. BILSKER:  Yes, Your Honor.

25              THE COURT:  If you go on and wrap it up,
```

Alferness, J. - Cross (cont'd)   1079

```
 1   Mr. Sherwood.
 2            MR. SHERWOOD:   Thank you, Your Honor.
 3                    CROSS-EXAMINATION
 4   BY MR. SHERWOOD:
 5   Q.  Mr. Alferness, before the lunch break I was asking you a
 6   few questions about quality score.   Do you remember that?
 7   A.  I do, yes.
 8   Q.  And I think you testified that quality score, in your
 9   view, is kind of an overloaded term?
10   A.  It's a broad term, that's correct.
11   Q.  And isn't the reason for that because quality score asks
12   for the first more than one thing?
13   A.  Quality score is used in different ways depending on the
14   subject or the context.
15   Q.  Right.  And you testified in direct that you and Google
16   take claims of patent infringement very seriously, right?
17   A.  Yes.
18   Q.  And you know what's been accused in this case; is that
19   right?
20   A.  To some extent, yes.
21   Q.  And so quality score one to ten, the front end, that's
22   not accused, is it?
23   A.  I don't believe so, no.
24   Q.  But quality score one, which is QBB pCTR, that is
25   accused, isn't it?
```

Alferness, J. - Cross (cont'd)   1080

1   A.   I guess, yes.

2   Q.   That's your understanding, isn't it?

3   A.   Yes.

4   Q.   And quality score two, which is the determination of the

5   eligibility of an ad to participate in the auction, that is

6   accused also, isn't it?

7   A.   Quality score two is predicted click-through rate.

8   Q.   Right. And that's an accused function or product, isn't

9   it?

10 A.   I believe it's the disabling and the promotion

11 specifically that are accused.

12 Q.   Okay. So during your direct testimony, you talked about

13 PX-176. That's in your binder. Can you pull that up?

14 A.   I have that here.

15 Q.   Great. In the -- let me direct your attention about a

16 third of the way down the page, you'll see that there is a

17 heading that says, "Question number 2."

18 A.   I see that, yes.

19 Q.   And the question is, "What is the quality score?"

20 A.   I see that, as well.

21 Q.   Right. And the answer is, "Quality score is simply a new

22 name for the predicted CTR, which is determined based on the

23 CTR of your keyword, the relevance of your ad text, the

24 historical keyword performance and other relevancy factors."

25 Do you see that?

Alferness, J. - Cross (cont'd)   1081

1   A.   I see that.

2   Q.   And to the best of your understanding, that is a true

3   statement, isn't it?

4   A.   No.

5   Q.   It is not a true statement?

6   A.   No.

7   Q.   Let me direct your attention to the date that appears up

8   towards the top of the page, Monday, July 18, 2005. Do you

9   see that?

10 A.   I do.

11 Q.   And your testimony is that this statement that I just

12 read to you, as of July 18, 2005, was an incorrect statement?

13 A.   This is a document, a blog aimed at our external

14 customers or advertisers. We are trying to explain things to

15 our advertisers in a way such that they understand how to

16 operate within the system. We are talking about tens if not

17 hundreds of thousands of advertisers, lay people here. We

18 are not prescribing in technical detail how the system works.

19 Q.   Mr. Cole, could you highlight the heading up at the very

20 top there where it says, "Official blog."

21   Is this document PX-176 a document created at Google?

22 A.   I would assume so, yes.

23 Q.   Is it, in fact, Google's official blog with respect to

24 how AdWords works?

25 A.   No. This is our blog that talks to our advertisers, our

Alferness, J. - Cross (cont'd)   1082

1   customers, so that they can understand at a high level in

2   some abstraction how the system works so that they can

3   perform well within that system.

4   Q. Mr. Alferness, please look at the top of the document

5   PX-176. Does it say Google's official blog or not?

6   A. The document says Google's official blog. It is not,

7   however, a technical prescription for how the product works.

8   Q. Please try to confine yourself to answering my question.

9   I did not ask you about that. I asked you if it was an

10   official blog. Is it the official blog, sir?

11   MR. BILSKER: Objection, asked and answered.

12   THE COURT: Move to the next question.

13   BY MR. SHERWOOD:

14   Q. Let me ask you to look at PX-357, please. Do you have

15   that in the binder?

16   A. I do not.

17   Q. Oh, you don't. Okay. All right. I'll move on.

18   Mr. Alferness, in your testimony earlier you said

19   that you reviewed Government filings to Google files with

20   respect to its advertising operation; is that right?

21   MR. BILSKER: Beyond the scope of direct. We didn't

22   go into that at all.

23   THE COURT: Mr. Sherwood, confine your questions to

24   the direct. Was that in your direct?

25   MR. SHERWOOD: Your Honor, I thought it was, but I

Furrow, B. - Direct   1083

```
 1   don't see it, so I won't pursue it.  I have no further

 2   questions at this time, Your Honor.

 3           THE COURT:  Any redirect?

 4           MR. BILSKER:  No, Your Honor.

 5           THE COURT:  All right.  Step down.  May the witness

 6   be permanently excused, counsel?

 7           MR. SHERWOOD:  Yes, Your Honor.

 8           MR. BILSKER:  Yes.

 9           THE COURT:  You may be permanently excused, sir.

10           THE WITNESS:  Thank you, sir.

11           (Witness excused.)

12           THE COURT:  Your next witness.

13           MR. NELSON:  Thank you, Your Honor.  Google calls

14   Bartholomew Furrow to the stand.

15           THE COURT:  All right.

16           (Witness was sworn.)

17           MR. NELSON:  May I proceed, Your Honor?

18           THE COURT:  You may.

19            BARTHOLOMEW FURROW, called by the defendant, having

20   been first duly sworn, was examined and testified as follows:

21                     DIRECT EXAMINATION

22   BY MR. NELSON:

23   Q.  Good afternoon, Mr. Furrow.

24   A.  Good afternoon.

25   Q.  Can you please state your full name for the record.
```

Furrow, B. - Direct   1084

```
 1   A.   Bartholomew David Furrow.
 2   Q.   Tell us where you live, please.
 3   A.   I live in Mountain View, California.
 4   Q.   Are you married?
 5   A.   I am.
 6   Q.   Do you have any kids?
 7   A.   I am seven months closer to having one than I was.  My
 8   wife is seven months' pregnant.
 9   Q.   Well, congratulations.
10   A.   Thank you.
11   Q.   So where do you work presently?
12   A.   I work at Google.
13   Q.   How long have you been at Google?
14   A.   A little bit over six years now.
15   Q.   So can you tell us what your current title is at Google?
16   A.   I'm a staff software engineer.
17   Q.   Now, do you have engineering teams or something like that
18   at Google?
19   A.   I guess you could say that, sure.
20   Q.   Okay.  Are you on any particular engineering team in your
21   current position?
22   A.   Yes.  So the broadest team that I'm part of is the ads
23   team, and within that I'm part of the ads quality team.
24   Q.   Can you just generally explain to us what the ad quality
25   team is?
```

Furrow, B. - Direct   1085

1   A.   Sure.   So we are responsible for essentially for the ads

2   on Google.com.   If you do a search on Google.com, sometimes

3   you'll see ads right over, sometimes below the search

4   results.   And we are responsible for sort of making sure that

5   those are the best ads that they can be by some sort of

6   definition of best.   We try to make them as good as possible.

7   Q.   Okay.   In your current position, is there any portion of

8   ads quality that you work on right now?

9   A.   Yes.   So I'm currently part of the ads thresholds team.

10   Q.   And can you just tell us generally what that is?

11   A.   Sure.   So when you do a search on Google, you don't

12   always get the maximum possible number of ads.   You sometimes

13   get fewer ads than that, and it is not just because there

14   aren't any ads in our system that we could show, but it's

15   because the ads that we -- we essentially have standards.   We

16   don't want to show an ad to a user that is not going to give

17   a good user experience, that sort of has nothing to do with

18   the query.   Even if the advertiser wants to show it on that

19   query, we probably don't want to.

20   Q.   Okay.   So have you had any other responsibilities during

21   your time at Google on ad quality?

22   A.   Yes, I have.

23   Q.   And can you tell us what those have been?

24   A.   Before I went to the thresholds team, about a year ago, I

25   worked on the SmartAds team for the five years prior to that.

Furrow, B. - Direct   1086

```
 1   Q.  Okay.  And, generally speaking, what did you do on the
 2   SmartAds team?
 3   A.  Well, as a software engineer, my -- the main parts of my
 4   job mostly had to do with writing code and computer source
 5   code and reading the code that other people had written to
 6   review it.  I would also sometimes run what are called live
 7   experiments to test out new SmartAds models and that sort of
 8   thing.
 9   Q.  So by experiments can you tell us what you mean by that?
10   A.  Sure.  So when people go to the Google website, they --
11   sometimes they have a good experience, sometimes they have a
12   bad experience, and we want to try to figure out what gives
13   them a good experience or a bad experience.  So a really
14   simple example of an experiment would be we'll try showing 10
15   percent of our users 5 percent more ads or 5 percent less
16   ads.
17           And then we will say, okay, does that make those
18   users happier or more unhappy?  What does it do to their
19   clicks on ads or clicks on other things?  So that is what a
20   live experiment is like.  And at any given time we are
21   running into quite a few live experiments.
22   Q.  So we will talk about SmartAds a little bit more later,
23   but let me switch to your background.  Can you tell us a
24   little bit about your background?  Let's start after high
25   school.
```

Furrow, B. - Direct   1087

1   A.   Sure.   So after high school I went to Queen's University,

2   which is a university in Ontario, Canada, and I got a

3   Bachelor of science there with a concentration in physics.

4   Q.   So what year was that?

5   A.   From 2000 to 2004, so I graduated 2004.

6   Q.   Okay.   Any other degrees you have past that?

7   A.   Yes.   After graduating from there I went to the

8   University of British, Columbia in British Columbia, Canada,

9   and I got a Master's of science with a focus in physics.

10   Q.   And what year was that?

11   A.   2006 I got the degree.

12   Q.   All right.   So what did you do, then, after you got your

13   master's degree?

14   A.   After I got the Master's, I came and worked for Google.

15   Q.   So how did you get interested in working for Google?

16   A.   So as I mentioned, I was a physics major in the

17   university, and I was sort of entrusted in computer science

18   but didn't really see myself in a career with it.   Back then

19   I was involved in programming contests, which are these

20   contests where you have a limited amount of time to solve as

21   many problems as you can.

22   And that really grabbed me because I'm kind of a

23   competitive guy.   So I got involved with those, got involved

24   with the team, and then I competed in a contest called the

25   Google Code Jam run by Google, and I did well enough on that

Furrow, B. - Direct   1088

```
 1   to where I went to the headquarters for the finals, and
 2   thought, oh, this is a pretty cool place.  Maybe I could get
 3   a summer job here.  So I got a summer job, got another summer
 4   job, and then started full time.
 5   Q.  Okay.  So when did you start full time again?
 6   A.  That was 2006, around when I graduated.
 7   Q.  So what was your first position once you started full
 8   time with Google?
 9   A.  My first position, I was a Software Engineer II, and I
10   was working on the SmartAds team.
11   Q.  Did you have another position after that?
12   A.  I had the position of Software Engineer III.
13   Q.  When did you make that transition?
14   A.  About a year after I joined the company, so it would be
15   around 2007, maybe 2008.
16   Q.  Okay.  Any other positions since you've been at Google?
17   A.  After Software Engineer III, I got promoted to senior
18   software engineer, and then from there to my current position
19   of staff software engineer.
20   Q.  So, generally speaking, in your changing positions did
21   the responsibilities you prescribed for us earlier change?
22   A.  The particular things that I was doing as time went by
23   sort of gradually changed from one thing to another.  As I
24   gained in a rank -- rank at Google, it isn't like you get
25   promoted to Software Engineer III and they say, okay, now
```

Furrow, B. - Direct   1089

1 here is your new job. You are working on this new thing.

2   It is kind of, well, you've been doing your job

3 really well, and we think that you've been taking on a lot of

4 responsibilities, so now we will call you a Software Engineer

5 III. And now you've been doing an even better job in taking

6 on the broader responsibilities, so now you are a Senior

7 Software Engineer.

8   That is sort of the way the promotion system works

9 there. So it's not like I've had sudden shifts in

10 responsibilities but gradually taking on bigger tasks and

11 more responsibilities overall.

12 Q. So earlier your mentioned one of your responsibilities at

13 least was writing source code, right?

14 A. That's correct, yes.

15 Q. About how much time do you spend on that?

16 A. I would say -- actually, vary a lot over the time that

17 I've been at Google. I would say any given time between 30

18 and 80 percent of my time would be spent writing source code

19 depending on -- I don't know if I've been really coded heavy

20 time or not.

21 Q. So are there any particular systems at Google for which

22 you've written source code?

23 A. Sure. So we have talked about two of them, the ads

24 thresholds team and the SmartAds team.

25 Q. Okay. So let's talk about AdWord for a little bit. Can

Furrow, B. - Direct   1090

1 you tell us generally what AdWords is?

2 A. AdWords is the system responsible for showing ads on

3 Google.

4 Q. And how is it generally that Google gets the ads that it

5 shows?

6 A. The ads themselves are entered by the advertisers. So

7 advertisers can come on to a Google website called the -- I

8 guess -- I don't know what it is called externally. Inside

9 we call it the AdWords front end, because we like catchy

10 names like that, I guess. And so they go to that website and

11 they enter their ad that they'd like to show onto the site.

12 Q. Okay. And is there anything else that advertisers enter

13 besides the ad when they are in this front end you mentioned?

14 A. Yes. So they enter the advertisement. They also

15 enter -- so when the advertisement gets shown then, if the

16 user clicks on it, that's got to go somewhere. So they enter

17 the -- what the webpage that the user would go to. They

18 enter, it is called a keyword or a series of keywords and a

19 bit.

20 Q. Okay. So let's -- you explained what a URL is. Can you

21 tell us what a keyword is?

22 A. Yes. So a keyword is essentially the -- very generally

23 speaking, it is the thing that they are selling. So to give

24 you an example, my father-in-law is -- he runs a volleyball

25 equipment business in Canada. When he advertises on Google,

Furrow, B. - Direct   1091

1   his keywords would be things like volleyball, volleyball

2   nets, the things that he sells.

3   So what he is sort of thinking is if someone is

4   searching for volleyball net, then I want my ad to show up.

5   And so that is sort of a loose connection between that and

6   the keywords that he enters.

7   Q.   Okay. Other thing you mentioned was a bit. Can you tell

8   us what that means?

9   A.   So advertisers, when they want to show an ad on Google,

10 they have to pay a certain amount if the ad gets clicked on.

11 So my father-in-law, for example, might say, well, if I get a

12 click on my ad for volleyball nets, then I'll pay $.10. And

13 so that is where the -- that $.10 and that gives them a good

14 bid.

15 Q.   So let's walk through at a high level of these -- the

16 process of serving ads, okay. We have some -- you have a

17 demonstrative or something that can help you?

18 A.   Yeah. I prepared a big slide a couple of nights ago.

19 Okay. Here we go. All right.

20 Q.   Is this it?

21 A.   This is it.

22 Q.   So let's start, why don't you tell us what system's

23 responsible for creating the webpage that's sent to the user

24 when they enter a query on Google.com.

25 A.   One of the first servers, if you go to Google.com, you

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1092

```
 1   type in your query and you hit enter.  Then the first major
 2   server it hits is this, what I have marked as GWS.  We call
 3   it gwis (ph.).  It is the Google web server, and that is a
 4   system responsible for making the webpage.
 5   Q.  So then how is it that the Google web server requests the
 6   ad that it might show?
 7   A.  There is a machine called the AdMixer, which is the next
 8   box over, and the AdMixer is responsible for -- it is sort of
 9   the nerve center of the ad server operation.  So the Google
10   web server or GWS sends a message to the AdMixer called an ad
11   request, and says, hey, AdMixer, the user just gave me a
12   query.  Here is the query.  Here is some other stuff about
13   it.  Please give me some ads.
14   Q.  So can you just tell us at a high level, then, what the
15   AdMixer is?
16   A.  The AdMixer is basically the nerve center of the ad
17   serving operation.  It turns out we need to use a lot of
18   machines because there are a lot of ads that we might
19   consider showing, and they won't all fit on one computer.  So
20   there are many, many, many computers involved in the serving
21   of ads and many systems.  But the AdMixer is kind of the
22   brains of it.  It's the thing that says, okay, you go and get
23   me some ads and that sort of thing.
24   Q.  Okay.  So you mentioned the user enters a query and that
25   goes to the, I think you called it the GWS; is that right?
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1093

```
 1   A.   The GWS, yes.
 2   Q.   So what happens to the query from there?
 3   A.   Okay.  So after the query goes to GWS, GWS sends an ad
 4   request to the AdMixer -- you want me to go to the next step?
 5   Q.   So when the AdMixer has it, what does the AdMixer do with
 6   it?
 7   A.   So the AdMixer -- so I should clarify.  I have written
 8   notes sort of six or seven steps here.  There is an awful lot
 9   in ad serving, and the steps have steps, and the steps that
10   have steps have steps.  I mean, it is a -- there is a lot
11   going on, and I have sort of highlighted some of the major
12   pieces.  The first really big thing that happens is there's
13   an extra server off to the side called the QRewrite server.
14   That is for query rewrite.  It is responsible for coming up
15   with keywords based on the query.
16   Q.   So can you just describe to us generally what that
17   process is?
18   A.   Sure.  So the first step of the process is the AdMixer
19   says, hey, QRewrite server, here is my query.  Give me some
20   keywords.  That is pretty straightforward.  But then the
21   server itself tries a bunch of things.  So I think an example
22   I gave earlier is if you use a query for volleyball nets, one
23   reasonable keyword that an advertiser might have entered
24   might be volleyball.
25            So if an advertiser is advertising on volleyball,
```

Furrow, B. - Direct   1094

```
 1   then a query for volleyball nets, maybe that person would

 2   want to see the ad from that advertiser.  So we come up with

 3   that as a possible keyword.

 4            Another keyword might be nets.  Another keyword

 5   might be volleyball net.  So as my father-in-law is entering

 6   keywords onto this Google web site, the AdWords front end, he

 7   is entering a bunch of keywords and saying, gosh, what might

 8   people search for that might interest them in my website?  He

 9   is going to think of lots of things, but if he thinks of

10   volleyball nets and not volleyball net -- it is kind of

11   obvious that somebody is searching for volleyball net still

12   wants to go to that website.  So the QRewrite server does

13   things like cutting off plurals.  It said net instead of

14   nets.

15   Q.  So you mentioned the keywords.  What are these keywords

16   used for then?

17   A.  These keywords get used to retrieve the list of ads that

18   we are going to consider showing, and this is sort of the

19   step four that I have drawn on here.  The AdMixer sends a

20   request to these computers called keyword servers and says,

21   give me -- essentially in short, give me a bunch of ads for

22   these keywords.

23   Q.  Okay.  So the keyword server, what is that responsible

24   for then?

25   A.  So the keyword server's job is essentially given a
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1095

```
 1   keyword or a bunch of keywords to return -- or to retrieve a
 2   list of what are called ad I.D.s.  They are identifying
 3   numbers associated with that.
 4   Q.  So what system is it that actually retrieves the ads
 5   themselves?
 6   A.  That's going to be later on down the line.  Once we've
 7   got the ad I.D.s, the creative servers will retrieve the ads
 8   themselves.
 9   Q.  So what happens with the ad I.D.s once the keyword server
10   has it?
11   A.  Once the keyword server has the ad I.D.s, there is a step
12   that I -- sorry for the inconsistent kind of drawings there.
13   There is a little arrow saying QBB on it.  And so there is a
14   step called QBB.
15   Q.  Let me stop you there.  So can you tell us generally what
16   that QBB step is?
17   A.  Sure.  So we -- in the QBB step, we take these ad I.D.s
18   that we've got so far, and we might have an awful lot of
19   them, and what we do with the QBB step is we have the -- we
20   have something else called a QBB pCTR, and I don't want to
21   get too deeply into that unless you want me to.
22         We combine those two, and by doing a little math on
23   that, essentially we keep some of the ads and we don't keep
24   others.  And so not all of the ads get passed on to the next
25   step.  That is what QBB is for.
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1096

```
 1   Q.   Okay.   You mentioned QBB pCTR just a minute ago?
 2   A.   That is correct.
 3   Q.   Can you just explain to us generally what that is?
 4   A.   Sure.  So I guess I should start with the acronym.  QBB
 5   is short for quality based fitting, and that tells you
 6   absolutely nothing.  It is just -- we just call it QBB.  It's
 7   just not a very useful name.  The pCTR is the predicted
 8   click-through rate.  A predicted click-through rate is the
 9   likelihood that we think this user is going to click on this
10   ad.  It's sort of -- what's the chance -- you know, we are
11   not psychics, so we don't know, but we can sort of say, oh,
12   well, maybe it is 10 percent this user is going to click on
13   this ad.
14        The QBB pCTR is a special case of pCTR where sort of
15   ahead of time we kind of said, let's -- we use the term
16   average really loosely here, but what is the average
17   click-through rate on this ad for this keyword?  That is not
18   quite right, actually.  So can I correct that?
19   Q.   Yes.
20   A.   Sure.  Sorry.  It is not the average but it's the -- what
21   is our predicted -- what is our best prediction for this ad
22   on this query -- excuse me, on this keyword.  I'm sorry.  I'm
23   all nervous here.  What's this ad on this keyword if we don't
24   know what the query is?
25   Q.   I mean, I can tell you're excited.  I think it would be
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1097

```
 1   helpful for the court reporter to slow down a little bit.
 2   A.   Sorry.
 3          THE COURT:   And concise as possible and clear as
 4   possible.
 5   BY MR. NELSON:
 6   Q.   Understood.   So you said ahead of time?
 7   A.   That's right.
 8   Q.   What do you mean by ahead of time, please?
 9   A.   Before the user has entered a query, the QBB pCTR has
10   already been computed.   So we don't even know the query at
11   the time we were computing it.
12   Q.   So now let's go to the creative server.   Can you tell us
13   what the creative serve does generally?
14   A.   The creative server gets the ad I.D.s from the keyword
15   server, and it looks up the -- essentially the text for the
16   ads, which we call the creatives.
17   Q.   So then once that text or the creative are located, how
18   does AdWord determine which ads are going to appear on the
19   top of the search result, for example?
20   A.   So that's a couple of steps past but the -- before that
21   determination gets made, we collect some facts about the ads.
22   We collect something called the SmartAds predicted
23   click-through rate.   This is the pCTR we talked about before
24   but from a different system, and we collect a couple of other
25   scores, and then what we do is we run an auction.
```

Furrow, B. - Direct   1098

```
 1   Q.   The auction, is there some name for the top auction?
 2   A.   I would call it the top auction.
 3   Q.   Oh, okay.  And you said that there was -- is there more
 4   than one or is there only one?
 5   A.   There are two auctions.  So there is one auction to
 6   determine which has the show on top and there's a second
 7   auction to determine what ads to show on the right-hand side.
 8   Q.   So what system is it that actually runs the top auction?
 9   A.   At this point we're back to the AdMixer so now we are
10   back to the brains.
11   Q.   And what system is it that runs the right-hand side
12   auction?
13   A.   Also the AdMixer.
14   Q.   So with respect to the top auction, what happens to the
15   ads that don't get into one of the top spots?
16   A.   If an ad doesn't get into one of the top spots, it is
17   then considered for the right-hand side spots.
18   Q.   And how about for the right-hand auction, what happens to
19   those ads?
20   A.   The ads that don't make it in?
21   Q.   Correct.
22   A.   If an ad doesn't make it into the right-hand side, then
23   there is some chance it might make it on to later pages, like
24   if -- so if you're on the Google website, you enter your
25   query, the thing that you want isn't on the first page,
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1099

```
 1   sometimes you click the next page button, and the ads that

 2   didn't show up on the first page might show up there.

 3   Q.   So you mentioned the ads show up on the page.  Are the

 4   advertisers charged when the ad shows up on the page?

 5   A.   No.

 6   Q.   When are the advertisers charged?

 7   A.   The advertisers are charged when someone clicks -- when a

 8   user has entered the query clicks on one of the ads.

 9   Q.   So let's go back and talk about a couple of these things

10   in a little bit more detail.  The query rewrite server, how

11   is it, again, that the AdWords determines which keywords to

12   use for the incoming query?

13   A.   The query that -- the server starts with the query, and

14   then performs a few different kinds of tasks on the query.

15   It will try cutting off words to make keywords.  So the

16   keywords I described earlier aren't just one word.

17   Volleyball nets could be a keyword.

18          So if the query has many words, one, we will try

19   removing some of the words and making a keyword out of what's

20   left.  If there are plurals, we will try getting rid of the

21   plurals.  If there aren't plurals we will try pluralizing, so

22   that sort of operation.

23   Q.   And how are those keywords then used to locate the ad?

24   A.   All right.  So once the keywords are given back to the

25   AdMixer, there are many different keyword servers that store
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1100

1   the keywords that we have. The AdMixer does a little math,

2   which I can get into if you would like, to figure out which

3   keyword server has each keyword on it. And then let's say

4   there are more then ten, but there are ten keyword servers,

5   then it would send off the keywords that are on server one to

6   server one, and the ones that are on server two, to server

7   two, and so on.

8   Q.   Okay. How many memory locations does the keyword server

9   check to find the candidate ad?

10   A.   The keyword server doesn't have to check a bunch of

11   memory locations. It has something that is called a hash

12   table which very quickly lets it say, well, here is the

13   keyword. Let me do a little bit of math on the keyword,

14   called a hash function, and then it says, oh, this must be in

15   row 5 million 26 on the -- in my hash tables. Then it goes

16   to that row, picks out the list of ad I.D.s for that keyword.

17   Q.   So does the keyword server then use the text to the ad to

18   locate the ad I.D.?

19   A.   No. We actually don't have the text of the ad until we

20   get to the creative server.

21   Q.   So then once you get these ad I.D.s, where do those ad

22   I.D.s go?

23   A.   The ad I.D.s then go to the creative servers. And it is

24   a similar sort of process where not every creative server has

25   every creative on it. So, again, we do a little bit of math,

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1101

```
 1   figure out which creative server has each one and then send
 2   them off accordingly.
 3   Q.  And those ads go back to the AdMixer at that point?
 4   A.  Once we get to the creative server, there is a step
 5   called the SmartAds prediction.  Once that's been made, then
 6   we sort of pass them back up all the way to the AdMixer.
 7   Q.  Okay.  So let's take the first one you mentioned, the top
 8   auction.  How does the AdMixer determine which of the ads are
 9   eligible for the top three positions?
10   A.  So for each ad the AdMixer computes something called a
11   long-term value score.  So basically what this is, is it's
12   our best estimate -- because we don't know if the user is
13   going to click on the ad.  We don't know if the user is going
14   to like what they see when they get there.
15          We compute this score based on our best guesses as
16   to how much the ad is worth to show, how likely is the user
17   is to click on it, how likely the user is to have a good
18   experience and come up with a score.
19   Q.  Okay.  So what are the factors then that are used to
20   compute this long-term value score?
21   A.  One of the factors is the bid, that is how much the
22   advertiser is willing to pay.  Another factor is the SmartAds
23   predicted click-through rate.  Another factor is something
24   called the LQ that we haven't talked about yet, and the
25   fourth factor is something called the CQ that we also haven't
```

1   talked about it.

2   Q.   Okay. So then let's talk about the LQ first. Can you

3   tell us briefly what the LQ is?

4   A.   It's Google's best guess that is available to us at the

5   time of how likely the user is to be happy if they click on

6   the ad, how happy they will be with their webpage they end up

7   on.

8   Q.   Okay. And then you mentioned CQ. Can you tell us

9   briefly what CQ is?

10   A.   CQ is the best guest for how likely the user is to look

11   at the ad and say, hey, this is a good ad for this query. So

12   CQ is short for creative quality; LP is short for landing

13   page quality.

14   Q.   So once the ad is determined -- the AdMixer determines

15   what ads are available for that top auction, how do they --

16   how does the AdMixer decide how to rank them?

17   A.   All right. So I think I left you with computing the

18   score, this long-term value score. We will only consider

19   showing the ads on top that have a positive score. So if

20   you've got a negative score, we don't want to show you

21   because if you have negative value, that is -- we don't want

22   to show that ad. The ad that has the highest value will be

23   shown on the first position. So there are three spots on the

24   top that we can show ads in. It could be that none of these

25   ads are good enough to show on top, in which case we just

Furrow, B. - Direct   1103

```
 1   won't show any.  But if there are ads that are good enough,
 2   we will take the best one, the one with the highest score,
 3   put it first.  If there is another one, then we will take the
 4   one with the highest score and put it second and then third.
 5   Q.  So how does the AdMixer determine the price of each ad
 6   that appears on top of the page if the user clicks on it?
 7   A.  There is some math involved there so we talked about how
 8   the advertiser bids how much they are willing to pay.  We
 9   don't charge them exactly their bid because we don't -- well,
10   this isn't -- I guess I shouldn't speak to the motivation but
11   if we do charge them what they bid then they will tend to
12   lower their bid until we are charging them less.  We do
13   something called second prices.
14   Q.  Okay.  Can you explain to us briefly what the second
15   pricing is?
16   A.  It's essentially, we say what is the minimum amount this
17   advertiser would have had to bid in order to beat the guy in
18   second place.  So if the advertiser bid 10 ads $.20, and they
19   would only have needed to bid $.15 to be in first place, we
20   will charge them $.15.
21   Q.  So now what happens in the ads that don't win one of
22   these top three spots?
23   A.  They are eligible to compete in the right-hand side
24   auction.
25   Q.  Now, are there any circumstances where an ad that has a
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1104

1   higher predicted click-through rate wouldn't be eligible for

2   this top auction?

3   A.   Yes, there are.

4   Q.   And briefly can you tell us what that will be?

5   A.   Well, there are four things that go into this long-term

6   value score, and predicted click-through rate is only one of

7   them. In particular, if you have a low bid, that is going to

8   hurt you quite a bit and could mean that you don't end up in

9   the top auction. And a low LQ score actually combines really

10 badly with a high pCTR. That is, if you are really likely to

11 go to the landing page, and then you are really likely to

12 hate it, and that's not the kind of ad we like to show. It

13 doesn't give a good user experience.

14 Q.   And when you say a bad landing page, can you just tell us

15 what you mean?

16 A.   Sure. I can give an example. Let's suppose I'm

17 searching for running shoes. If I search for running shoes,

18 then Nike is probably going -- or Wal-Mart's website where

19 they sell running shoes. So that would have a high LQ score.

20 A bad landing page would be where I give my credit card

21 number in there, sign up for a newsletter on running shoes.

22 I don't think anybody wants to go to that site when they have

23 queried for running shoes, so that would be a site with a low

24 score, low LQ score.

25 Q.   So now we talked about the top auction. Let's talk about

Furrow, B. - Direct   1105

```
 1   the right-hand side auction.  How does the AdMixer determine
 2   which ads are going to be eligible for the right-hand side
 3   auction?
 4   A.  So the right-hand side auction overall is very similar to
 5   the top auction.  We compute a fresh long-term value score.
 6   It is not exactly the same.  We use the same four inputs to
 7   it but we combine them in a slightly different way.  We use
 8   different numbers to combine them together.  And, again, if
 9   anything has a score below zero, we put it aside; we are not
10   going to show it on this page.  And for the things that have
11   above zero, if there are any left, then we will put the top,
12   the one with the highest score in the first spot, second
13   highest score in the second spot, and so on.  It is a very
14   similar procedure in the top spot except that we have eight
15   spots instead of three.
16   Q.  So is that long-term value score you mentioned, is that
17   used to set the price of the ad when you advertise the click
18   on?
19   A.  When the user clicks on, yes.
20   Q.  Excuse me, when the user clicks on it?
21   A.  Yes.  So, again, it's the second price in the scheme,
22   works the same way.
23   Q.  When you say the same way, same way to what?
24   A.  We talked about second pricing on top, the minimum amount
25   they have to pay to beat the next one down.  It's the same
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1106

```
 1   thing on the right-hand side.
 2   Q.  Okay.  You know, in terms of ads with a high pCTR for
 3   this right-hand auction, are there circumstances where they
 4   may still not make it into the auction?
 5   A.  Yes.  And it's the same -- same sort of circumstance as
 6   is on top.  If you've got a low bid or a low LQ score -- I
 7   mean, a low CQ score will contribute as well, but any of
 8   those things put together on their own could be an ad not to
 9   show.
10   Q.  Okay.  So we've heard a lot about SmartAds in this case.
11   At a high level, can you tell us what SmartAds does within
12   the AdWord system?
13   A.  Sure.  SmartAds is responsible for providing a predicted
14   click-through, a pCTR like we talked about before, for the
15   ads that we are considering showing.
16   Q.  Well, how does SmartAds learn the information that is
17   used to compute this predicted click-through rate?
18   A.  The SmartAds system is -- it has what is called a machine
19   learning model that we train on billions and billions of old
20   ads that we've shown people.  So when we show an ad to
21   somebody and that person -- sorry.  You look like you want to
22   stop me.
23   Q.  So you said billions and billions of old ads that were
24   shown, where does this information come from?
25   A.  We have what are called logs.  We store information about
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1107

```
 1   what ad users have seen and what ad users have clicked on and
 2   not clicked on, and we store them in files called log files.
 3   Q.  Okay.  And generally speaking, what kind of information
 4   is in the log files?
 5   A.  Information about the query:  What did the user type?
 6   What country was the user in when he or she typed it?  What
 7   ads did we show to the user?  Which ads did the user click
 8   on?  What keyword did we use to look up that ad?  These are
 9   just some of the elements.  What did SmartAds predict for
10   each of these ads?
11   Q.  Now, what information does SmartAds take out of these
12   logs in order to train?
13   A.  SmartAds takes information out -- sort of have to pick
14   the level to answer that question -- we take information out
15   that we call features, and we'll -- we do a whole bunch of
16   things that you are going to stop me from, you're going to
17   cut me off if I go on that long, so I'll let you --
18   Q.  So you mentioned feature.  Can you tell us what a feature
19   is?
20   A.  Yes.  A feature --
21   Q.  Within the SmartAds?
22   A.  Within the SmartAds.  A feature is a fact about a query
23   and ad that we showed to somebody.  So somebody issues a
24   query, sees an ad.  There are lot of things we can say about
25   that, and we call some of those things features.
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1108

```
 1   Q.  Do you have any examples?
 2   A.  Sure.  One fact would be, the query was running shoes.
 3   That will be -- that could be a feature.  Another feature
 4   could be the webpage for the ad is Amazon.com, that would be
 5   another feature.
 6   Q.  So how are those features then used in SmartAds?
 7   A.  The first thing we do is we combine them together to make
 8   things called attributes.
 9   Q.  And can you tell us what an attribute is?
10   A.  An attribute is a combination of features.  Could even be
11   just one feature on its own but we have decided to call -- to
12   make it into an attribute.
13   Q.  And can you give us an example of what an attribute might
14   be?
15   A.  Sure.  So using the example of feature I gave before, one
16   attribute could be the query was running shoes and the
17   webpage for the ad was Amazon.com.  So those two things put
18   together would make an attribute, or either of them on its
19   own, we could take it on its own and call that an attribute.
20   Q.  So how are attributes then used by SmartAds in this
21   training process that you described?
22   A.  So in the training process SmartAds generally tries to
23   learn what kind of effect each of these attributes has on the
24   user's chance of clicking on an ad.  So each attribute we
25   will gradually fess out what is called an odds multiplier.
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1109

```
 1   Q.   Let me stop you there.  So how is that odds multiplier

 2   then determined on this log information you called it?

 3   A.   We -- there is a lengthy explanation, and the short one

 4   is that there is an algorithm called stochastic gradient

 5   descent that we use to come up with the multipliers.

 6   Q.   So let's break that down, go through it once again.

 7   A.   One step at a time.

 8   Q.   Yes.  So then how is the -- that information -- the

 9   information in the log used to create this odds multiplier

10   for the attribute?

11   A.   So the brief version is that the SmartAds system will go

12   through all of these old logs of these old ads that we showed

13   and either got clicked or not, and then every time we

14   consider an ad -- first of all, we find the set of

15   attributes, we come up with a set of attributes for the ad,

16   and then if the ad got clicked, we say, well, these

17   attributes must have been at least a little bit good, right,

18   because they led to a click.

19           So we will take this odds multipliers number and

20   make it a little higher for those attributes, and then we

21   will go on and read the next log line or the next impression

22   and maybe this one didn't get clicked.  And we will generate

23   all the attributes for that one, and then if they -- and then

24   because the ad didn't get kicked, we say, well, this didn't

25   work out so well, let's lower all the odds multipliers for
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1110

```
 1   these.
 2   Q.   And then you mentioned feature.  Does the SmartAds
 3   training process do something similar for each of the
 4   features?
 5   A.   No.  The SmartAds training process learns multipliers
 6   only for attributes.
 7   Q.   Now, does SmartAds, in this training process that you
 8   described, track the historical performance of a specific
 9   advertisement?
10   A.   No, it doesn't.
11   Q.   Well, I thought you said earlier that advertisers are
12   only paid when an ad is clicked on, right?
13   A.   That's right, yes.
14   Q.   So if you don't store the historical performance of a
15   specific ad in SmartAds, how do you decide when the
16   advertisers have to pay?
17   A.   So that the -- there is a system in the AdWord system
18   that is responsible for keeping track of that and for telling
19   advertisers how many clicks you got, how many times we showed
20   your ad.  The SmartAds system itself, however, just doesn't
21   care.  It doesn't keep track of that fact.  So there is a
22   system that does keep track and there's a system that charges
23   the advertiser, but we don't use the historical click-through
24   rate of ads in order to choose which ads are served either in
25   the SmartAds system or any other system in the ad serving
```

Furrow, B. - Direct   1111

```
 1   system.  So we keep track of it, we just don't use it.
 2   Q.  Was one of these attributes that you talked about, is
 3   that the historical click-through rate of an ad?
 4   A.  No.
 5   Q.  So how is it, then, you can predict the click-through
 6   rate for an ad that you are going to show if you don't track
 7   the ad's historical performance?
 8   A.  So what we want to do is actually something more
 9   sophisticated than that.  We don't want to just say, this is
10   what happened before, and therefore it is what is going to
11   happen again, because no two queries are exactly alike.  We
12   want to be able to generalize.  We want to be able to say for
13   this ad, which is a new ad, we have never seen it before, we
14   still want to predict how likely it is to click on it.  We
15   can still use that like, what was the keyword, what words
16   appeared in the query, and that sort of thing, to come up
17   with a decent prediction even though we have never seen the
18   ad.  So the short answer is we want to do something more
19   sophisticated, and that is what SmartAds let us do.
20   Q.  So in this training process that you talked about to
21   figure out the odds multipliers, does SmartAds group the
22   information by user in that training model?
23   A.  No.
24   Q.  Do any of the attributes that you talked about group
25   information by users in SmartAds?
```

Furrow, B. - Direct   1112

```
1   A.   No.
2   Q.   Okay.  So you were just talking about how the SmartAds'
3   model is trained.  Let's move on and talk about how the
4   SmartAds model is used in the ad serving process, okay.
5   A.   Sure.
6   Q.   So can you tell us just generally, at a high level,
7   besides how SmartAds is used in the ad serving process.
8   A.   Sure.  For each of the ads that we are considering
9   showing, we will generate the list of attributes for that ad.
10  We will go get the odds multipliers for each of those
11  attributes, and we will combine the odds multipliers
12  together.  And bigger numbers mean more likely to click;
13  smaller numbers mean less likely to click.  There is a bit of
14  math that gives us the final actual number, but overall that
15  is what happens.
16  Q.   And the odds multipliers, how are those put together?
17  A.   When we did the SmartAds training process, the whole
18  point of that was to come up with these odd multipliers, and
19  we will just use the odds multipliers that we came up with in
20  the training process in the serving process.
21  Q.   So then you have a query come in, how does SmartAds
22  compute the pCTR for that current query and whatever the
23  candidate ad is?
24  A.   So the first thing that it does is it generates the set
25  of attributes that apply to this query ad pair.
```

Furrow, B. - Direct   1113

```
 1   Q.  Well, let me stop you there.  How are those attributes
 2   generated?
 3   A.  When we are making this model in the first place, we, as
 4   humans -- because most of the model making work is done by
 5   computers.  But the first step of model making is we as
 6   humans decide what attribute -- what is called attribute
 7   templates to use in order to make a model.
 8   Q.  So let me stop you.  So what is an attribute template,
 9   then?
10   A.  So we talked about attributes and we talked about
11   features.  If I may, I'd like to first say what a feature
12   template is, because I think it will help us figure out what
13   an attribute template is.
14   Q.  So then I've asked you a bad question.  What is a feature
15   template?
16   A.  So feature itself was a fact about the query or ad.  A
17   feature template is like the question that the feature is the
18   answer to.  So the feature example I gave was that the user
19   queried for running shoes.  The feature template would be
20   what did the user query for.
21   Q.  So then what's the relationship between feature template
22   and attribute template that you mentioned?
23   A.  If you put together feature template, then that gives
24   you -- would actually be a template.  So an actual template
25   is like a collection of questions.  And the answer is the
```

Furrow, B. - Direct   1114

```
 1   collection of answers to those questions gives you the

 2   attribute so then we would have odds multipliers for.

 3   Q.  And in the current SmartAds models, how many attribute

 4   templates are there?

 5   A.  I believe there are 78 in the current model.

 6   Q.  And how about feature templates?

 7   A.  So the feature templates are all stored in the attribute

 8   templates, and if you sort of laid all the attribute

 9   templates end to end, you would end up with 158 feature

10   templates.

11   Q.  So once the pCTR is determined and the ads clicked, how

12   does that affect these odds multipliers in the SmartAds

13   model?

14   A.  So now we are headed sort of full circle back to

15   training.  Once we've decided what ads to show, the ads get

16   shown and the user clicks on an ad, then that goes into our

17   logs, and the training process will see it, and the training

18   process will say, this ad got clicked on, so let's raise all

19   the odds multipliers for all the attributes.

20   Q.  Okay.  How about a nonclick, does that affect any of

21   these odds multipliers?

22   A.  It's in the same way except that instead of raising the

23   odds multipliers, will lower them.

24   Q.  So let's say I put in a query like flowers and a user

25   clicked on an ad that was shown.  Would that affect any of
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1115

```
 1   these odds multipliers for a different query like kayaks or
 2   something?
 3   A.   Yes.  So when -- for starters there will just be
 4   attributes in common between the two.
 5   Q.   What do you mean when you say the attributes in common
 6   between the two?
 7   A.   Well, there -- the attributes on the ads that clicked on
 8   for the query flowers, that will be exactly the same
 9   attributes as the ad that got clicked on for the query, I
10   believe you said kayak.
11   Q.   Yeah, kayak.
12   A.   Okay.  So it would be attributes that are exactly the
13   same attribute over here as they were over here.
14   Q.   Now, are there -- setting those aside, the ones where the
15   attributes are in common, are there any other attributes that
16   might be affected for an unrelated query?
17   A.   Yes.  Everything is affected.
18   Q.   What do you mean when you say everything is affected?
19   A.   The way that our -- I'm going to say the name again --
20   the stochastic gradient descent, all of them works, in very
21   brief, is that when we adjust our odds multipliers for
22   this -- that we've shown here, the next time we go to adjust
23   all the odds multipliers, the fact that these guys up here
24   got changed is going to affect every single odds multipliers
25   over here.
```

Furrow, B. - Direct   1116

1   So we train on A, and then on event B, and what we

2   do on event B is going to depend on what we did on event A.

3   So every attribute is affected by every attribute that has

4   been -- that has come before it.

5   Q. Now, if I just open my computer and I put in a query like

6   raven, would SmartAds know whether I was looking for a bird

7   or the football team?

8   A. Well, I don't know. SmartAds is not psychic. It can't

9   tell just from one word what thing you're looking for.

10 Q. Now, you mentioned that you were on the SmartAds team and

11 you spent a lot of time writing source code, right?

12 A. That's right, yes.

13 Q. Okay. So what were you working on?

14 A. So there are -- it was five years, so there are a few

15 different things. One of the things I was working on was

16 trying to improve these SmartAds models, come up with new

17 combinations of actually be templates so my letter model

18 learned something clever that nobody had thought of before.

19   Another thing I worked on was trying to figure out

20 how -- I talked about how it is important for SmartAds to

21 generalize and make predictions in situations we haven't seen

22 before. I designed and implemented the system for testing

23 how good SmartAds are -- different SmartAds models are at

24 generalizing so we can compare how good is this model at

25 generalizing to new queries versus this one.

JODY A. STEWART, Official Court Reporter

Furrow, B. - Direct   1117

1   Q. So you mentioned models there. Generally speaking,

2   what's the difference between one model and another in

3   SmartAds?

4   A. Generally speaking, the two models will have different

5   lists of attribute templates.

6   Q. And do you know up to the current date how many different

7   models there have been in SmartAds?

8   A. So we have tried many, many different models, but a lot

9   of those get discarded. Of the ones we've actually liked

10 enough to keep them and keep using them, the current one is

11 called Google 26, and sometimes we use numbers but not

12 usually, so around 26.

13 Q. So how often do these attribute template models that you

14 mentioned for SmartAds change?

15 A. About two or three times a year.

16 Q. All right. Let me shift gears a little bit. Are you

17 involved at all in obtaining patents regarding the SmartAds

18 system at Google?

19 A. There was one point at which I think I had been working

20 on something and -- I don't know if I was contacted by a

21 lawyer or something, saying, hey, do you have anything

22 patentable --

23   THE COURT: Don't tell us what somebody else said to

24 you. That is hearsay.

25   THE WITNESS: Okay.

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1118

```
 1              THE COURT:  What you did.
 2              THE WITNESS:  Okay.  In that case, I believe I may
 3   have filed an initial sort of is-this-worth-patenting kind of
 4   e-mail, but it didn't go any further than that.
 5   BY MR. NELSON:
 6   Q.  Do you have responsibility for patents that others might
 7   want to file?
 8   A.  No.
 9   Q.  Do you know who does?
10   A.  I believe it just boils down to whoever wants to file the
11   patent is responsible for filing it, and they would do that
12   in communication with Google's lawyers.
13              MR. NELSON:  Okay.  Thank you very much.  I don't
14   have any further questions.
15              THE COURT:  Any cross?
16              MR. CIMINO:  Yes, Your Honor.
17                      CROSS-EXAMINATION
18   BY MR. CIMINO:
19   Q.  Good afternoon, Mr. Furrow.
20   A.  Good afternoon.
21   Q.  I'm going to ask you a couple questions about your
22   testimony.  First, let's talk about training, okay?
23   A.  Are we talking about SmartAds training?
24   Q.  SmartAds training, yes.  I believe you testified that
25   SmartAds doesn't track the entire ad; is that right?
```

Furrow, B. - Cross   1119

1   A.   Sorry, you said doesn't track the entire ad?

2   Q.   I believe that is what you testified. Is that what you

3   testified?

4   A.   I don't remember using those words. What do you mean by

5   the entire ad?

6   Q.   The ad I.D., it doesn't track the rate of an ad?

7   A.   That's right, it doesn't do that.

8   Q.   SmartAds does track parts of the ad, though, doesn't it?

9   A.   SmartAds -- well, it doesn't track the historical

10   click-through rate through any part of anything.

11   Q.   We are not talking about the rate, we are talking about

12   the part -- it does track part of the ad, doesn't it?

13   A.   There are attributes that are based on parts of the ads.

14   Q.   Sure. Like creative?

15   A.   Not sure that we have one for -- we might have had one

16   that fingerprints parts of the creative. I'm not certain,

17   but there are certainly -- we certainly have attributes for

18   at least parts of the creative.

19   Q.   Okay. So and that would be part of the ad rather than

20   the entire ad, right?

21   A.   That's right, yes.

22   Q.   And you also track lines of the ad, right?

23   A.   The lines of the text of the creative?

24   Q.   Yes.

25   A.   That's right. Yes.

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1120

```
 1   Q.   SmartAds tracks lines?
 2   A.   When you say tracks, I just want to make it clear we are
 3   not keeping track of historical click-through rates or
 4   anything like that.  We are just --
 5   Q.   But it uses the historical clicks, doesn't it, to train
 6   models based on parts of the ad, doesn't it?
 7   A.   It uses -- I mean, it uses all of our historical clicks
 8   and impressions to come up with those odd multipliers.
 9   Q.   And it does so for parts of the ad?
10   A.   There is -- there could be an odds multipliers -- so I
11   actually don't know off the top of my head if there is an
12   attribute that is just the ad and that we learn the
13   multiplier for.  I guess it is theoretical possible but I
14   haven't seen personally or identified anyone that's like
15   that.
16   Q.   Mr. Furrow, we are talking about line one, line one of
17   the ad.
18   A.   Okay.
19   Q.   The clicks of a particular ad, the information about
20   those clicks would go into SmartAds for the feature about
21   that line of the ad, wouldn't it?
22   A.   Again, I'm not sure that we are using feature that is
23   exactly the first line of the ad.
24   Q.   You have similar features, though, wouldn't you agree?  I
25   don't want to close the courtroom and bring out the source
```

Furrow, B. - Cross   1121

1   code, so I'm trying to talk in generality. But you would

2   agree with me that there are features in SmartAds that track

3   lines of the ads?

4   A.   There are features in the SmartAds that are lines of the

5   ad.

6   Q.   Are lines of the ad. That's better; line one, line two,

7   line three, and so on and so forth?

8   A.   I think we have one, just for argument sake, let's say we

9   have one that is the fingerprint of those three lines, which

10   I think is one we use.

11   Q.   Sure. Okay. So we can agree that there are feature

12   templates that are components of the ad or parts of the ad,

13   right?

14   A.   Yes.

15   Q.   And the billions and billions of clicks you said that are

16   collected by SmartAds, would bring into the SmartAds training

17   process information about when those components of the ads

18   have been clicked?

19   A.   I think it was one of the ads. I'm not sure if it ads up

20   to billions of clicks.

21   Q.   Okay. Billions of ads, let's just say the clicks in

22   general, the historic clicks on ads, the information about

23   the clicks would come into SmartAds and affect templates

24   based on components of the ad?

25   A.   So far we have only been talking about feature templates,

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1122

```
 1   and there is no effect on feature templates of the previous
 2   clicks and nonclicks.
 3   Q.  I'm trying to keep track and keep it simple.  So are you
 4   unable to answer that question, just talking about features?
 5   A.  The answer would be no, just talking about features.
 6   Q.  So an attribute where you combine features and one of the
 7   features is the component of the ad?
 8   A.  Okay.
 9   Q.  The same question, the clicks that happen in the past
10   were you used in training SmartAds for the attribute that
11   contains a feature that is a fact about a component of the ad
12   such as lines one, two and three?
13   A.  Yes, all of our historical clicks are used for that.
14   Q.  And other features, Mr. Furrow, would be invisible URL,
15   right?
16   A.  That is another feature, yes.
17   Q.  That's a component of the ad?
18   A.  Sure, if you say so.
19   Q.  And a price would be a component of the ad, right?
20          MR. NELSON:  Your Honor, we are getting down into
21   the details of these things, which is --
22          THE COURT:  You have been in the details for the
23   last hour.
24          MR. NELSON:  No, no, no I'm talking about the
25   features -- the details of the actual templates which is the
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1123

```
 1   proprietary testimony.
 2           THE COURT:  Well, we don't intend to do that because
 3   we are not closing the courtroom this afternoon.
 4           MR. CIMINO:  I understand, Your Honor.
 5           THE COURT:  Ask your questions.
 6           MR. CIMINO:  I understand, but in view of the direct
 7   testimony, I do need to at least speak in generalities, which
 8   I've been trying to do, to rebut some of the testimony that
 9   Mr. Furrow has just given at a higher level.  So I will try
10   and speak in generalities --
11           THE COURT:  All right.
12           MR. CIMINO:  -- as long as it's necessary.
13   BY MR. CIMINO:
14   Q.  You also have features that track the query, right?
15   A.  We have features that are --
16   Q.  Part of the query?
17   A.  Are features of the query, I guess you could say.
18   Q.  And there are also attributes that combine the query with
19   components of the ads; isn't that right?
20   A.  Are we talking about features or attributes?
21   Q.  Attributes, sorry.  It's tough to keep it straight.
22   There are attributes that combine features of the query and
23   components of the ad price?
24   A.  Yes, that's correct.
25   Q.  And for those attributes, the feedback on which you were
```

Furrow, B. - Cross   1124

```
 1   trained would be tied to the query; isn't that right?
 2   A.   I think I'm -- yes, the thing on which we trained
 3   would -- yes, that particular attribute would depend on the
 4   query.
 5   Q.   And you also add one set depending on the keyword; isn't
 6   that right?
 7   A.   Yes, that's correct.
 8   Q.   And the same situation would occur, you would also, when
 9   training SmartAds, track information relative to the
10   components of the ad based on specific keywords?
11   A.   Sorry.  Would you mind repeating that?  I'm sorry.
12   Q.   Sure.  Your answer to the last question I believe was yes
13   when we were using a query.  I just want to establish that
14   the same situation occurs when you have a feature that is a
15   keyword and combined with the feature that is part of the ad,
16   that you would also track or use clicks in the past that are
17   associated with that keyword?
18   A.   We use all clicks from the past and those would be some
19   of them, yeah.
20   Q.   But that attribute in particular would look at clicks
21   associated with that keyword?
22   A.   It would be affected by every click or nonclick that
23   we've seen before, but those are some of them, yes.
24   Q.   Well, if you fingerprint the keyword, it would be
25   associated just for that keyword, wouldn't it?
```

Furrow, B. - Cross   1125

```
 1    A.   It would be affected by every click impression that we
 2    had before, not just to that keyword but everything.
 3    Q.   Whether it was clicked or not?
 4    A.   That's correct.
 5    Q.   We are talking about impressions versus click, right?
 6    A.   Yes.
 7    Q.   Can you pull up the demonstrative that you were speaking
 8    about.
 9           Now, Mr. Furrow, you would agree with me, wouldn't
10    you, that this is a high level simplification of AdWords?
11    A.   I would say it's a high level simplification of ad
12    serving, yes.
13    Q.   Would you agree that it is not technically accurate?
14    A.   I would say that there are steps that I haven't talked
15    about, as I mentioned.  I believe that in all the particulars
16    that I have written down, those particulars are technically
17    accurate, as well as the particulars that I've discussed with
18    the jury.
19    Q.   Well, let me point your attention to six.  It's not true
20    that the only thing that the SmartAds server gets is the
21    creatives; isn't that right?
22    A.   It's not true.  The only thing, no.
23    Q.   It also gets the query, doesn't it?
24    A.   That's correct, yes.
25    Q.   The query is not shown here, is it?
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1126

1   A.   No, it is not.

2   Q.   And I assume you know, from your participation in this

3   case, whether SmartAds tracks things based upon a query is an

4   important issue in this case. You knew that, didn't you?

5   A.   Yes.

6   Q.   And you created this document, didn't you?

7   A.   Yes, two nights ago in about ten minutes.

8   Q.   So this document was created for the purpose of this

9   trial?

10   A.   That's correct, yes.

11   Q.   And in your entire direct testimony, you didn't show any

12   Google documents created before they were sued in this case,

13   did you?

14   A.   Sorry, I didn't show any document -- I don't think any

15   documents were shown other than this in my direct testimony.

16   Q.   You are certainly aware of actual Google documents

17   created in the normal course of business that would show the

18   process on AdWords, aren't you?

19   A.   I'm not sure I'm aware of any that would do it in the --

20   to the degree of -- well, first of all, some of them wouldn't

21   be current, and others would either be too low level or too

22   high level.

23   Q.   So this high level simplification, you would agree with

24   me, is a useful way to explain complicated technology to the

25   jury?

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1127

```
 1   A.   I think on its own it would be pretty useless.  I think

 2   without my -- I asked it to be brought up as visual aid so

 3   that I could explain what was going on.  I think that on its

 4   own, it's not much good to anybody, but along with the person

 5   explaining it, then it can be useful.

 6   Q.   Sure.  Okay.  So, Mr. Furrow, when you start the process

 7   you mentioned inserting a query, how this whole thing starts,

 8   correct, a user would insert a query?

 9   A.   That's correct, yes.

10   Q.   And Google currently has billions of ads?

11   A.   That's my understanding, yes.

12   Q.   And the goal is to narrow down the ads from a billion to

13   the 10 or 11 you are going to show on the first page; isn't

14   that right?

15   A.   I wouldn't say so, no.

16   Q.   Okay.  Maybe it's not your goal but that is what actually

17   occurs, isn't it?

18   A.   Again, I wouldn't say so, no.

19   Q.   Google does not send all billion to the auction, does it?

20   A.   No, it does not.

21   Q.   Google can't send all billion to the auction and return

22   the ads in the time required for a user to get its search

23   results, can't it?

24   A.   I don't think we've ever tried it.

25   Q.   You know of no fact at Google where that would be
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1128

1   possible, do you?

2   A. No what?

3   Q. No facts, you're aware of no facts or experiment to

4   Google where it would be possible to send 10 million ads to

5   the auction and return in the time frame, I believe, of 10

6   milliseconds, was the testimony given by Mr. Alferness?

7   A. That's correct, as far as more, there has been no attempt

8   to do that.

9   Q. So you have to disable; isn't that right? Let me ask you

10 different. You do disable?

11 A. Yes.

12 Q. You do disable? Over here you show QBB, right?

13 A. That's correct, yes.

14 Q. That is a disabling step; isn't that right?

15 A. It's a step in which we choose not to show some of the

16 ads.

17 Q. Right. You said you keep some and you don't keep others?

18 A. That's correct, yes.

19 Q. So you keep some, you don't keep others. I think we

20 heard that described as pull out bad ads; would you agree

21 with that characterization?

22 A. No, I don't think so.

23 Q. Would you agree that it is a type of filtering, you are

24 filtering out the ones you don't want to keep and you're

25 letting the ones you do want to keep pass?

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1129

```
 1   A.   That would be an accurate statement, yes.
 2   Q.   Okay.  And also down to the -- you mentioned down a
 3   little later the SmartAds server, when it goes back to the
 4   AdMixer, we have promotion, and we have the left-hand side
 5   auction, right?
 6   A.   The right-hand side auction.
 7   Q.   I'm sorry.  Second time I've done that.  Right-hand side
 8   auction.  So you have up top and you have them on the right?
 9   A.   That's right.
10   Q.   And before you go to the auction, you also do a disabling
11   step, is that right, to limit the candidate ads for the
12   auction?
13   A.   Which auction are we talking about here?
14   Q.   Let's talk about the top.  Top is called promotion,
15   right?
16   A.   Yes.
17   Q.   The auction is where you mix in how much people are bid
18   and how the quality of the ads and figure out the final
19   purchase price or the final payment price by the advertisers,
20   correct?  Is that fair?
21   A.   I wouldn't describe it that way, I guess.
22   Q.   Okay.  Well, in any event, the auction is the sort of
23   final step, correct, which ad is going to show?
24   A.   So I mentioned that there are lots of steps here.  Some
25   of the steps I think neither you nor the defense would
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1130

```
 1   particularly care about.

 2   Q.  Let's just use the picture steps for purposes of this

 3   case.

 4            THE COURT:  Only one of you can talk at a time.

 5   BY MR. CIMINO:

 6   Q.  Yes, Your Honor.

 7   A.  Sorry, sir.

 8   Q.  Okay.  So for purposes of this case, the final steps we

 9   are talking about are the auction and pricing, right?

10   A.  The two auctions and the pricing, yes.

11   Q.  And prior to that happening, Google removes candidate ads

12   by disabling or promotion; is that correct?

13   A.  We don't remove any candidate ads by promotion.  We --

14   the ads that aren't promoted are eligible for the right-hand

15   side auction.

16   Q.  Well, at least for the top slot they are not allowed to

17   enter the auction; isn't that correct?

18   A.  That's correct, yes.

19   Q.  So you have -- you keep some for the top part of the

20   auction and I believe you don't keep others to the top part

21   of the auction, right?

22   A.  That's correct.

23   Q.  And that would also be a filtering -- a type of filtering

24   step, wouldn't it?

25   A.  We are filtering stuff out from the top slot, is that
```

Furrow, B. - Cross   1131

1   what we are talking about here?

2   Q. Yes.

3   A. Sure.

4   Q. And then you'll have the right-hand side -- got it right

5   that time -- the right-hand side before the auction, you also

6   do a disabling step; is that right?

7   A. Yes, that's correct.

8   Q. And the same question, you keep some that go to the

9   auction, so you limit the amount that actually make it to the

10 auction, and you remove some that are poor quality; is that

11 fair?

12 A. I wouldn't agree with that, no.

13 Q. Well, you keep some and you don't keep others?

14 A. We keep some -- others may show up on future pages but

15 they are ineligible for this particular auction.

16 Q. Yes. So you don't keep them for this particular auction?

17 A. That's right.

18 Q. And with respect to disabling, that would also be

19 properly characterized as a filtering step with respect to

20 the right-hand side auction, at least the first page?

21 A. Well, I guess it depends on whether you consider stuff

22 that is still eligible to show on the second page as

23 filtering.

24 Q. Let's just talk about the first page. Would you agree

25 that disabling for purposes of whether something makes it to

Furrow, B. - Cross   1132

```
 1   the auction for the first page -- I'm sorry, let me start
 2   over.
 3          Would you agree that disabling, for purposes of
 4   determining whether ads are eligible for the right-hand side
 5   auction, first page, is a form of filtering?
 6   A.  We filter them out from being able to be shown on the
 7   first page on the right-hand side.
 8   Q.  I'm sorry.  What did you say?
 9   A.  We filter them out from being able to be shown on the
10   first page on the right-hand side.
11   Q.  Yes.  And for promotion, the disabling step is based on,
12   at least in part, predicted click-through rate, right?
13   A.  I'm sorry.  Are we talking about promotion or disabling?
14   Q.  The promotion step before the auction?
15   A.  All right.  Sorry.  Could you please repeat the question?
16   Q.  Yes.  The promotion or, slash, disabling, the step that
17   occurs before the auction for the top ads, that is based on
18   predicted click-through rate, right?
19   A.  It's based on the long-term value score.
20   Q.  Which include predicted click-through rate, right?
21   A.  Predicted click-through rate is one of the four signals
22   that uses.
23   Q.  And you gave some testimony about long-term value.  Let
24   me just jump to that for a second.  You said it was a
25   combination of bid, predicted click-through rate, LQ and CQ;
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1133

```
1    is that right?
2    A.   That is how we compute the long-term value score, yes.
3    Q.   This is not related to the quality of the ad, is it?
4    A.   Not really.  You can imagine an advertiser with a lower
5    quality ad might raise the bid so that to make up for the low
6    piece.  So in that sense there is kind of a relationship, but
7    the bid itself is not really an indication of quality.  Is
8    that what --
9    Q.   But Google can't understand whether the ad has a higher
10   quality merely from the bid the advertiser gives you; isn't
11   that right?
12   A.   I would say it's a fair statement.
13   Q.   And same thing with LQ; is that right?  That is not an
14   indicator of the ad quality?
15   A.   That, I would disagree with.
16   Q.   LQ is an indication of landing page, correct?
17   A.   That's correct.
18   Q.   And the -- so let me rephrase.  LQ is not an indication
19   of the quality of the four lines that form the ad itself?
20   A.   So I believe -- and I'm really not certain about this --
21   that those ads may actually be used as a -- excuse me, those
22   lines of text may actually be used as a signal to the LQ
23   system.  So I can't promise you that it's not the case that
24   those are used in the LQ score.
25   Q.   Well, you would agree that predicted click-through rate
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1134

```
 1    is the most significant driver to determine quality in LCD

 2    score for the ad itself?

 3    A.   I don't think I would agree with that, no.

 4    Q.   Now, Mr. Furrow, when you took the stand, you said you

 5    were part of the ads quality team, right?

 6    A.   That's correct, yes.

 7    Q.   And you said you were -- that's the group that is

 8    responsible for showing the best ads in making them as good

 9    as possible.  Is that a fair characterization of your

10    testimony?

11    A.   Using the terms best and good very loosely, yes.

12    Q.   It's true, isn't it, that the ads quality team is

13    actually responsible for making sure that the ads you show to

14    users are relevant to the query; isn't that right?

15    A.   I think that it's fair to say that the ads that we show,

16    it would be nice if they were relevant.

17    Q.   But the ads team is responsible for making sure the ads

18    shown at the Google website are relevant; isn't that right?

19              MR. NELSON:  I think it is asked and answered, Your

20    Honor.

21              THE COURT:  Sustained.

22    BY MR. CIMINO:

23    Q.   At your deposition when I asked you similar questions,

24    you wouldn't use the word "relevant," would you?

25    A.   I wasn't comfortable with it, no.
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Cross   1135

1   Q.   And as a matter of fact you said that you don't have a

2   definition of relevance and those aren't words that you use

3   in the context of ads -- in the context of ads; isn't that

4   right?

5   MR. NELSON: I'm going to object, Your Honor.   This

6   is not proper impeachment.   He asked him the question and he

7   answered the question.

8   THE COURT: Sustained.

9   BY MR. CIMINO:

10   Q.   You were given the example of raven, do you recall that?

11   A.   Yes, I do.

12   Q.   Whether SmartAds could determine whether raven refers to

13   bird or football team; is that right?

14   A.   That's roughly correct, yes.

15   Q.   It would be true, though, wouldn't it, that SmartAds

16   would be able to distinguish raven from Chrysler automobiles?

17   A.   Distinguish in what way?

18   Q.   That it would know the difference?

19   A.   It -- I guess -- I don't mean to be argumentative, it is

20   just to say that SmartAds knows the difference, I'm not sure

21   exactly what that means.   We would generate different

22   attributes, and there would be different odds multipliers

23   involved.   Is that what you're getting at?

24   Q.   Yes.

25   A.   In that case, yes, we would generate different attributes

JODY A. STEWART, Official Court Reporter

```
 1  and different odds multipliers.

 2  Q.  So someone looking for ravens probably wouldn't get an ad

 3  for a Chrysler automobile; would you agree with that?

 4  A.  It is pretty unlikely.

 5          MR. CIMINO:  No other questions.

 6          THE COURT:  Any redirect?

 7          MR. NELSON:  Just briefly Your Honor.

 8                      REDIRECT EXAMINATION

 9  BY MR. NELSON:

10  Q.  So Mr. Cimino asked you a couple of questions about some

11  attributes that relate to the query in some aspect of the ad.

12  Do you remember that?

13  A.  Yes, I do.

14  Q.  Okay.  So what are those attributes used for?

15  A.  Well, those attributes are just used to compute an odds

16  multiplier.

17  Q.  Okay.  And what is the process for doing that, just to

18  get the right odds multipliers?

19  A.  To get the right odds multipliers for any given

20  attribute, well, it is not going to turn out very often, for

21  the most part, but we will go through all of our log events

22  and update all of our odds multipliers up and down as we see

23  clicks and nonclicks, and that will just be one of them, and

24  we will arrive at the odds multipliers for that just based on

25  just the other odds multipliers and how everything is moving
```

Furrow, B. - Redirect   1137

```
 1   around and on -- also on the clicks and nonclicks on events

 2   for that attribute.

 3   Q.  So does that attribute then get combined with the odds

 4   multipliers?

 5            MR. CIMINO:  Objection, Your Honor.  I can go into

 6   combination, and that is a legal issue.

 7            MR. NELSON:  That ad combination is the whole

 8   process.

 9            THE COURT:  Well, he did but I'm not sure he went

10   that way.  Rephrase it and try it again.

11   BY MR. NELSON:

12   Q.  Okay.  Just explain for us, then, the relationship

13   between the odds multipliers and the attribute.

14            MR. CIMINO:  Your Honor, I didn't go into that

15   either.  Another way to get into a lead question.  They can

16   have their expert talk about combination.

17            THE COURT:  Do you know the difference?

18            THE WITNESS:  The difference between?

19            THE COURT:  Do you know how to answer the question

20   he's asked you?

21            THE WITNESS:  I believe so, yes.

22            THE COURT:  Objection overruled.

23            THE WITNESS:  An odds multiplier is associated with

24   an attribute.

25   BY MR. NELSON:
```

JODY A. STEWART, Official Court Reporter

Furrow, B. - Redirect   1138

1   Q.   Okay. And how is the attribute used to get the odds

2   multipliers?

3   A.   In serving, there is just a big old table like a big old

4   dictionary, and then we would say, all right, this attribute,

5   (indicating), you know, go to the right page for that and

6   there is a number written on it.

7   MR. NELSON: Okay. Thank you. I have no further

8   questions.

9   THE COURT: Ladies and gentlemen, we are going to

10 take a break right here 15 minutes, and we are going to come

11 back and continue. May this witness be excused permanently

12 or do you want to keep him around?

13   MR. CIMINO: He can be excused.

14   MR. NELSON: That would be fine, Your Honor.

15   THE COURT: You are excused.

16   THE WITNESS: Thank you very much, Your Honor.

17   THE COURT: I have one housekeeping question before

18 we depart.

19   You may step down, Mr. Furrow.

20   (Witness excused.)

21   (Jury out at 3:50 p.m.)

22   THE COURT: You may have a seat. The Court needs to

23 get a handle on the schedule because some other matters, and

24 so the Court needs to -- do you have an idea how many

25 witnesses you may be calling? I'm trying to figure out

```
 1    exactly how many more days we may need?  I know it is early,

 2    but having been here about six or seven days you may have a

 3    better assessment of how many of these witnesses you have

 4    listed that you are probably going to need.

 5              MR. NELSON:  Yeah, potentially four more, Your

 6    Honor, and that would be the maximum.  I believe they have

 7    one more witness, which is a rebuttal and validity expert.

 8              THE COURT:  Okay.  So is a possibility we may be

 9    able to finish by Friday?

10              MR. NELSON:  We can try the best we can.  The one

11    question about that, I know Your Honor's direction is that

12    there was some deposition testimony that we had originally

13    designated Mr. Berger, and I know you want us to call him

14    live.  It would be much faster if we just played the little

15    deposition testimony and move on from there.

16              THE COURT:  Mr. Berger is still here?

17              MR. NELSON:  I don't know.

18              MR. BROTHERS:  Yes, Your Honor, Mr. Berger -- we

19    have told him to stick around since they told us they would

20    be potentially calling him.

21              MR. NELSON:  I mean, it is only timing.  We are fine

22    with that but --

23              THE COURT:  Well, you know, we just keep going live

24    at this juncture.

25              MR. NELSON:  Okay.
```

Ungar, L. - Direct   1140

```
 1              THE COURT:  All right.  Recess for 15 minutes.

 2              (Recess from 3:52 p.m. to 4:14 p.m.)

 3              THE COURT:  Okay.  Bring the jury in.

 4              (Jury in at 4:14 p.m.)

 5              THE COURT:  I forgot to ask you how long you thought

 6   the direct might take?

 7              MR. PERLSON:  The direct will take several hours

 8   because he is doing noninfringement and validity issues.

 9              THE COURT:  We will break at our regular time, then.

10   You may be seated.

11              Let the record reflect all jurors are present in the

12   courtroom.  Does counsel agree?

13              MR. CIMINO:  Yes, Your Honor.

14              THE COURT:  Call your next witness.

15              MR. PERLSON:  Okay.  Defendants call Dr. Lyle Ungar.

16              (Witness was sworn.)

17               LYLE UNGAR, called by the defendant, having been

18   first duly sworn, was examined and testified as follows:

19                          DIRECT EXAMINATION

20   BY MR. SHERWOOD:

21   Q.  Good afternoon, Dr. Ungar.

22   A.  Good afternoon.

23   Q.  Could you please tell us your full name?

24   A.  Lyle H. Ungar.

25   Q.  And where do you live, Dr. Ungar?
```

JODY A. STEWART, Official Court Reporter

Ungar, L. - Direct   1141

```
 1   A.   I live in Philadelphia.
 2   Q.   And could you tell us a little bit about yourself?
 3   A.   Yes.  I'm professor at the University of Pennsylvania.
 4   I'm happily married with a nine-year-old daughter who is very
 5   upset that I'm away from her for so long, and I'm very fond
 6   of bicycling.
 7   Q.   What do you do for a living?
 8   A.   I'm professor of computer and information science at the
 9   University of Pennsylvania.
10   Q.   I put up there for the jury to show, is this a copy of
11   your CV?
12   A.   Yes.
13   Q.   And the first page?
14   A.   First page, of course.
15   Q.   Okay.  And let's talk some about your experience that's
16   relevant to this case.  When did you start working with
17   computers?
18   A.   I started programming actually as a high school student.
19   Q.   And what sort of program were you doing then?
20   A.   Oh, then mostly just fun little programs to play around
21   on my father's computer.
22   Q.   Okay.  And what was your next training after that?
23   A.   Well, I did my undergraduate degree at Stanford where I
24   took courses in computer science, and then I did my Ph.D. at
25   MIT where I also studied computer science and artificial
```

Ungar, L. - Direct   1142

```
 1   intelligence.
 2   Q.   Okay.   And what degrees did you get from -- well, what
 3   degree did you get from Stanford?
 4   A.   I got a Bachelor's in science in chemical engineering.
 5   Q.   And how about from MIT?
 6   A.   MIT I got a Ph.D. in chemical engineering.
 7   Q.   And what did you do after studying at MIT?
 8   A.   I took up a position as an assistant professor at the
 9   University of Pennsylvania.
10   Q.   And how long have you been at the University of
11   Pennsylvania?
12   A.   I joined in 1984, so that's -- a very long time.
13   Q.   And when you joined the faculty at the University of
14   Pennsylvania, what department were you in at first?
15   A.   I was initially hired as a chemical engineer in the
16   chemical engineering department.
17   Q.   And at some point in time did you switch departments?
18   A.   Yes.   Short -- well, a couple of years after I got there
19   I started teaching computer science courses.   I decided I was
20   more interested.   I thought for a while about changing
21   computer science, and after a few years I switched over to
22   have my primary appoint be in computer science.
23   Q.   Dr. Ungar, are you an engineer?
24   A.   I'm trained as an engineer.   I've never practiced on
25   engineer.   I'm also computer scientist.
```

Ungar, L. - Direct   1143

1   Q.   And have you written computer codes?

2   A.   I've written lots of computer code. My Ph.D. thesis

3   involved writing hundreds and hundreds of pages of computer

4   code, and certainly in my decades at Penn I wrote lots of

5   computer code. I also supervised a number of programmers in

6   writing computer code, and, of course, I taught many, many

7   times writing computer code.

8   Q.   Okay. I think we have up on the screen here a sampling

9   of some of the classes that you taught at the University of

10   Pennsylvania. Can you first go over what the undergraduate

11   courses that you taught?

12   A.   I taught lots of courses, a sampling, but I taught the

13   introductory program course, very large, 200-student course.

14   I taught students in expert systems and artificial

15   intelligence, which are questions about how do you get a

16   computer to automate some sort of reasoning that a person

17   does in terms of interpreting e-mail that is sent or making

18   decisions to who to give a loan to or driving a car. I have

19   taught statistic modeling courses. Those are all

20   undergraduate courses.

21   Q.   And can you tell us a little bit about the model building

22   and modern statistics class?

23   A.   Yes. A lot of what I do for my research is take

24   complicated systems and write equations, describe them, and

25   that as they collected data, then update those models, and

JODY A. STEWART, Official Court Reporter

Ungar, L. - Direct   1144

1   that's one of the things I teach my students how to do.

2   Q.   Okay. And do you do any teaching of graduate students?

3   A.   Yes. About half my teaching is graduate Master's and

4   Ph.D. level teaching.

5   Q.   Okay. And I think we have a few examples here. Can you

6   walk us through some of the graduate teaching work you do?

7   A.   Most of those are on the more mathematical technical

8   side. Machine learning is the statistics method you heard

9   about stochastic gradient descent, these very complicated

10   algorithms, lots of very mathy questions about how to deal

11   data. Artificial intelligence, I mentioned, this field of

12   robotics and vision. Can you take a picture and recognize

13   who it is? Can you take an e-mail and understand what it is

14   talking about? Can a computer do that? Data mining,

15   processing large amounts of numbers or text.

16   Q.   And does some of your work in dealing with graduate

17   students and Ph.D. students, does that involve supervising

18   research?

19   A.   Yes. About a third of my time is actually teaching in

20   the classroom. About a third of my time is supervising

21   research projects. I supervised many Ph.D. theses and lots

22   of master students and post-doctoral fellows and undergrads,

23   as well, in the laboratories.

24   Q.   Okay. Well, let's go over some of the work you've done

25   in research. Have you written technical papers?

JODY A. STEWART, Official Court Reporter

1   A.   Yeah, many, many. I stopped counting at a hundred but

2   lots of technical papers.

3   Q.   And is that something that you do regularly as part of

4   your job?

5   A.   Yes. Yeah. I certainly publish five or ten papers a

6   year in technical journals.

7   Q.   And have you ever -- we've heard a lot about

8   collaborative filtering in this case. Have you ever written

9   any papers on collaborative filtering?

10 A.   Yeah. I have written several. I've listed a couple

11 here. One clustering methods for collaborative filtering

12 back in 1998, and then the second one from 2002, talking

13 about the cold-start recommendations. How do you make a

14 recommendation before anybody has done any clicking? So just

15 given, in this case for example, compact disks or movies or

16 webpages, before someone clicks before you have any

17 information, how do you start off the system.

18 Q.   Okay. And there's a reference in this Slide to over 400

19 citations each. What does that refer to?

20 A.   Well, measuring some sense of how important your paper is

21 in my field, is how many people have read the paper, and when

22 they write a paper, do they cite you? So they say based upon

23 extending the work of Ungar and Foster, we did the following.

24 And these papers are very widely, much more widely read but

25 very widely cited. Lots of people build on top of these

Ungar, L. - Direct   1146

1   techniques.

2   Q.   And are you an inventor on any patents, Dr. Ungar?

3   A.   Yes, I'm core inventor on nine patents.

4   Q.   And, again, do you have any patents relating to

5   collaborative filtering systems?

6   A.   Yes. I have listed three of them here.

7   Q.   Can you -- we don't need to go over each of them, but,

8   first of all, what is the dates of these patents or do you

9   indicate that there?

10   A.   Yes, these patents were all filed in 1994 or 1995. So,

11   again, we are talking several years, four or five years

12   before the filing date of the patent in question here.

13   Q.   And maybe you could just tell us about the first one, the

14   '939 patent, just very high level.

15   A.   Yes. So the goal of this was to customize electronic

16   identification of desirable objects, trying to find desirable

17   object, a webpage, a CD, compact disk you are looking for,

18   and this is a system for helping to find that, it generates

19   user profiles, information about the user. The second one

20   looks at object profiles, information about the object, what

21   we called the content before.

22   So these are methods that have some content-based

23   and actually some collaborative-based methods inside them for

24   recommending, here is something you might like.

25   Q.   And how about consulting work, do you do consulting work

1   outside of your research and teaching?

2   A.   Yes. My deal is ten which is standard, as I can spend

3   one day a week outside, and I have done, over the years,

4   many, many projects, with everything ranging from startups to

5   big corporations.

6   Q.   And have those, any of those were collaborative

7   filtering?

8   A.   Yeah, a number of have. I've listed three here.

9   Q.   Maybe you could tell us about you CDNow project.

10 A.   CDNow was a startup back at the same time that Amazon was

11 starting with in the mid-'90s, and they sold compact disks

12 through the web, which was novel back then, and they needed a

13 system to recommend.

14   So if someone has bought one CD, and the question is

15 what other CDs should I recommend to you? They have 40,000

16 different CDs to sell at the time. I can recommend maybe

17 five in an e-mail. Which five -- of course, want to

18 recommend a different five to each of you to maximize your

19 chance of buying, and I designed an algorithm for them and

20 supervised the writing of the software for that.

21 Q.   Okay. And then there is another one here, Alkindi.

22 A.   Alkindi was a dot-com startup in the 2000 era that went

23 bankrupt that tried to recommend movies. They did, they

24 actually wrote a software before it went bankrupt, like these

25 movies, here are other movies you would like potentially to

1 have.

2 Q. And how about the Digital Trowel? First of all, the

3 first few you have there are in relation to collaborative

4 filtering?

5 A. Those are all recommending CDs you might like, movies you

6 might like, arts you might like, sell art on the web. They

7 are still in business.

8 Q. Okay. The second bullet you have there relates to

9 consulting work in information extraction and retrieval.

10 First of all, what is that?

11 A. Information extraction is when there is a webpage, be

12 nice to know what information is on it. Google mostly

13 historically brings back, here is a page to you, but it is

14 useful to know what are the people on it, what are the movies

15 on it, what are the CDs on it, did this person who reviewed

16 this movie on this page like the movie or dislike the movie

17 or was that neutral?

18   So information extraction is pulling out facts from

19 the movie, the people, where they worked, what their phone

20 numbers are.

21 Q. And maybe you could describe one of these like, for

22 example, the Dow Jones?

23 A. Yes. So Dow Jones is a company that publishes newspapers

24 like the "Wall Street Journal," but they also sell products

25 to help marketing people and business analysts track how well

Ungar, L. - Direct   1149

```
 1   their products are doing.  So your Apple, you release the new

 2   iPhone, you'd like to know what's being said in the

 3   newspapers and the blogs, what is being tweeted about, what

 4   people are posting on Facebook.  And so Factiva is a product

 5   that uses information retrieval and extraction, finds the

 6   things said about them, has a very sophisticated user

 7   interface to see, well, are people saying good things or bad

 8   things?  What is being associated with the iPhone, sort of

 9   tracking what is happening in the news broadly construed.

10           MR. PERLSON:  At this point, Your Honor, we move to

11   qualify Dr. Ungar as an expert in computer science and

12   information retrieval.

13           THE COURT:  You wish to voir dire him on his

14   credentials?

15           MR. CIMINO:  No, Your Honor, no objection.

16           THE COURT:  Okay, ladies and gentlemen.  You may

17   accept Dr. Ungar as an expert in the field of computer

18   science and information retrieval.

19   BY MR. SHERWOOD:

20   Q.  Dr. Ungar, have you formulated any opinions related to

21   this case?

22   A.  I have.

23   Q.  Okay.  And you put up here a summary of some of that.

24   Maybe you could, first of all, have you conducted an opinion

25   as to whether the patents are infringed in this case?
```

Ungar, L. - Direct   1150

```
 1   A.   I have.

 2   Q.   And what is your opinion?

 3   A.   My opinion is that the accused products do not infringe.

 4   Q.   Okay.  And then the second one, alternatives to accused

 5   functionality, have you formulated an opinion in relation to

 6   that?

 7   A.   Yes.  I have studied the question and have come up with a

 8   fair number of alternatives that could be used in place of

 9   the accused functionality.

10   Q.   And then comparable patents, what is that referring to?

11   A.   I was asked to look at several different patents and to

12   opine, to say whether they were, in fact, comparable or not

13   comparable.  I have done that.

14   Q.   Okay.  And then the last bullet, patents are invalid,

15   have you formulated opinions in that regard?

16   A.   Yes.  I was also asked to check, based on the prior art,

17   are these patents obvious or anticipated based on the prior

18   art, and I have formed an opinion.

19   Q.   And what is your opinion?

20   A.   The patents are not valid, they are invalid in light of

21   the prior art.

22   Q.   Well, let's first talk about the -- we will go through

23   all those in details but first I'd, you know, like to address

24   the issue of noninfringement.  First of all, in formulating

25   your opinions on that issue, what did you review?
```

Ungar, L. - Direct   1151

```
 1   A.  Lots of materials.  I looked, of course, first of all, at

 2   the patents themselves.  I looked at the Court's claim

 3   construction.  The Court has, as you know, specified certain

 4   phrases and mean certain things.  I looked at lots of Google

 5   documents, both the high level marketing and technical

 6   internal documents.  I've looked at depositions of a number

 7   of people.  You've seen several of them speaking here.

 8           I talked to some of the engineers, like Bartholomew

 9   Furrow, who you just heard.  I spoke with him many times on

10   the phone.  I also, of course, just relied on my general

11   expertise.  I have been doing computer science for a long

12   time.

13   Q.  And did you review source code?

14   A.  And I did actually look, Google provided me with source

15   code, which I reviewed myself and walked through -- I had

16   questions with Google engineers.

17   Q.  And, well, let's just briefly go over the asserted

18   patents in this case.  First of all, when was the '420 patent

19   filed?

20   A.  The '420 patent was filed on December 3rd, 1998.

21   Q.  And why is -- the filing date, is that important to your

22   analysis and opinions that you've rendered in the case?

23   A.  It's important for questions of whether this patent was

24   anticipated, did someone have the same idea beforehand.  So

25   patents are, loosely speaking, not valid.  I'm sure we will
```

Ungar, L. - Direct   1152

```
 1   come later to technical, legal details.  But if someone has

 2   had the same idea beforehand, you can't patent something

 3   that's already fully described in the literature as obvious.

 4   And it has to be described before that filing date.

 5   Q.  And the -- there is the second patent, '664, how is that

 6   related to the '420 patent?

 7   A.  The '664 patent, as you may remember, has the exact same

 8   specification, the descriptions are the same, but has a

 9   different set of claims.

10   Q.  Well, let's go over briefly -- I have shown you -- put up

11   here the abstract.  Can you just at high level explain what

12   these patents are about?

13   A.  Yes.  So the patent, as you've heard, describe a search

14   engine system, and this search engine system has in it two

15   components.  It's a combined collaborative/content-based

16   filter.  So it's collaborative feedback data that is used.

17   It's got a content-based filter that combines those two in

18   ways that are specified in the patent description and most

19   importantly in the claims.

20   Q.  Okay.  Well, before we get into the claims, just do a

21   little walk-through of some of these high level concepts.

22   First of all, this first slide is the header is

23   scanning/searching.  Can you explain how that relates to the

24   patents?

25        Little animation there.
```

Ungar, L. - Direct   1153

```
 1   A.   What the patents require is that there is a -- they call
 2   is a demand query.  The user types in a query, a search like
 3   Jaguar, some search term.  Then that is sent to a scanning or
 4   searching term.  The patents use different terms there.
 5   Those -- the system -- the network, for example, the Internet
 6   looks for webpages, pulls those webpages back.
 7            The patent uses, I think, a strange name that they
 8   made up called informons.  So informon is just some unit of
 9   information like a webpage or a description of a book.  That
10   is the core piece of the scanning/searching is going out to a
11   network, grabbing these webpages and pulling them back.
12   Q.   Content filtering, does the patent talk about content
13   filling?
14   A.   The patent does.  It is one of the concepts you have
15   heard and I think the description in the patent is actually
16   quite clear.  "Content-based filtering is a process of
17   filtering by extracting features from the informon."  Okay.
18   It is not the same kind of feature you heard about from
19   Google, but it says what it means, features of the text of
20   the document, that is the words in the webpage, and the
21   informon is the document.  So extracting features from an
22   informon, says is pulling the words out of the document or a
23   page or an article.  "To determine the informon's relevance,"
24   how relevant is this webpage to a query.
25   Q.   Now, what's shown on this slide here?
```

Ungar, L. - Direct   1154

1   A. This slide illustrates just the basic idea of

2   content-based filtering. It's the user, my hypothetical

3   example types in Jaguar, the scanning/searching system would

4   come back with lots and lots and lots of webpages.

5   But the first thing to do is to remove ones that

6   don't mention Jaguar or don't mention Jaguar often enough.

7   So it will only keep page where Jaguar shows up three times

8   or where at least one word in a hundred is Jaguar. So I have

9   shown here is that there are some pages like flowers.com or

10   kayak.com, they don't mention Jaguar often enough, they are

11   filtered out, they are removed. So all that is returned are

12   webpages that mention Jaguar, the word "Jaguar."

13   Q. Okay. Now, on the next slide there is a reference to a

14   problem with that content filtering. Can you explain what

15   that refers to?

16   A. Yes. In general in search there is a big problem which

17   is that each word in English and every language can refer to

18   lots of different things. And in particular example, a

19   Jaguar could be a big cat, it could be the name of a football

20   from Florida. It is. It's is the name of a kind of fancy

21   car. There is other lots of other Jaguars. And so the

22   problem is that searching for the word "Jaguar," the content

23   filtering brings back all sorts of Jaguars.

24   Q. And one of the other concepts we've heard is

25   collaborative filtering, and does the patent talk about

Ungar, L. - Direct   1155

```
 1   collaborative filtering?
 2   A.   The patents do talk about collaborative filtering, and
 3   collaborative filtering, in contrast to content filtering, is
 4   a process of filtering informons.  They can forget the
 5   documents by determining what informons or which webpages
 6   other users with similar interests or needs found to be
 7   relevant.  So it uses information about people who are
 8   similar to you, what else did they like.
 9   Q.   Okay.  Well, let's kind of walk through this concept a
10   little bit.  What is shown on this slide here?
11   A.   So imagine three people, each of whom type in the word
12   "Jaguars" as a demand query, as a search.
13   Q.   Okay.  And then what happens?
14   A.   Well, each of them gets back only webpages that mention
15   Jaguars, but collaborative filtering says we can do something
16   better if we know that you're a car lover, you're a group of
17   users that still like cars, we will give you pages that were
18   liked by car lovers, in this case combined both Jaguars and
19   cars.
20           So this gets rid of all, in this example, the real
21   world, at least gets rid of some of these other Jaguar pages.
22   So the car lover would be shown car-related Jaguar pages, not
23   Florida football team related or big cat Safari related
24   Jaguars.  So it's the way to further filtering down the
25   webpages to be ones that the user actually cares about.
```

Ungar, L. - Direct   1156

```
 1   Q.   And is this another example?
 2   A.   Yes.  So someone were in a different community, different
 3   group, a group of the travellers, they would get
 4   travel-related Jaguar pages, ones that were liked by other
 5   people who had also indicated or somehow been classified as
 6   travelers.  So you get Safaris or National Geographic pages
 7   about Jaguars.
 8   Q.   Now, the things that we have gone over so far in the
 9   content filtering that -- did that exist before the patents
10   in this case?
11   A.   Oh, yes.  It was well-known.
12   Q.   And how about collaborative filtering?
13   A.   Collaborative filtering was also well known.  For
14   example, even now I used collaborative filtering that tends
15   to recommend CDs to people.  So these were techniques that
16   were widely practiced by me and many, many other people.
17   Q.   And you referred to searching, was searching done before
18   the patents-in-suit?
19   A.   Yes.  Yes.  There were lots of search engines back then.
20   I remember using several of them.
21   Q.   Okay.  Well, let's talk about, you know, how the patents
22   use this content filtering, collaborative filtering step.
23   What is shown on this slide?
24   A.   So this slide shows, to illustrate the benefit of
25   collaborative filtering.  So with content filtering you only
```

Ungar, L. - Direct   1157

```
1    see webpages that have the word "Jaguars," but everybody is

2    treated equally.  Everybody, you, I, we all get the same

3    webpages.  But with an applied collaborative filtering on top

4    of that, if I could have the next slide, now if it knows that

5    I like cats and you like cars, we will see different

6    webpages.  So it helps.  It does a further refining on top of

7    the content-based filtering.

8            MR. CIMINO:  Your Honor, objection on -- you

9    sustained an objection on this topic before.

10           MR. PERLSON:  Your Honor, that is not correct.

11   There was no objection sustained.  This is a specification.

12           THE COURT:  What is it?

13           MR. PERLSON:  Part of the specification from this

14   patent.  Dr. Frieder went over the patent repeatedly.  He

15   didn't go over this section of the specification but it's an

16   important part and we -- and it's part of his report.

17           THE COURT:  The Court recalls we had some discussion

18   previously about the mind pool.

19           MR. CIMINO:  That's correct.

20           MR. PERLSON:  Well, my understanding, Your Honor,

21   that there was an objection made and you withdrew it, but

22   there was no ruling, it was just not something we chose to

23   present at that time.  But it is a critical part of the

24   specification.  It talks about the very thing that we are

25   talking about, and we are using it to explain what the patent
```

JODY A. STEWART, Official Court Reporter

```
 1    discusses.

 2           Dr. Frieder repeatedly, throughout his -- referred

 3    to other parts of the specification, and this is an

 4    appropriate part to explain what the concept is about.

 5           THE COURT:  It is a mind pool.

 6           MR. PERLSON:  In fact, this is the only part of the

 7    patent that actually discusses how to use collaborative

 8    filtering, so it is particularly critical.

 9           MR. CIMINO:  Your Honor, it is not an asserted

10    claim.  There are claims to mind pool.  There are other

11    patents in this family that are directed to mind pools.  The

12    claims at issue are not mind pools.  That is why we suggest

13    one.

14           THE COURT:  I recall this discussion now.  Objection

15    sustained.  Move to another slide.  I recall it.

16           MR. CIMINO:  Your Honor, same objection.

17           MR. PERLSON:  Your Honor, again, this is the only

18    discussion of grouping in the patent and --

19           THE COURT:  What is about the desire to pursue the

20    matter, the mind pool features that continue to draw an

21    objection from you, Mr. Cimino?  I wish we had taken this up

22    again before we got the doctor on the stand.

23           MR. PERLSON:  That slide --

24           THE COURT:  This is the one right here?

25           MR. PERLSON:  This is the one after the one that
```

Ungar, L. - Direct   1159

1   shows the mind pool.

2   MR. CIMINO: I have an objection to this one also,

3   Your Honor. The highlighted part is where the mind pool

4   hierarchies is in. Again, this is one of the preferred

5   embodiments, no private instruction for mindful to indicate

6   it is other claims that are not asserted. Same objection as

7   before. We have a difference of opinion on how to do this,

8   similar interests of needs. If they want to have Dr. Ungar

9   explain what that is, fine. But this is embodiment that is

10 not relevant to these claims.

11   MR. PERLSON: Your Honor, we are merely trying to

12 explain the patent.

13   THE COURT: Well, consistent with my previous

14 ruling, I sustain the objection on this one also.

15   MR. PERLSON: I'll move on to this one, assuming

16 that is the same objection.

17 BY MR. PERLSON:

18 Q. So let's move on to talk about the claims here. First of

19 all, claim 10, can you just sort of walk us through claim 10

20 in the '420 patent?

21 A. Yes. So the claim 10, which is the main claim in the

22 '420 patent, describes a search engine system which has in

23 the system for scanning a network. I gave you the example of

24 going out to the web and looking for webpages to make a

25 demand search based on the query like Jaguars or informons,

Ungar, L. - Direct   1160

```
 1   webpages relevant to a query.  Right.  Find pages that are

 2   relevant to Jaguars.  It has a content-based filter system

 3   like I described for receiving this informons, the webpages,

 4   and filtering the informons on the basis of applicable

 5   content profile data for relevance, checking to see if it's

 6   got the word "Jaguars" in the webpage.

 7           That is a feedback system for receiving

 8   collaborative feedback data.  That was the part I didn't get

 9   to explain, but the Court has defined, construed what

10   collaborative feedback data, data from users with similar

11   interests or needs, and remember that I said, for example,

12   you have car lovers, you have people who like football.

13   Those are the users with similar interests or needs, ones

14   that are interested in football, ones that are interested in

15   cars, and the collaborative feedback data, that's the data

16   from people who are similar to you, right.

17           Takes that information, and then it combines the

18   collaborative feedback data, right, the ones from the people

19   like you who are -- other people like you seeing big cats

20   with the content information, the Jaguar information, and

21   uses that to filter each informon, decide which webpages to

22   show, filter it for relevance to the query.

23   Q.  And now this is the '420 patent, claim 10.  Is there

24   another independent claim to the '420 patent?

25   A.  Yes.  There is a second parallel claim, claim 25, I
```

JODY A. STEWART, Official Court Reporter

Ungar, L. - Direct   1161

```
 1   believe.  This claim is a search engine system to the second
 2   claim that describes a method.  The system is more like a
 3   physical thing.  The method is how it does it.
 4   Q.   And how are the elements related to each other?
 5   A.   They each require exact same elements.
 6   Q.   Okay.  So when we are talking about noninfringement today
 7   and throughout your testimony, will we be -- and you're
 8   referring to claim 10, would those same discussion apply to
 9   the other independent claims?
10   A.   All the arguments for claim 10, the system, apply exactly
11   the same to claim 25, the method claim.  There is no need
12   happily to go through both of them.  All the arguing is for
13   one apply equally to the other one.  So I will talk mostly
14   about the '420 just to keep from repeating myself.
15   Q.   So let's go to the other asserted claim in this case --
16   I'm sorry, the other asserted patent in the case, the '664
17   patent, claim 1.  Can you just briefly walk us through that,
18   too?
19   A.   Yes.  So the '664 patent, which has the exact same
20   specification, has somewhat different claims.  The claims
21   look similar.  They have the same pieces in them, but they
22   are a little bit different, so let me explain this.  So,
23   again, it's a search system, and it comprising, is made up of
24   a scanning system for searching for information relevant to a
25   query associated with the first user.  That's the same as
```

JODY A. STEWART, Official Court Reporter

Ungar, L. - Direct   1162

1   last time, someone types in Jaguars, the scanning system that

2   looks for pages that mention Jaguars. There is a feedback

3   system for receiving information found to be relevant to the

4   query by other users. So when other people typed in Jaguar,

5   what webpages did they get back? What information did they

6   get?

7   Finally, there's a content-based filter system that

8   combines the information, the webpages from the feedback

9   system with the information from the scanning system. Right.

10   Remember there was some pages from other users, some pages

11   from the first users, combines them together and filters the

12   combined information for relevance to at least one of the --

13   either the query or the first person who did the search or

14   both. I'm sorry. Am I echoing a little bit?

15   Q. It was a little bit at the end.

16   A. I will move this just a tiny bit farther away. Let me

17   know if I'm not loud enough.

18   Q. There is little bit but --

19   A. Okay.

20   Q. So, now, when you were about to conduct your analysis on

21   infringement in the case and noninfringement, were you

22   instructed as to the rules of the road as to how it was you

23   are supposed to engage in that analysis?

24   A. Yes. There are a number of terms itself in the patent

25   that the Court has given definitions from. They are

Ungar, L. - Direct   1163

1   constructed. You have seen these before. Dr. Frieder talked
2   about them also. And so, for example, I said informon, every
3   time I see informon, what does it mean? I look at these
4   claims. It's an information entity, like a webpage, a
5   potential actual interest to the individual user or first
6   user. So each time you see a term like informon or user or
7   relevance to the query, the first thing I do is look back and
8   say, well, did the Court tell me what it meant? Great, I
9   will use that.
10   Q. And then in relation to the language of the claims and
11   the Court's constructions, what do you do next?
12   A. So I'm not sure I follow. Try the question again.
13   Q. The second part of the analysis; you have the language,
14   you have the Court's constructions, and then in the
15   infringement analysis or noninfringement analysis, what is
16   the next part?
17   A. The next part then is to ask whether the Google products
18   infringe or not. So they are the claims. The claims have
19   elements, each little section of the claim is called
20   elements. We have some of the terms there defined, and now
21   the question is do the Google products infringe? Do they
22   exactly do what's described in each of the elements?
23   Q. Just real quick, I think I asked you this question in
24   relation to the '420 patent but I forgot to do it for the
25   '664. Is there another independent claim of the '664 patent?

Ungar, L. - Direct   1164

```
 1   A.  Again, just like the '420 patent, this is a system
 2   patent, system claim.  There is a corresponding methods claim
 3   that, again, requires the same elements as the system claim.
 4   So, again, it's a parallel -- it's common, patents have the
 5   same claim repeated effectively twice, once for the system,
 6   one says the method.
 7   Q.  And so your discussion regarding claim 1 of the '664,
 8   would that apply to the other independent claim of the '664
 9   patent, too?
10   A.  Yes.  The two claims have the same elements, a discussion
11   that is for claim 1 also applies to the corresponding method
12   claim.
13   Q.  So let's go --
14         MR. CIMINO:  Your Honor, I object to this
15   demonstrative.  I'm sorry for interrupting.  This has the
16   same preamble issue that counsel has taken out of the opening
17   and we discussed in Dr. Frieder's testimony.
18         THE COURT:  The first entry on it.
19         MR. PERLSON:  Your Honor, Dr. Frieder checked the
20   box.  We are unchecking the box.  We are showing that it
21   shouldn't be checked, although we are saying no, but that is
22   all we are doing, Your Honor.  He said it was a search
23   engine.  We are saying that is not a search engine.  That is
24   all we are doing, is two slides.
25         MR. CIMINO:  Your Honor, AdWords does not practice
```

JODY A. STEWART, Official Court Reporter

```
 1    the claims.  There is a section that comes later that shows,

 2    the next thing in the search engine that requires an opinion

 3    that is limited, that is not as important.

 4              THE COURT:  Wait a minute.  I'll ask Dr. Ungar.

 5    Dr. Ungar, did you write a report indicating that there was

 6    no search engine here?  Did you put that in your report?

 7              THE WITNESS:  Yes.

 8              THE COURT:  You put that in the report?

 9              THE WITNESS:  Yes.

10              THE COURT:  Okay.  All right.  My objection is

11    overruled.  The jury will have to decide between these

12    experts who is right and who is wrong.

13              MR. PERLSON:  Thank you, Your Honor.

14    BY MR. PERLSON:

15    Q.  Now, let's look here.  We have here claim 10 in the '420

16    and claim 1 of the '664.  What is shown there?

17    A.  Both of them start, as I said, by describing either a

18    search engine system or a search system.  It says what is

19    being talked about.

20    Q.  And let's look at the next -- does Google have a search

21    engine?

22    A.  Google does have a search engine, a very good widely used

23    search engine.

24    Q.  And is that search engine accused in this case?

25    A.  It is not.
```

Ungar, L. - Direct   1166

1   Q. And up here on the right, is that -- what is shown there

2   on the right?

3   A. On the right is a quote from Dr. Frieder, and on the left

4   is the demonstrative that -- the picture that he showed, and

5   Dr. Frieder agrees that the search engine part is not

6   infringed. So the part in what he calls red or the orangey

7   red color on my screen, which is the search engine, that part

8   is not accused, not at issue here. In green, across the top

9   and on the right-hand side, is the ad system, showing ads,

10 and that's the part that is accused. So there is no, I

11 think, dispute that the search engine of Google is not an

12 accused product. It is not accused of infringing on the

13 patent.

14 Q. And is AdWords a search engine?

15 A. AdWords is not a search engine.

16 Q. Is it an advertisement system?

17 A. It is an advertising system for showing ads.

18 Q. Okay. So let's go on to the next one. So we just

19 discussed you agreed that it is -- is there a search engine

20 in AdWords?

21 A. AdWords is not a search engine.

22 Q. Okay. So let's go to the next element that we will see

23 here. So we show claim 10 of the '420 and claim 1 of the

24 '664. Can you explain to the jury what is being shown here?

25 A. Yes. The next element in each of these is something

JODY A. STEWART, Official Court Reporter

```
 1   describes scanning.  The wording is slightly different so
 2   there is no confusion, do the one by one.  The '420 patent
 3   talks about, "A system for scanning a network to make a
 4   demand search" -- remember that was the query, user asking
 5   for Jaguars -- "for informons," webpages, "relevant to a
 6   query from an individual user," and I've highlighted below
 7   that some of these terms are ones the Court has said this is
 8   the definition, and then constructed.
 9           So the Court has said that scanning a network is
10   looking for or examining items in a network.  A demand search
11   is a single search engine query, like Jaguars.  I typed in
12   the Google search engine, performed upon a user request.
13           And the '664 patent is similar but it talks about a
14   scanning system rather than scanning a network for
15   information like webpages, relevant to a query associated
16   with the first user.  And here scanning system has been
17   defined by the Court to be a system used to search for
18   information.  So both of them require some form of scanning
19   or searching.  The word users are slightly different.
20   Q.  And did you, in formulating your opinions in this case,
21   did you apply these constructions?
22   A.  I absolutely did.  That is why I put them here.
23   Q.  Okay.  And let's look at this slide here.  In the first
24   bullet point it says, "Ads and keywords provided to Google by
25   advertisers.  Scanning not needed."  Can you explain the
```

Ungar, L. - Direct   1168

```
 1   significance of that?
 2   A.   Yes.   Unlike a search engine which goes out to the web
 3   and searches for webpages and brings them back, AdWords, as
 4   you heard Bartholomew Furrow say earlier today, the
 5   advertisers themselves enter the ads.   Google doesn't have to
 6   search and find the ads.   If I want to advertise with Google,
 7   I give Google the ads I want to be shown.
 8            An advertiser tells Google, here is the ad, please
 9   show these.   Google doesn't search for them.   It doesn't scan
10   for them or look for them or examine things that are there.
11   Q.   And the second bullet point refers to a database lookup.
12   What is that?
13   A.   So Dr. Frieder's claim that when the ad system, AdMixer,
14   goes and looks up the ads and I.D.s associated with a keyword
15   term, that that's scanning, looking for information,
16   searching, which of these various terms, but that is wrong.
17   That is not how a database lookup works.
18            So remember how Mr. Furrow said a user types in a
19   user query, expanded it out, so he types in tulips, that may
20   be expanded to tulips and other versions.   Then the AdMixer
21   takes that word, a tulip, and looks to find ads that have
22   keywords of tulip.   It looks it up.   It doesn't need to look
23   for it.
24            So particular, the way a database works, is that it
25   knows where each of these words is stored.   So what it
```

Ungar, L. - Direct   1169

1   doesn't do is scan through and say, tulip, is that a flower?

2   Doesn't match. Is tulip a car, no. Is that a flower? Does

3   that match kayak? It doesn't go through looking through each

4   of these, look for it, doesn't search for it. It doesn't

5   examine items as it goes through the database.

6   Bartholomew Furrow used the fancy word of hash. But

7   that is just a fancy word for an address. It knows for each

8   keyword this is the address. This is where it is stored. So

9   when the AdMixer takes the database query of tulips and tries

10 to find all ads that have tulip as the keyword, it doesn't

11 look for it, it doesn't search for it, it doesn't scan. It

12 looks it up.

13   It knows it's address just like if you are going to

14 a friend's house, you know their address. You don't look for

15 their house. You don't examine --

16 Q. Dr. Ungar.

17 A. Sorry. I'm going on. I apologize.

18 Q. Used to teaching?

19 A. I'm used to teaching. I apologize. Thank you.

20   THE COURT: What I will suggest to counsel is that

21 we are going to stop right here and let you just take up

22 tomorrow with Dr. Ungar's testimony.

23   Ladies and gentlemen, it has been a long day. We

24 are going to stop, and we will start again tomorrow morning

25 at 10:00. Turn in your materials, see you in the morning.

Ungar, L. - Direct   1170

```
 1              You can step down, Doctor.

 2              THE WITNESS:  Thank you.

 3              (Jury out at 4:58 p.m.)

 4              THE COURT:  You may return to your seat.  Please

 5   have a seat.  One thing we need to address before we go.  One

 6   thing we need to address before we go.  I think there is an

 7   indication that we may need to close the court at some point,

 8   and if that's the case, I need to try to see where we can

 9   predict that will happen so that I can also give appropriate

10   notice.

11              MR. PERLSON:  Yeah, so I think the part of the

12   testimony that would get into the statistic templates is

13   actually very soon.  It would be shortly afterwards, maybe in

14   like 15, 20 minutes in, and it's very brief.  It's, you know,

15   probably 15, 20, 30 minutes at the most.

16              THE COURT:  What the Court would prefer to do is to

17   not start and stop and then have to clear the courtroom.  If

18   we could start it, deal with it, then continue to move, as

19   opposed to coming in for 15 to 20 minutes, then ask everybody

20   to leave, you know.

21              MR. PERLSON:  I can start with -- I can move on to

22   that point.  There was just one more point about that issue

23   but I can easily do that after that specific point.

24              THE COURT:  I hate to break up your flow but I think

25   in terms of dealing with the public and convenience to
```

Ungar, L. - Direct   1171

```
 1   everybody, that way I can put in notice that we will simply

 2   have the courtroom closed between 10 -- how long do you think

 3   it will take you to get through it?

 4           MR. PERLSON:  15, 20, 30 minutes, no longer than 30

 5   minutes.  I don't think it will take that long but I don't

 6   want to -- if it goes longer than expected, I don't want

 7   to --

 8           THE COURT:  We will do it between 10:00 and 10:30.

 9           MR. PERLSON:  That sounds great.

10           THE COURT:  That means if you have any issue, we

11   don't want to eat up that time frame that we say we are going

12   to be in closed session, which means you're going to have to

13   take the issue after the closed session.

14           MR. PERLSON:  Understood.

15           THE COURT:  I hate to tell you early in the morning

16   because I think you'll take me up on it, but we will have to

17   do it before 10, depending upon what it is.

18           MR. PERLSON:  Okay.

19           THE COURT:  So at least by 9:30, you need to reach

20   me if you have some issues that need to be taken up.

21           MR. CIMINO:  I think we do have some additional

22   issues on the slides that I prefer we have instead of

23   interrupting Dr. Ungar's testimony.  I tried to work it out,

24   but Mr. Perlson said he doesn't want to change the slides.

25   So I think the Court is going to have to see them.
```

JODY A. STEWART, Official Court Reporter

Ungar, L. - Direct   1172

```
 1              THE COURT:  You mean the two of you didn't work out
 2   anything on these slides?
 3              MR. PERLSON:  He asked me one question, Your Honor,
 4   and I didn't agree with the one point.
 5              THE COURT:  Was that the source of your meet and
 6   confer?
 7              MR. PERLSON:  We had the meet and confer last night
 8   regarding some of the objections we got.  There has not been
 9   a meet and confer regarding the objections related to the
10   invalidity slide that we got at 1:30 in the morning several
11   hours after the agreement, agreed time.  So we haven't met
12   and conferred on those.  We will tonight.
13              THE COURT:  Okay.  We will see what you have left
14   tomorrow morning at 9:30.
15              MR. CIMINO:  Yes, Your Honor.  Just a point of
16   clarification on the search engine issue, the preamble issue.
17              THE COURT:  I knew you were coming back to it,
18   Mr. Cimino.
19              MR. CIMINO:  Well, the issue is it's not a
20   limitation, all right.  Our expert said in his report it's
21   not a limitation.  That position is not rebutted by
22   Dr. Ungar.  He didn't come in and say, I believe it is a
23   limitation for these reasons and it's not there.  So the real
24   objection is if it's not a limitation, it's prejudicial to
25   show the jury that it's missing, because if it's not a
```

JODY A. STEWART, Official Court Reporter

Ungar, L. - Direct   1173

```
 1  limitation, it can't support noninfringement.

 2          MR. PERLSON:  Your Honor, he's the one who got up

 3  there and checked it four times.  I'm just unchecking it.  I

 4  mean, I just -- I can't believe that we are even arguing

 5  about this.

 6          THE COURT:  Well, I tell you what we are going to

 7  do.  The list is growing long.  I guess the Court will be in

 8  position to tell the jury don't believe anything either one

 9  of you said by the time we get to the end of this case.  I'm

10  not being comical.  I'm just being serious.  The list is very

11  long.

12          The Court is going to have to spend a long time

13  going back and reading the case law and trying to deal with

14  the issues you object.  Just add that to it.  And we are

15  going to have a session with the jury where we are not going

16  to be instructing, I'm gong to be dealing with some of these

17  things.  So you can put it in and you keep on moving.  No

18  search engine, he says he's just unchecking it, we shall see.

19  So the Court notes your objection.

20          MR. CIMINO:  Yes, Your Honor.

21          THE COURT:  All right.  Court will see you in the

22  morning hopefully at 10:00 instead of 9:30.

23          MR. CIMINO:  Yes, Your Honor.

24          (Hearing adjourned at 5:03 p.m.)

25
```

Ungar, L. - Direct   1174

```
 1                         CERTIFICATION

 2

 3        I certify that the foregoing is a correct transcript

 4   from the record of proceedings in the above-entitled matter.

 5

 6

 7            X_____/s/_____x

 8                      Jody A. Stewart

 9                      X_____10-24-2012_____x

10                           Date

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25
```