

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA

UNITED STATES OF AMERICA, ET AL.,)	SEALED
)	
Plaintiffs,)	
)	
vs.)	CV No. 20-3010
)	Washington, D.C.
)	September 21, 2023
GOOGLE LLC,)	9:45 a.m.
)	
Defendant.)	Day 8
_____)	Morning Session

TRANSCRIPT OF BENCH TRIAL PROCEEDINGS
BEFORE THE HONORABLE AMIT P. MEHTA
UNITED STATES DISTRICT JUDGE

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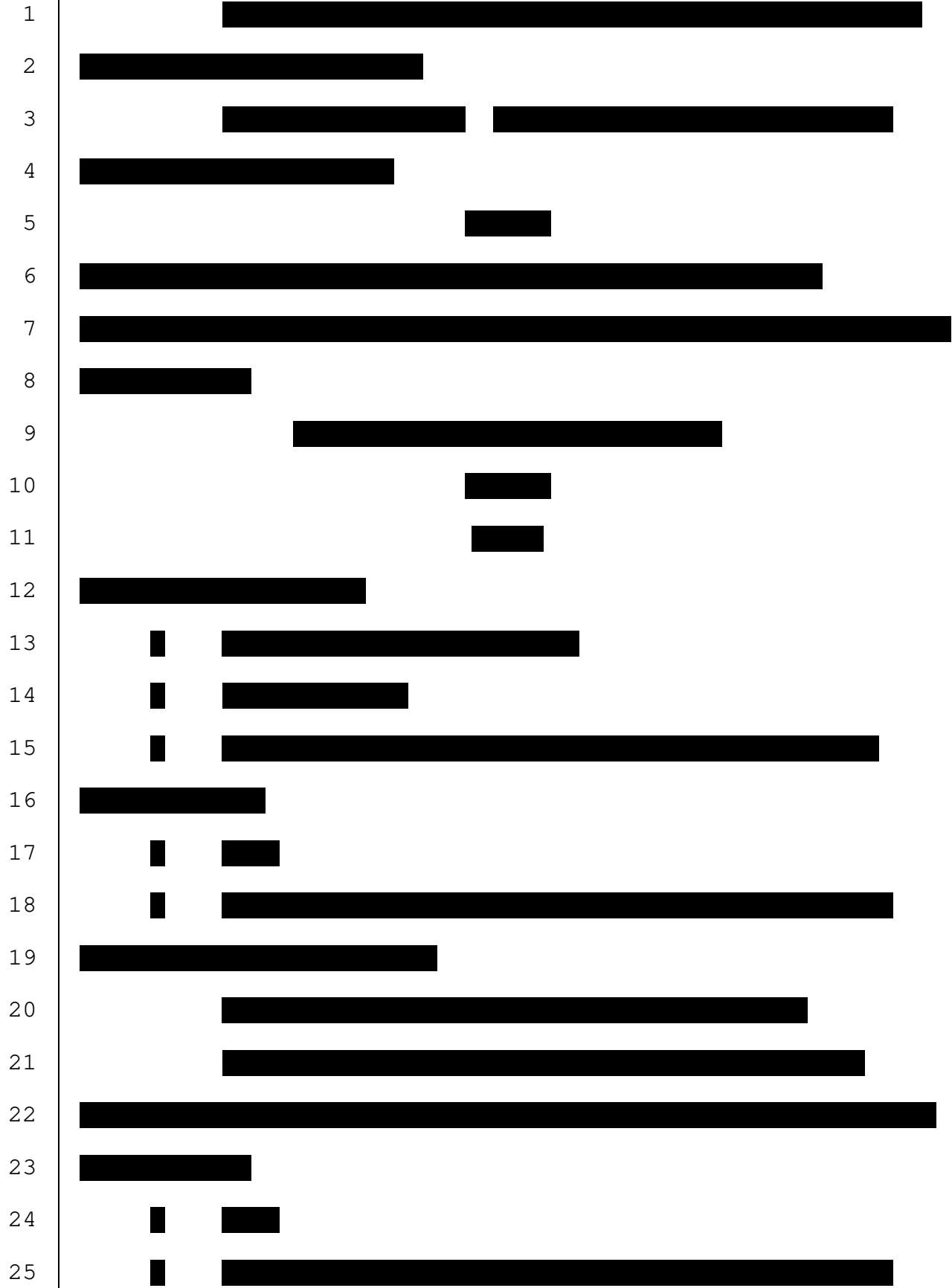
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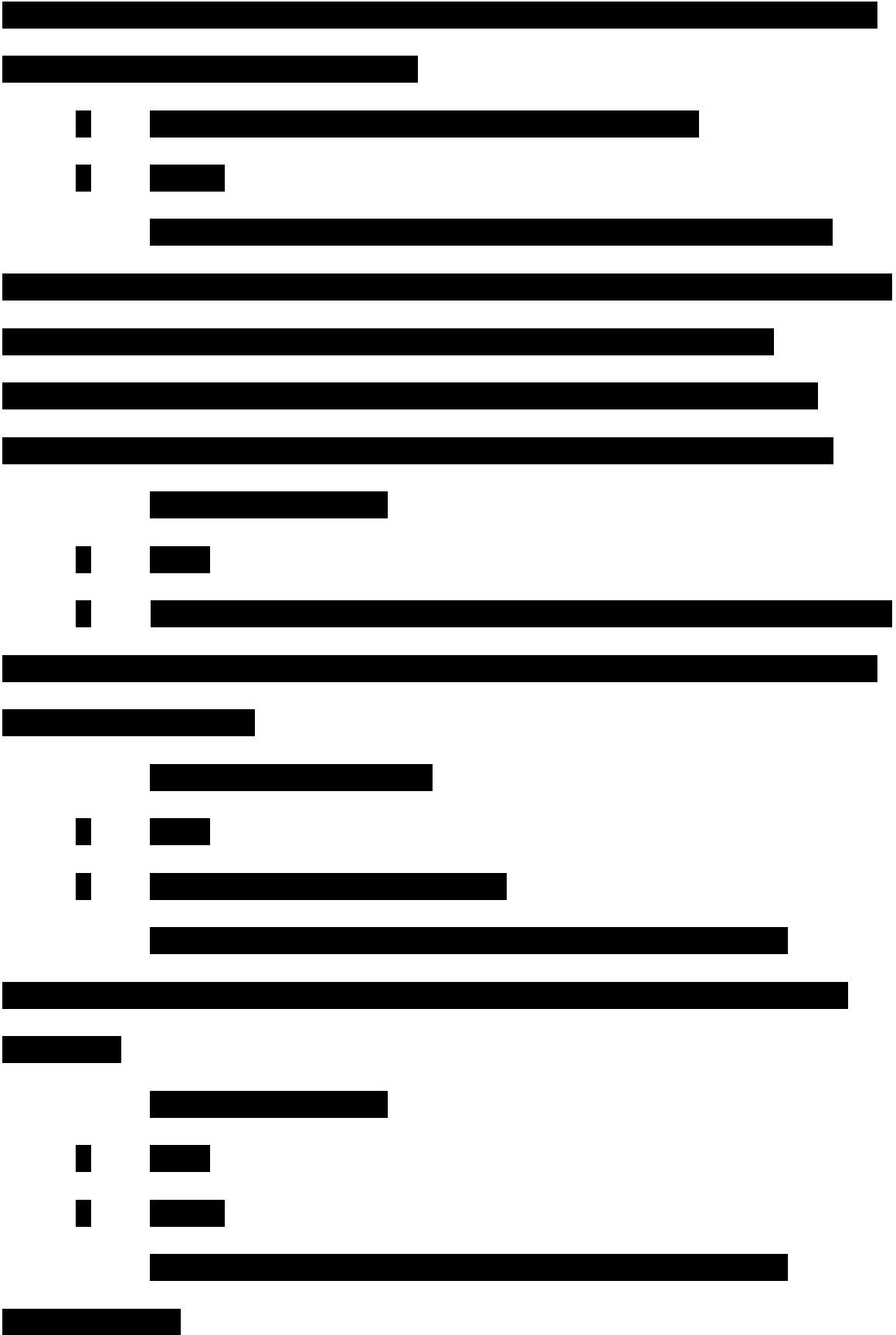
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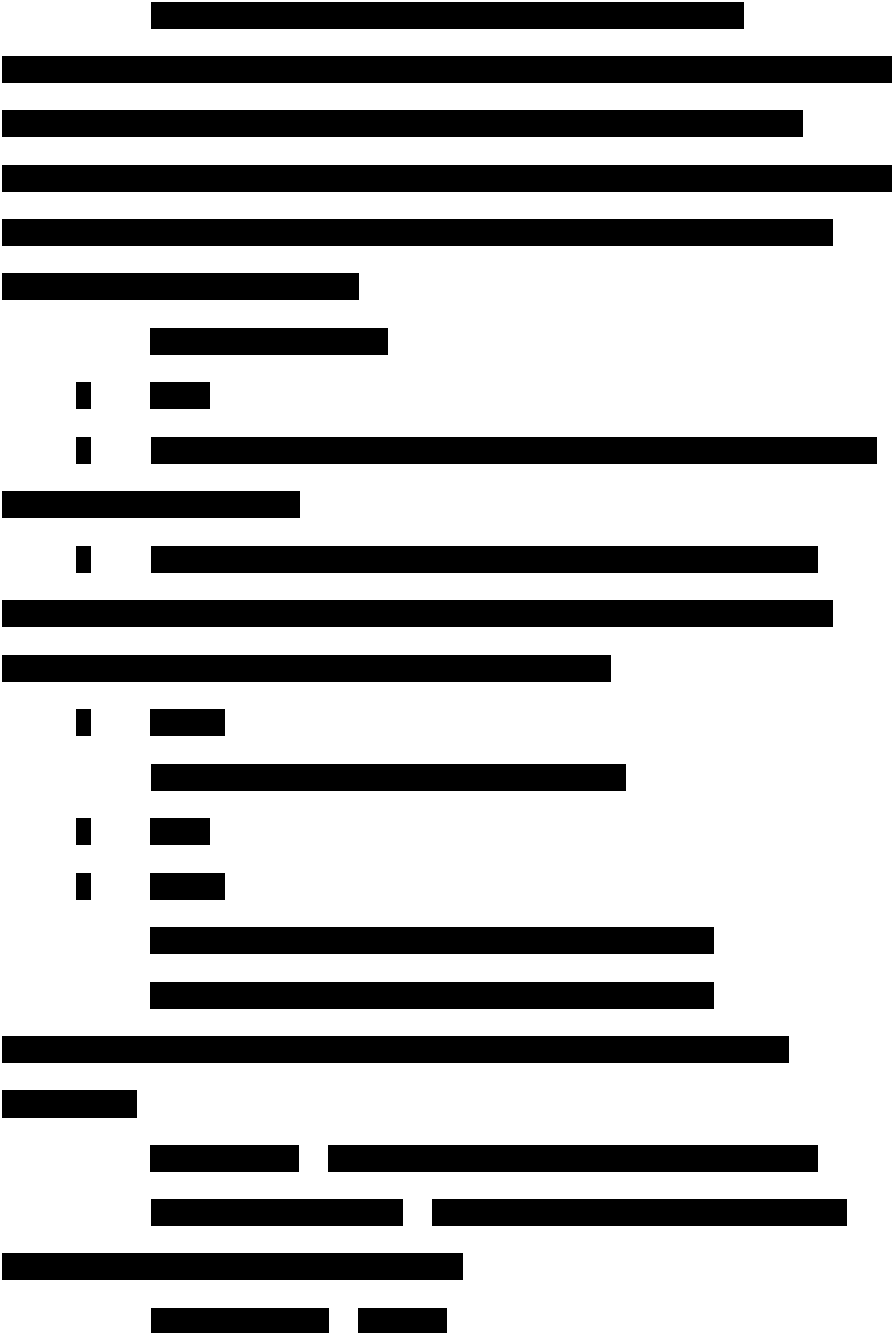
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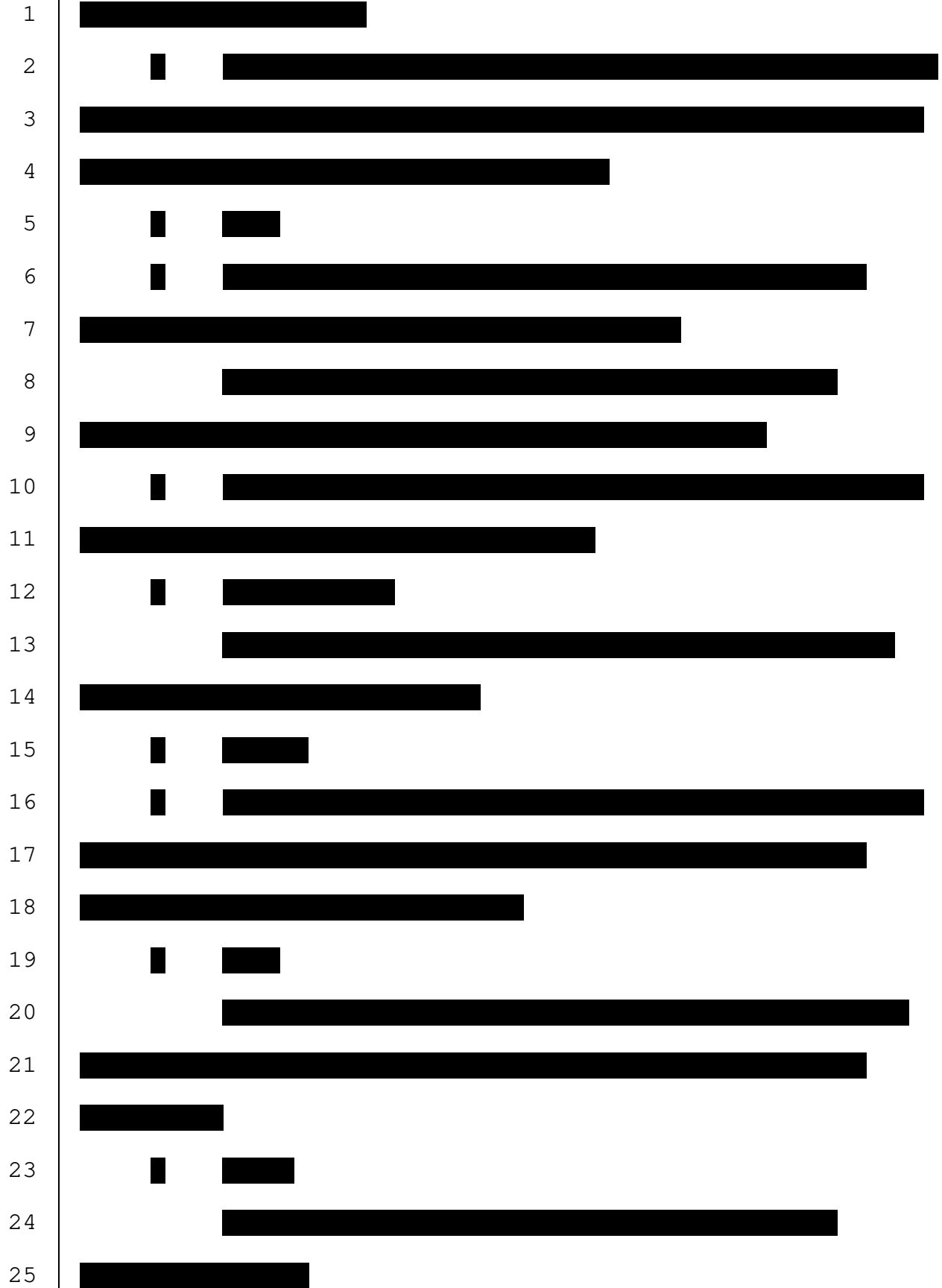


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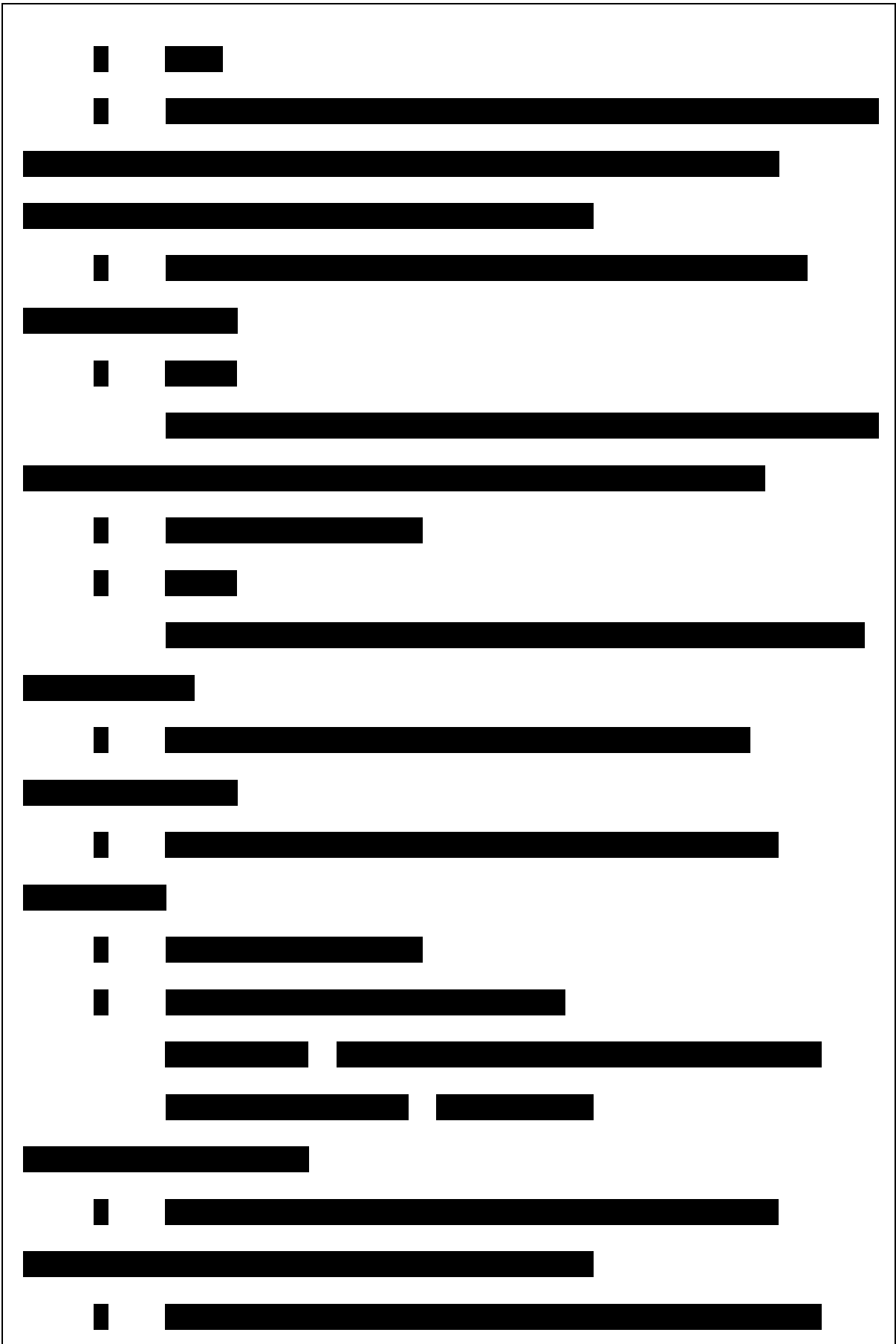


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(Open court)

8

BY MR. SMURZYNSKI:

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Q Good morning, Dr. Lehman.

10

Yesterday, the plaintiffs asked you a number of questions about Google's use of clicks and different ranking components. Do you remember that?

11

12

A Yes.

13

14

Q What is the relationship between, on the one hand, the number of ranking components that utilize clicks in some way and on the other, the volume of clicks those components need?

15

16

A So I guess I would make two notes about that. One is maybe sort of obvious, which is that it's not additive. That is, if you have 20 components, you don't need 20 times as many clicks. We've shown the chart showing all the number of clicks for those different components. Again, it's all the same clicks.

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There is a more subtle aspect. I think yesterday we talked about the difference between memorization systems

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1 and generalization systems. So now boost would be an
2 example of a memorization system. It remembers for a
3 particular search query and a particular web page user did
4 or did not click.

5 But the primary effort in use of clicks over the
6 last 10 or 15 years has been on generalization systems.
7 There, the goal is to generalize from situations where we
8 have data to situations where we don't. So these are kind
9 of like filling in the holes where we don't have data.

10 So I think in terms of how these systems respond
11 to different quantities of available data, a factor to keep
12 in mind is that even though we're adding more systems, many
13 of these are generalization systems. They're systems that
14 are designed to fill in holes in data. So I think that adds
15 a kind of a robustness to the system in that if you reduce
16 data, those systems can patch up the holes.

17 Some of the -- those older versions of systems
18 themselves need quite a bit of data train, but the new ones
19 require far less.

20 THE COURT: Can I ask a question?

21 The systems that you've described as generalized
22 systems, in the development of those systems, was ClicData a
23 component of how those systems were developed?

24 THE WITNESS: Yes, yes.

25 Roughly, those systems tried to find patterns

1 typically in the ClicData so that you can say, Well, I see,
2 for 300 cases like this, people tended to do this kind of
3 click, and hours here's the 301st case which, well, it's
4 sort of like that, so I'm going to bet people click sort of
5 the same way.

6 And the notion of same varies from one
7 generalization system to another. And gradually, as we sort
8 of move to deep learning, the kinds of patterns these
9 systems could look for to generalize ClicData got more and
10 more complex.

11 THE COURT: Got it. Thank you.

12 BY MR. SMURZYNSKI:

13 Q Dr. Lehman, are you familiar of a principle called
14 diminishing returns?

15 A Yes.

16 Q And how, if at all, does that principle impact the
17 value Google obtains from user data?

18 A So I think there's sort of good empirical evidence
19 that Google's query stream has a certain distribution called
20 Zipfian, Z-i-p-f, and that produces this long tail effect
21 that we talked about previously.

22 I guess one way to think about it is that you can
23 imagine, you start up your search engine one day and so you
24 start processing queries, and over time, the number of
25 queries that you see grows and grows and grows sort of

1 linearly.

2 And then you can say, Well, what is the
3 probability, when I get a new query, that I've seen it
4 before.

5 And I think a reasonable model, it's pretty
6 well-established over decades, is that it grows
7 logarithmically, that is, sort of a classic diminishing
8 returns curve.

9 Q And what implications, if any, does that have for
10 the value of additional user data to Google and with respect
11 to the quality of Google's search engine?

12 A Well, for a system like navboost, as the volume of
13 queries that Google has seen in the past grows, the
14 percentage of situations that we've seen before begins to
15 level off, and so you get diminishing returns.

16 Q We've talked about navboost, and you just
17 referenced it there.

18 With respect to queries that Google has seen only
19 a few times, how does navboost treat that relative to
20 queries that it's seen hundreds, thousands, tens of
21 thousands, millions of times?

22 A Right.

23 So for many queries in navboost, there's a large
24 number of queries that we've seen a small number of times, a
25 small number of queries that we've seen a large number of

1 times, and for a query that we've seen a small number of
2 times, we'll have scraps of data. So each click is a little
3 bit of a hint, but they come with caveats. And if you don't
4 have too of many of them, it's hard to draw a strong
5 conclusion.

6 So, for example, there might be a search query
7 where one person clicked on one result, two people clicked
8 on another result, but, you know, maybe this current user is
9 in Australia and both of those clicks came from people in
10 the United States. So maybe we should trust them, maybe
11 not.

12 Maybe some other results seem plausible to our
13 other search components, but we're not sure that anybody
14 actually even sort of looked far enough down the page to see
15 them.

16 So that's sort of the typical picture for one of
17 these queries that -- for which we don't have much data.
18 And so I think navboost does kind of the natural thing,
19 which is, in the face of that kind of uncertainty, you take
20 gentler measures. So you might modify the score of a
21 document but more mildly than if you had more data.

22 THE COURT: Can I ask another question, I'm sorry.

23 So the world is ever evolving.

24 THE WITNESS: Yep.

25 THE COURT: How do -- how does the search engine

1 handle new developments in the world?

2 Here's a terrible example but one that I will
3 understand and some of you may.

4 A lot of people put Taylor Swift into the search
5 engine, right? So you've already got in navboost lots of
6 connections for Taylor Swift but apparently she's now dating
7 Travis Kelce who's a football player. So if I want to get
8 the latest on that, how does the search engine -- how does
9 it -- how is it able to identify these new developments and
10 get people to those relevant links?

11 THE WITNESS: Yeah. So this is a complex question
12 within Search, we talked about it as the problem of
13 freshness.

14 And there's no single simple answer.

15 Some systems respond very quickly to new
16 developments in the world, while others, others don't.

17 So one kind of system that actually responds very
18 quickly is the sort of the old school techniques. So if you
19 do Taylor Swift, and I don't know, maybe some other term
20 about her relationships or whatever, then the old systems
21 will still be looking for web pages that talk about Taylor
22 Swift and relationships. Now, they could be dated pages.
23 But at least they'll work.

24 And I think that's important when something like
25 COVID happens. Like the word "COVID" wasn't even a word so

1 a lot of our systems didn't know about synonyms for COVID,
2 COVID-19 or whatever. But still these old school systems
3 work, which is why it's kind of nice to keep them around.

4 There is a special sort of freshness component
5 that tries to look at things like, often news articles will
6 have by-line dates so you can say, well, how old is this
7 article versus this one. This is about Taylor Swift's
8 relationship two years ago, this is one two weeks ago. And
9 so it can sort of boost the more recent ones more
10 aggressively.

11 Does that answer the question?

12 THE COURT: I think so.

13 But it sounds like there are different components
14 that would evaluate these variables. It's not simply
15 navboost or -- there are multiple systems that operate to
16 identify -- or help promote fresh results?

17 THE WITNESS: Yes.

18 And Clicks is one of them. You know, like once we
19 start to get Clicks on a topic, there's sort of a fast
20 response system that tries to make use of those as quickly
21 as possible.

22 But it's something we struggled with for a long
23 time. And, you know, I think one argument was we should try
24 to think about freshness in all our search components. I
25 don't know if we've 100 percent succeeded with that though.

1 There's some that -- particularly around COVID, there was a
2 crash effort to try to update our systems to ensure that we
3 had relevant information. So if everything were working
4 perfectly, that wouldn't have been necessary but it wasn't.

5 THE COURT: Got you.

6 All right. Thank you.

7 BY MR. SMURZYNSKI:

8 Q I just want to go back to that concept you were
9 talking about, the weighting of navboost between long-tail
10 queries and what you described yesterday as head queries.
11 Sort of without getting into like the nitty-gritty of the
12 mathematics of it, how does the system do that?

13 A So qualitatively for these head queries that we've
14 seen many times and for which we have ClicData, we're more
15 confident in that boost data and we can adjust the scores of
16 documents more dramatically or as for queries that are in
17 the long-tail where we have little scraps of data, it's
18 ambiguous, it's harder to figure out what to include.
19 Navboost will adjust the scores of documents more mildly.

20 Q If you could turn to document UPX228 which is in
21 your binder and we'll just put the cover page on the screen.

22 A 228? I got it.

23 Q It should be in the first section, yes.

24 A Right.

25 THE COURT: Sorry, Counsel, I was still taking --

1 what's the number?

2 MR. SMURZYNSKI: Certainly.

3 It's 228.

4 THE COURT: Thank you.

5 BY MR. SMURZYNSKI:

6 Q And yesterday, Dr. Lehman, you said there was a
7 somewhat complicated story behind why you gave this
8 presentation. What was that story?

9 A Right.

10 So this was an opportunity for me to talk to the
11 whole Search leadership, which is a rare opportunity for me.

12 And the people to whom I was really targeting this
13 talk were the people who do design of the sort of the user
14 experience of Search, how things look on the screen. And
15 also the more senior Search people who make decisions about
16 how many special features we put on the page and how busy it
17 is.

18 And the reason that I was speaking to those
19 audiences implicitly is that I was concerned about the
20 connection between the way Search results are visually
21 presented and the ranking of Search results.

22 And I don't think that connection was widely
23 appreciated and so that's something I was trying to drive
24 home in this presentation.

25 In particular, my concern was that our Search

1 results page could get too busy, and sometimes results could
2 be presented in ways that were a little bit hard for people
3 to understand.

4 And because Clicks are an important signal in
5 ranking, if the page is too complicated, then it's hard to
6 interpret Clicks.

7 Remember, the point of Clicks is that we're asking
8 people to sort of read by proxy for us. Computers couldn't
9 read. So we have people read the search results and the
10 query and everything else on the page and then we observe
11 their reactions, and those observations are Clicks.

12 But as the page gets busier and more complicated
13 and if Search result previews aren't really clear, then we
14 observe users doing things but we don't know how to
15 interpret them and extract information from them.

16 So my message was to people who work in sort of
17 the visual presentation of results and decide the layout of
18 the page, no, you need to think about this. We need to
19 learn from our users in the form of Clicks.

20 And I think this was not obvious. I mean, Search
21 is a huge organization with thousands of people, and I'm
22 getting up as somebody who's kind of a data wonk who deals
23 in algorithms and that kind of stuff and I have to talk to
24 people from a very different world, the sort of user
25 experience people who are kind of more thinking about human

1 behavior and art and visual presentation and say, no, we
2 need you.

3 And so one thing I was trying to do in this talk
4 is motivate those people to help us. I can't just browbeat
5 them.

6 And so that's why I sort of introduced this notion
7 of Magic. So I wanted to say, if you help us, then we can
8 get Google to do these magical things, these things that
9 seem otherwise impossible. So I'm trying to sort of inspire
10 the people in those organizations to work a little bit
11 differently, work with us so we can make this really cool
12 stuff.

13 So these are intended to be inspirational
14 examples.

15 MR. SMURZYNSKI: Your Honor, if I may approach the
16 witness?

17 BY MR. SMURZYNSKI:

18 Q Dr. Lehman, I put in front of you a document that
19 has been marked as UPX203 which is in evidence.

20 And take a look at the cover slide.

21 What is this presentation?

22 A So periodically there will be all-hands meetings
23 where everyone from an organization is invited to attend.
24 This looks like it was from the fourth quarter, the end of
25 the year in 2016, it was an all-hands presentation for the

1 Search organization.

2 Q All right. And if you go in a page, there is an
3 agenda; is that right?

4 A Yes. Right.

5 Q And under "Ranking," there's the name Eric. Was
6 that you?

7 A Yes.

8 Q Much less formal at Google than in court?

9 A Yes.

10 Q And if you go forward in the deck to the page that
11 ends in 904, and is this the portion of the presentation
12 that you gave at the end of 2016?

13 A Yes.

14 Q All right.

15 And if you go forward one more slide, this is the
16 first slide in your presentation.

17 What's the topic that you're addressing in your
18 presentation?

19 A So this is a time when sort of the first wave of
20 deep learning had arrived and we were starting to try to
21 understand, you know, what are the implications for the
22 future.

23 And I think as we've discussed, you know, the
24 biggest problem in Search is you're given a web page and a
25 query and you need to figure out whether or not that web

1 page is relevant to the search query. And the challenge has
2 always been, well, computers can't read so we have to do all
3 these workarounds.

4 But we're starting to wonder if that might
5 possibly change.

6 And I guess the first line here, "Search is a
7 great place to start understanding language." Maybe there
8 are two sides to that. One is that Search was, I think, a
9 really powerful driving application for this fundamental
10 scientific problem of how you get computers to understand
11 language, how do you get computers to read.

12 And in this presentation, I also thought Google
13 was a great place to begin exploring that problem, not only
14 because of the motivation but because of the resources. We
15 have access to large amounts of text, and we also had access
16 to lots of user data, which at this time I thought would
17 probably be an important asset.

18 Q All right. And if you turn the page to 905, what
19 are you saying there?

20 A Right, so this is, I think, a thing that's come up
21 quite a bit lately.

22 So with this fundamental problem of determining
23 whether a web page is relevant to a query, as of this
24 presentation, after just the first wave of deep learning
25 systems, we really couldn't read documents. It was -- our

1 ability was minimal. So we played this game of read by
2 proxy. Show the text to people, we observe their reactions
3 and we adopt them as our own.

4 And this approach, it has limitations, though,
5 that we've talked about. So, for example, when we show
6 people search results, they don't actually read the whole
7 web page, they just read the preview. They tend to click on
8 results that are lower quality than we'd like to show, and
9 yet, at this time, that was a really important technique.
10 So user data, you know, is an important source of data and
11 use was used in many Google systems.

12 Q And there you're describing today which is in the
13 context of this document, December of 2016, correct?

14 A That's right. Sort of after the first wave of
15 deep learning systems.

16 Q If you turn to the page that ends in 919.

17 And on the top of the slide you're positing a
18 task; is that right?

19 A Yes.

20 Q And what is that task?

21 A So in this presentation, we're -- I was starting
22 to contemplate the possibility that rather than this whole
23 mechanism of read by proxy, have people read for us and try
24 to learn from Clicks, that we might -- I guess here I'm
25 saying, we might maybe someday, we might get to a point

1 where -- with a computer we'd be able to understand a
2 document, like a web page or a passage, there are just a few
3 sentences instead of a web page, based just on the content
4 alone. That is, we wouldn't need humans to interpret it for
5 us. We could get computers to directly understand a
6 document or a passage just based on the words.

7 And, you know, I think this was a little bit of a
8 crazy idea at the time, and I think I felt pretty anxious
9 about presenting this.

10 You know, the history of artificial intelligence,
11 I guess I would like to say that to sum up the first
12 history, the first 50 or 60 years of AI research, I would
13 say not much happened. And so I think for people in the
14 field, the idea that we could actually do something like AI,
15 it was almost embarrassing to suggest it. It felt like AI
16 was a marketing hype term, not real.

17 MR. SMURZYNSKI: Your Honor, if I may approach?

18 THE COURT: I guess before you get to the next
19 document, though.

20 So finish your thought, Dr. Lehman. This was
21 your -- this was the view of the world at the end of 2016.
22 So how has that changed in the ensuing six years?

23 THE WITNESS: It's been kind of a complicated
24 journey.

25 The next big milestone for me was the arrival of

1 BERT around 2018, and that was just a shock to me on
2 multiple fronts.

3 One was that -- so BERT was developed in
4 connection with something called WebAnswers. So, you know,
5 when you do a search, sometimes Google will try to guess the
6 answer to your search and put it at the very top. That's
7 WebAnswer. So that's a case where there's just a short
8 passage instead of a full web page involved.

9 And so BERT was developed, and that was its first
10 application. And there was like a Christmas holiday, and
11 what we found out just before that is BERT beat all of our
12 existing systems combined by a large margin. It just made
13 everything else irrelevant. So that was kind of a milestone
14 moment for me.

15 And then, you know, in some ways, WebAnswers is
16 sort of like the junior version of Web Search, because you
17 only have to work with just a small passage instead of full
18 web pages.

19 So I think at that point, it started to become
20 clear that we were looking at a change that would kind of
21 knock all the pieces off the board of search probably at
22 some point within the next few years.

23 And then things began to pick up speed, so I -- it
24 felt like at first maybe there would be a breakthrough every
25 four years, and then it got to be like, Hey, wow, every year

1 there's a breakthrough. And then it's just like every few
2 months.

3 And it's just accelerated and accelerated.

4 So I was just noticing in the news that the
5 quality of systems that take text as input and produce
6 images that are described by that text has actually jumped
7 significantly since lunch yesterday.

8 So I think one of the big surprises to me is --
9 was that -- and I still don't have my head wrapped around
10 it, is that these systems could learn from text alone.

11 I believe, and I think there may be presentations
12 here, that language acquires meaning because it means
13 something to people. Otherwise, it's just symbols on a
14 page. And so I thought that for machines to understand
15 language in a humanlike way, they would have to learn from
16 seeing people interact with data. And so I thought user
17 data would be essential to helping machines learn language.

18 But it turned out not to be the case. It turned
19 out that these very large machine learning systems can learn
20 simply from text. So that was another sort of huge
21 milestone.

22 And I guess when I left Google, things had begun
23 to accelerate so fast, and it looked like the implications
24 were just going to be staggering, and not just for search
25 but for the world at large.

1 And I did my very best with it, but at some point
2 I feel like I needed to back away and hand it over to
3 someone who's younger and ready to deal with it, I guess.

4 BY MR. SMURZYNSKI:

5 Q And, Dr. Lehman, you have in front of you what's
6 been marked as DX237, which is already in evidence.

7 You talked about BERT in your response to the
8 judge. What was the next sort of milestone in the journey
9 in terms of these large language models?

10 A Yeah, let me sort of informally say there was sort
11 of these first-generation systems around 2014. There was
12 BERT around 2018 as a sort of second generation. For me, at
13 least, this was sort of the third generation. So this is
14 MUM, which was sort of completed and started to get ready
15 for production use in 2021.

16 I guess this is a presentation of MUM to the head
17 of search at that time, Prabhakar Raghavan. I think it's
18 kind of a monster document, particularly to give to a senior
19 executive, but I think this one he read through thoroughly.

20 Q And I used a term there, "large language model."
21 What is a large language model?

22 A So it's a computational system that tries to, in
23 some way, capture patterns in language.

24 And the name is maybe a little bit deceptive.
25 Language models could be something as simple as noticing

1 that like adjectives usually come before nouns, and united
2 is often followed by states, things like that.

3 And people would try to capture these as models of
4 language, it's sort of systems that reflect the patterns in
5 language.

6 And then people started building larger language
7 models that could capture more patterns in language, and
8 they got larger and larger and larger.

9 And then strange things started to happen. It
10 seemed that these systems began -- in their effort to find
11 patterns in language, they began to, in some ways, it
12 appears mimick the cognitive processes of the people who
13 created that language, you know.

14 A sort of trivial example is if you give one of
15 these systems a bunch of school worksheets or something like
16 that where it says 3 plus 5 is 8, 4 plus 7 is 11, and so on,
17 then in its search for patterns in language, it will learn
18 to do math, and so it can begin to do arithmetic questions
19 that it's never know seen before.

20 And that one's fairly clearcut, but then it can do
21 some of the more qualitative cognitive things that people
22 do. And it's limited. It's not AI. Or at least it wasn't
23 then, but it was quite startling to us.

24 Q This, as you describe, is a long, complicated
25 document, it contains many trade secrets. But if you go to

1 the third page of the document, there's a section that's
2 marked "TL;DR." Not what those letters mean, but how is an
3 acronym used within Google?

4 A As sort of executive summary.

5 Q Okay.

6 And in the -- about halfway through the paragraph,
7 you write, "These models are significantly more powerful
8 than BERT, demonstrating a large improvement on SuperGLUE
9 benchmarks, and let's just pause there for a second.

10 What is a SuperGLUE benchmark?

11 A So as people were trying to make computers
12 understand language, and by people here, I mean people at
13 Google, people in academia, people in other U.S.
14 corporations, corporations around the world, particularly in
15 China, they wanted a way to measure progress that we could
16 all agree upon. And so some folks set up some -- a system
17 called GLUE, and it was a set of several language
18 challenges.

19 And then whenever someone had a new computer
20 system that they believed could understand language better,
21 they could use this GLUE system to check the progress of
22 their work.

23 So they would check how well their system worked
24 on each of those challenges. There would be taken -- they'd
25 take an average. And there was sort of a leader board

1 saying, Who's gotten the highest score across all tasks,
2 who's second highest and third highest. And there were sort
3 of a lot of people competing.

4 And then BERT came along and just demolished
5 everything. So everything on that leader board became
6 variants of BERT. And the performance of BERT was so strong
7 that for those tasks, it was performing above human level.
8 But the tasks weren't that hard, so that wasn't that
9 impressive.

10 So the creators of GLUE created a new set of
11 reading comprehension challenges, which they called
12 SuperGLUE that was designed to be the BERT killer. It's
13 even stickier. So they were much harder challenges, and
14 BERT exhibited fairly weak performance. It was scoring
15 about 60, and they speculated this would be much harder for
16 machines.

17 However, within a matter of, I don't know, about a
18 year or so, a system called T5, which later evolved into
19 MUM, among other systems, achieved essentially human-level
20 performance.

21 Q And in your answer, you mentioned BERT, T5, and
22 MUM. What was Google's involvement in the creation of each
23 of those systems, if any?

24 A So BERT was developed by Google researchers
25 working with the WebAnswers team, and then they later

1 constructed sort of the Version 2 of rank embed, which
2 I think we talked about earlier.

3 T5 was a significantly more powerful system that
4 got very high scores on the SuperGLUE benchmark. It was
5 also developed by Google researchers. They were sort of off
6 doing their own thing at Google research, but then some of
7 us in search contacted the T5 team and we began working
8 together. And MUM is -- can be thought of as a much scaled
9 up version of the T5 system developed by Google researchers.

10 And that sentence says -- you continue on, it
11 reads, "And reaching human-level performance for many
12 tasks."

13 Do you see that.

14 Yes.

15 Q Was among those tasks the ones that, in the 2016
16 document, you had posited maybe someday a machine will be
17 able to do this?

18 A I don't know if it was exactly the same task. I'm
19 not sure, you know, which one I was thinking of at that
20 time. But it was -- but these are challenging reading
21 comprehension tasks. I think, you know, people find them
22 challenging, they don't score perfectly. They score about
23 the same as MUM.

24 MR. SMURZYNSKI: Your Honor, this is DX241. And
25 at least one of the plaintiffs, I believe, has lodged a

1 hearsay objection to it, but I don't know if they continue
2 to maintain it.

3 MS. MURDOCK-PARK: Your Honor, our understanding
4 is that this is not a document associated with Dr. Lehman.

5 THE COURT: Well, is there any objection to its
6 admission?

7 MS. MURDOCK-PARK: I believe there's a hearsay
8 objection, and I don't -- nope, we have no objection.

9 THE COURT: Okay.

10 MR. CAVANAUGH: No objection, Your Honor.

11 THE COURT: So it will be admitted. DX241.

12 (Defendant's Exhibit DX241
13 received into evidence.)

14 BY MR. SMURZYNSKI:

15 Q Dr. Lehman, if you could turn forward to the slide
16 that begins 448, and this just is to orient you. The slide
17 reads "MUM, a major milestone in language understanding."

18 MR. SMURZYNSKI: And, Alan, if you could go
19 forward to the next slide.

20 BY MR. SMURZYNSKI:

21 Q And we'll go through these, but just at a general
22 level, could you describe for the Court what is being
23 communicated in this slide?

24 A This looks like a few high-level bullet points
25 about the MUM model, the sort of third-generation language

1 understanding system.

2 Q Okay.

3 And in the first bullet there, what is being
4 conveyed with regard to the comparison between BERT and MUM?

5 A So when working with language, I think we found
6 that if you need to memorize a lot of facts about the world,
7 you need a lot of memory but not a lot of computation and
8 systems like QBST work well.

9 But if you want to do reading comprehension and
10 sort of reasoning tasks, you need to do a lot of
11 computation.

12 And what this is saying is that the amount of
13 computation per unit of text is about a thousand times
14 greater in MUM than BERT, and the consequence is that it
15 should be able to understand language more deeply, perform
16 reasoning more effectively.

17 Q And in the third bullet, there's a reference to
18 "understand and generate human language."

19 What data does MUM use in order to achieve that
20 task?

21 A So MUM was trained on large volumes of text drawn
22 from the Internet.

23 Q Was MUM trained on click-and-query data that
24 Google had?

25 A No, and as I mentioned, it was a shock to me that

1 that's possible, but no, there was -- there are no -- no
2 user data.

3 Q And the next bullet down refers to "Few-shot
4 learning requiring far fewer data inputs than BERT."

5 And these data inputs, again, are raw text from
6 the Internet?

7 A This may be a little bit different.

8 So with these sort of language systems like BERT
9 and like MUM, typically you train them initially on lots of
10 language, and in the process, they understand the structure
11 of language and acquire some kind of reasoning abilities.
12 It's a little hard to tell what they're doing, they're just
13 giant masses of numbers. And then typically you would apply
14 them to some particular task.

15 With BERT, the procedure for applying them to a
16 particular task would be a process called fine-tuning, where
17 after they understand the basic structure of language, you
18 give them some inputs and desired outputs, and that modifies
19 the internal structure of the model a little bit so that it
20 gets really good at that one specific task.

21 So, for example, if BERT were being adapted for
22 WebAnswers, the task that they used for fine-tuning would
23 be, here's a query, this passage is relevant; here's another
24 query, this passage is not relevant. And you would go to a
25 bunch of those examples, and then it would get very good at

1 that task.

2 For large language models, they can be adapted to
3 specific tasks in a very different way. These things take
4 text as input and you would just give a few examples written
5 as text as your initial input and then pose your new problem
6 also in text and, based on just those just few examples, in
7 many cases they could just begin to perform that new task.

8 Q And is that what the reference to few-shot
9 learning is?

10 A Yes, that's few-shot, each shot is like an example
11 and sometimes, you know, two or three or something are
12 enough.

13 Q And that's all you need, two or three in order to
14 accomplish this with MUM?

15 A Yeah. Yeah.

16 Q If you could go to the next slide.

17 And to remind you, this is as of July of 2021, we
18 saw on the first slide.

19 And without reading the number out loud, you see
20 halfway down the page, there's a reference to the number of
21 search related teams that are using MUM to improve existing
22 products. Do you see that?

23 A Yes.

24 Q And to your knowledge, that number is accurate as
25 of July of 2021?

1 A It seems about right, that number started growing
2 very fast and so I don't know exact value, exact dates.

3 Q Fair enough. In July of 2021, as of the time you
4 left Google, was that number higher or lower?

5 A It was higher.

6 Q Dr. Lehman, I put in front of you a document
7 that's been marked as UPX197 which is in evidence?

8 A Yes.

9 Q And I'd like to direct your attention to the top
10 of that email. And it's an email you write on
11 December 26th, 2018.

12 A Yes.

13 Q And then you write, I'd like to offer a thought
14 for contemplation over the break.

15 And then you set forth something in bold text
16 there. Do you see that?

17 A Yes.

18 Q And what did you write at the end of 2018 to the
19 various folks in search leadership who are identified in the
20 top of this email?

21 A So this is over the Christmas holiday. And we had
22 just seen the results of BERT for this web-answered problem.
23 We've just seen that it had outperformed everything that
24 we'd done, you know, dozens of engineers over roughly a
25 decade.

1 And so I sent this email to reflect on what the
2 implications of that were for the future. It was quite a
3 shock. I always felt that Google's -- you know, it's really
4 big advantage is that by focusing on Search for essentially
5 so many years, we developed this deep body of theory and
6 practices and we made a lot of mistakes but we learned over
7 time. And I thought that was kind of our treasure chest.

8 And then along comes this system and just like,
9 no, never mind, beats everything. And at this point we had
10 just seen that this kind of, sort of junior problem,
11 WebAnswers, had experienced this just dramatic disruption,
12 where machine learning made everything previous kind of
13 irrelevant.

14 And the thought I'm considering here is that
15 that's going to happen to Web Search, too. I was guessing
16 that these kinds of advances would -- yeah, just kind of
17 clear the table of all past work.

18 Q And if you could scroll down, Alan, to the
19 paragraph that begins at the bottom of the page, one
20 consideration and then carries over.

21 BY MR. SMURZYNSKI:

22 Q And, Dr. Lehman, could you read that paragraph for
23 us, please.

24 A "One consideration is that such a deep ML system
25 could well be developed outside of Google - at Microsoft,

1 Baidu, Yandex, Amazon, Apple, or even a startup. My
2 impression is that the translate team experienced this.
3 Deep ML reset the translation game; past advantages were
4 sort of wiped out. Fortunately, Google's huge investment in
5 deep ML largely paid off, and we excelled in this new game.
6 Nevertheless, our new ML-based translator was still beaten
7 on benchmarks by a small startup. The risk that Google
8 could similarly be beaten in relevance by another company is
9 highlighted by a startling conclusion from BERT: Huge
10 amounts of user feedback can be largely replaced by
11 unsupervised learning from raw text. That could have heavy
12 implications for Google."

13 Q And you wrote this at the end of 2018 with BERT.
14 By November of 2022, with the introduction of MUM and
15 further advances in ML, what's your view?

16 A I think by 2021, with the arrival of MUM, it seems
17 like this is the path we're going down. And I think, MUM
18 was a big deal in 2021 but now these large language models
19 are everywhere. You can download them from the web and run
20 on a large PC. So I think indeed we have seen such deep ML
21 systems developed outside of Google at pretty much, I think,
22 almost every major tech company in the U.S. and many abroad,
23 and a notable startup like OpenAI.

24 So, yeah, I think this is largely come to pass and
25 it's a story that's still unfolding, but I think it seems

1 like this is a road we're still on.

2 MR. SMURZYNSKI: Thank you, Dr. Lehman. I have no
3 further questions.

4 THE COURT: Dr. Lehman, just quickly, deep ML
5 system. ML stands for?

6 THE WITNESS: Machine learning.

7 THE COURT: Got you. All right. Thank you.

8 MS. MURDOCK-PARK: If I may have a minute,
9 Your Honor, I will have a few redirect.

10 THE COURT: Counsel, before you begin your --
11 I'm sorry, go ahead, Ms. Murdock.

12 MS. MURDOCK-PARK: No. Please, Your Honor.

13 THE COURT: No, no. I was going to ask one more
14 question but just whenever you're ready.

15 MS. MURDOCK-PARK: Happy to get Your Honor's
16 question before I get started. It might have been one of
17 mine.

18 THE COURT: So, Dr. Lehman, could I ask you to
19 project out five years, ten years from now, what would you
20 guess to be the relationship between these deep ML systems
21 and user data in terms of search?

22 THE WITNESS: So my guess, and it's really hard to
23 guess --

24 THE COURT: Fair enough.

25 THE WITNESS: -- is that search engines will shift

1 largely from a reliance on user data and all these other
2 tricks we built up over the years to systems that draw upon
3 these deep learning systems largely.

4 I think there will still be a role for user data
5 but I think it will be much diminished, but I think user
6 data does still bring some things. Maybe the clearest thing
7 would be popularity.

8 So, for example, you know, I don't know, I search
9 for toothpaste. Well, there are a lot of kinds of
10 toothpaste. And so all those associated web pages are
11 relevant and a machine-learning system can say, oh, they're
12 relevant. Okay, but they're not all likely popular. And
13 I think user data can still help inform something like that.

14 So I think there will still be a role for user
15 data but, you know, trying to get a high resolution picture
16 of the world from user data requires a vast amount, trying
17 to figure out which is the most popular toothpaste and a
18 bunch of things like that I think will require much, much
19 less user data.

20 So generally I think a lot of the function of user
21 data will be replaced but probably not all of it. But it's
22 a guess.

23 THE COURT: Thank you.

24

25

1 Grushetsky.

2 If you see on the first page at the very top,
3 where it says from, Alexander Grushetsky. So I believe in
4 this text, his comments are being interleaved with mine and
5 I'm pretty sure that that was his comment.

6 Q And do you disagree with Mr. Grushetsky?

7 A Well, he's saying a lot of things here. Parts of
8 it, I agree with. Parts of it, I question what he's talking
9 about, because they don't seem right to me. Alex is a
10 really smart guy. If he were here, I would say, wait, what
11 do you mean, Alex. We could go through it phrase by phrase
12 and I could point out which parts that make sense to me and
13 which don't, if you want.

14 Q Well, my biggest question is, you said, "I'm
15 pretty sure that navboost alone was/is more positive on
16 Clicks and likely even on precision/utility metrics by
17 itself than the rest of ranking."

18 A Right.

19 So there's several assertions there.

20 So the first part is navboost alone was/is more
21 positive on clicks.

22 And that is, I think, true but kind of misleading.

23 So I think at some point we looked at a chart and
24 we talked about how components of ranking could be evaluated
25 using, I call it "live traffic experiments."

1 And the idea of those experiments is, for a given
2 ranking component, you ask, are the search results at that
3 system boosts getting more or fewer clicks than the search
4 results that would otherwise be there. And so that would be
5 such a system, if such a system -- if a component boosted
6 results that got more clicks than results that were
7 previously there, then we would say it is "positive on
8 clicks."

9 The navboost system is by far the most positive on
10 clicks; that is, it boosts results that in experiments then
11 get lots of clicks.

12 But that is somewhat misleading, and so clicks are
13 not usually used to evaluate navboost. And the reason it's
14 misleading is because it's almost circular.

15 The navboost system, what it does is observe
16 documents that in the past got lots of clicks, and then it
17 boosts those.

18 So the near circularity is there's some documents
19 or web pages that got clicks in the past, they get boosted
20 up by navboost and then this goes into the evaluation system
21 which says, ah, I see navboost has boosted all these
22 documents and they get lots of clicks. Well, of course they
23 do.

24 What that measurement of navboost on clicks is
25 really telling you is that people tend to click on the same

1 results over time. So the past is fairly predictive of the
2 future.

3 And one way to see why that's kind of a bad type
4 of analysis, I think we've talked about how people often
5 click on low quality results, bad search results, it's not
6 super often but there's a tendency.

7 So you imagine what's going to happen with those
8 clicks on bad search results. Well, the navboost system is
9 going to observe these bad results, got clicks, it's going
10 to boost them, and then an evaluation system, these bad
11 results will be boosted, and they'll continue to get clicks.

12 And so navboost will look even more positive on
13 clicks even though it's doing something that's actually
14 damaging search quality.

15 So, yes, it's true that navboost alone is very,
16 very positive on clicks, but that's deceptive.

17 Q We can go ahead and put this document aside.

18 I'd like to go back to UPX203, which your counsel
19 showed you, and specifically the page ending in 907, which
20 is Slide 51.

21 And this is the portion of UPX203 that you wrote
22 for the ranking section, correct?

23 A Let's see.

24 I'm just needing a minute to find it.

25 Q Of course. It is not in the binder. Your counsel

1 handed you binder clipped copies. I believe it's the
2 thickest one.

3 A The big one. Okay.

4 Okay.

5 Q And it's page 57, but it ends in Bates 8907.

6 It's a graphic of some people with arrows to each
7 other.

8 Do you see that, Dr. Lehman?

9 A Yes.

10 Q And the graphic says, "Each searcher benefits from
11 responses of past users and contributes responses that
12 benefit future users," right?

13 A Yes.

14 Q And you wrote, "So if you search right now, you'll
15 benefit from the billions of past user reactions we've
16 recorded. And your responses will benefit people who come
17 after you. Search keeps working by induction." Right?

18 A Yes.

19 Q Okay.

20 We can go ahead and put 203 aside.

21 Now, you talked a little bit about MUM with your
22 counsel. Is another consequence of the amount of
23 computation needed by a system like MUM is that it adds
24 latency?

25 A That's a little bit of a complicated question.

1 Certainly computation takes time. There's kind of a whole
2 repertoire of techniques for trying to reduce the time
3 required by these language systems on -- when used in a
4 large-scale application like search.

5 But, yeah, computation takes time.

6 Q And time is latency in terms of how long it takes
7 to pull up a search result?

8 A Yes. And, again, we should be careful because
9 when you do a search, many, many things happen in parallel.

10 So, for example, the DeepRank system which runs on
11 BERT, I believe that adds no latency to Google's search
12 results because we found a spot where we could run it in
13 parallel with other activities that take more time.

14 Latency is a challenge, but there are ways to
15 manage it to a degree.

16 Q Okay.

17 And another consequence of the amount of
18 computation needed by a system like MUM is expense, right?
19 The systems are expensive?

20 A Yes, these systems are expensive.

21 Q When MUM was launched, Google still used more
22 traditional ranking systems, right, with respect to navboost
23 and QBST, certainly?

24 A Yes, definitely.

25 Q And you mentioned BERT again. Any competitor can

1 use BERT, correct?

2 A Yes.

3 Q But Google had a nice head-start on using BERT
4 because of the amount of user data available to Google,
5 right?

6 A I don't think that's true.

7 I think Google's biggest advantage in using BERT
8 early was that it invented BERT.

9 The first two applications of BERT were in
10 WebAnswers, where I -- I don't -- I'm not sure if they used
11 user data at all. ClicData isn't very useful for
12 WebAnswers.

13 And then the second application was DeepRank,
14 where we hustled, we got it launched.

15 I think Microsoft may have, after we launched and
16 announced it, said in some kind of press release, Well, we
17 did it first, but maybe my memory is not clear.

18 Q If I could show you UPX193, which is a redacted
19 document, and it's in evidence.

20 MS. MURDOCK-PARK: If I may approach, Your Honor?

21 THE COURT: Yes.

22 BY MS. MURDOCK-PARK:

23 Q And this is a document, Dr. Lehman, titled "Bullet
24 Points for Presentation to Sundar."

25 Do you see that?

1 A Yes.

2 Q This is a document that was in your files.

3 If we could highlight Bullet 4 where it says, "Any
4 competitor can use BERT or similar technologies.

5 Fortunately, our training data gives us a nice head-start.

6 We have the opportunity to maintain and extend our lead by

7 fully using the training data with BERT and serving it to

8 our users. This needs multiple orders of magnitude more

9 hardware resources (mainly TPUs)." Right?

10 A Uh-huh.

11 MS. MURDOCK-PARK: No further questions,

12 Your Honor.

13 MR. SMURZYNSKI: Your Honor, since this document
14 was introduced for the first time on redirect, I'd like to
15 ask the witness one or two questions on it.

16 THE COURT: Could I just ask a question of
17 Dr. Lehman first?

18 When you say "training data" in this bullet point,
19 what are you referring to?

20 THE WITNESS: Yeah, I think that's a significant
21 thing.

22 So this document appears to be talking about the
23 application of BERT to WebAnswers, which was the first
24 application. So, like, I think it says in Bullet Point 2,
25 "Applying BERT to WebAnswers demonstrated this huge coverage

1 increase."

2 And then the third bullet point says, "Early
3 experiments with BERT apply to several other areas of
4 search."

5 So I think it's talking about the use of BERT in
6 WebAnswers primarily and saying that we started exploring
7 its use in other areas.

8 So I think here, training data refers to the first
9 application, which is in WebAnswers.

10 So in that case, the training data would be this
11 large bank of query passage pairs, where people employed by
12 vendors hired by Google have marked the answers as good,
13 bad, or somewhere in between, and Google built up that bank
14 of training data over some years. And I think that's what
15 it's referring to here.

16 I don't think it's referring to ClicData because,
17 for these cases where we show our best attempt at an answer
18 at the top of search results, ClicData is not very helpful
19 because if we show somebody an answer and it answers their
20 question, then they don't need to click.

21 Click is usually at least a weak indication that
22 they're not satisfied with the answer we provided. So
23 there's a little bit of information.

24 My understanding of the value of user feedback in
25 this WebAnswer system is that it's much less than a ranking

1 of search results. One person told me a click is worth
2 about a tenth. Another person disagreed and said it's more.
3 I haven't worked on it and I don't know exactly.

4 But to answer your question directly, I think this
5 training data refers to human-rated answers.

6 THE COURT: Do you have any follow-up questions,
7 Counsel?

8 MS. MURDOCK-PARK: No, Your Honor, but we would
9 object to Google having a re-redirect since we asked
10 questions directly relevant to their cross, used a document
11 to do so.

12 MR. SMURZYNSKI: Your Honor, you asked the
13 question I was going to ask, so I have no further questions.

14 THE COURT: Okay.

15 All right. Dr. Lehman, this means you are done.
16 Thank you very much for your time and your testimony, and
17 safe travels home.

18 THE WITNESS: Thank you.

19 THE COURT: Thank you.

20 All right. Plaintiffs ready with their next
21 witness?

22 MR. HOFFMAN: Yes. Good morning, Your Honor.
23 Ian Hoffman for the United States of America.

24 Our next witness is Gabriel Weinberg.

25 So you know, Your Honor, we anticipate both an

1 open session and a closed session.

2 THE COURT: Okay.

3 MR. HOFFMAN: I've been told the witness is in the
4 hallway, Your Honor.

5 COURTROOM DEPUTY: Before you have a seat, please
6 raise your right hand.

7 (Witness is placed under oath.)

8 COURTROOM DEPUTY: Thank you.

9 THE COURT: Mr. Weinberg, welcome.

10 THE WITNESS: Thank you.

11 MR. HOFFMAN: May I proceed, Your Honor?

12 THE COURT: You may.

13 - - -

14 GABRIEL WEINBERG, WITNESS FOR THE PLAINTIFF, SWORN

15 DIRECT EXAMINATION

16 - - -

17 BY MR. HOFFMAN:

18 Q Good morning, Mr. Weinberg. My name is Ian
19 Hoffman, and I represent the United States of America in
20 this case.

21 Could you state your name and spell your name for
22 the Court, please.

23 A Sure.

24 Gabriel, G-a-b-r-i-e-l, Weinberg, W-e-i-n-b-e-r-g.

25 Q And where do you currently work, Mr. Weinberg?

1 A I work at DuckDuckGo.

2 Q And what is your role at DuckDuckGo?

3 A I am the CEO, and I founded the company too.

4 Q And in what year did you found DuckDuckGo?

5 A 2008.

6 Q And where are DuckDuckGo's headquarters?

7 A Paoli, Pennsylvania.

8 Q And can you tell the Court what DuckDuckGo is?

9 A Sure.

10 So DuckDuckGo is the leading Internet privacy
11 company.

12 We're most well-known for our private search
13 engine.

14 Over the last several years, we have expanded the
15 product vision to be more the easy button for privacy is
16 what we call it. Our flagship kind of product experience is
17 our free browser, which is a replacement for Chrome. It has
18 the private search engine built in, along with about
19 12 other privacy protections that also protect your
20 browsing, email, other online activity.

21 Q And how many people --

22 THE COURT: I'm sorry to interrupt you.

23 I may have missed it. What's the name of the
24 browser?

25 THE WITNESS: DuckDuckGo. Same name.

1 THE COURT: Oh, same name, okay. The browser and
2 the search engine are the same name?

3 THE WITNESS: Yeah. Our basic pitch is to be the
4 easy button. And so not have multiple products, we have one
5 product, it's just like pressing the easy button. You
6 download DuckDuckGo, you get everything.

7 THE COURT: Got you. Thank you.

8 BY MR. HOFFMAN:

9 Q And how many people does DuckDuckGo employ today?

10 A Right about 250.

11 Q And how many searches does the DuckDuckGo search
12 engine run every day?

13 A About a hundred million.

14 Q One hundred million?

15 A Yes.

16 Q Okay.

17 How does DuckDuckGo generate its results?

18 A So to kind of appreciate that, it might be useful
19 to give a little context.

20 Q Sure.

21 A It -- when search engines started back in the
22 '90s, there was like one index of links, and I think that's
23 how people still think about them.

24 But since about the mid-2000s, search engines
25 increasingly put these boxes on top of the results.

1 Sometimes they're on the side, down below, but a lot on top.

2 I'm going to call these search modules, but other
3 people refer to them as one boxes, sometimes the knowledge
4 graph collectively, instant answers.

5 So these search modules actually have their own
6 indexes. So -- and there's about -- these are things like
7 maps, directions, weather, news, images, things like that.

8 I'd say there's about 20 of them that are
9 essential now.

10 So a search engine today doesn't really just have
11 one index, they're really operating with all of these kind
12 of dozens of indexes.

13 So when I started the company, this was one of the
14 thesis of the company originally was I thought these search
15 modules were the future of Search and I wanted to focus on
16 that because it was the innovative portion. So I tried to
17 license the traditional links as soon as I could, at the
18 beginning, that was with Yahoo!. Fast-forward to today,
19 it's pretty much the same. We license the traditional links
20 from Microsoft, along with some other content, most notably
21 ads, and then we do most of the modules ourselves, which
22 means indexing, calling, as well as working with other
23 partners like we work with Apple for apps, for example.

24 Q And when you say you license content from
25 Microsoft, is that from Microsoft's search engine Bing?

1 A The Bing division within Microsoft.

2 Q Okay.

3 And can you explain for the Court how search
4 results on DuckDuckGo differ from search results on Bing?

5 A Sure.

6 Another kind of a nonintuitive piece of context
7 may be useful here.

8 So when you have a search results page, it's
9 intuitive that the further down the page you get, the less
10 things are going to be clicked on. So it might be the case
11 that -- you might expect it to be the case that, you know,
12 things on the top of the first page may be clicked on two or
13 three times more than the bottom. But in reality it's more
14 like 100X.

15 And the reason for that is the function that we
16 see empirically is about one-half -- things right below the
17 thing above it get about one-half the clicks. So if the top
18 things gets, like, 100 clicks, the next thing will get 50,
19 25, et cetera.

20 So when you have -- with that context, if you take
21 two pages that look to a casual observer nearly identical
22 and you just flip the top two things, in practice, that's a
23 much different search experience. And also from the pages
24 that those things are linking to would get much -- a lot
25 different traffic.

1 So with that in mind, we actually choose a lot of
2 different search modules to put on top of the page so that
3 creates a pretty distinct experience from Bing. And as
4 I just mentioned, most of the search modules, we don't
5 actually get from Bing ourselves so that makes it more
6 different.

7 And then there's some other differences like the
8 links that we get from Bing and the ads are just sometimes
9 different. So we display less ads on our site than Bing.

10 Also because we're private, you know, the links
11 themselves aren't changed around based on any profiling so
12 that'll make some differences.

13 And then finally like visual treatments are
14 different. So fonts, colors, layouts, that kind of stuff.
15 Also subtle effects, there, can have huge differences on
16 what people click on.

17 Q And with respect to the web index from Bing that
18 DuckDuckGo uses, why is it that DuckDuckGo licenses Bing's
19 web index rather than create its own?

20 A Well, initially as I mentioned, like we had
21 limited resources and I wanted to focus on the -- what I
22 considered to be the innovative portion which were these
23 search modules.

24 Today, it's similar. We -- it's a very expensive
25 proposition that we can't really afford.

1 But in addition, I'd say we get it from Bing with
2 the ads. So in addition to links to monetize a search
3 engine, you need ads. The ads itself have a very strong
4 network effect which is coalesced into two search ad feeds.

5 And then we kind of get the result -- get those
6 link results with the ads which is kind of further incentive
7 not to invest in that when we can invest in search modules.

8 Additionally we invest in other privacy technology
9 as well to make this privacy easy button that I was
10 mentioning earlier.

11 Q And who does DuckDuckGo consider to be its search
12 engine competitors?

13 A Really most of our users switch from Google. So
14 like far and away, we consider Google just our competitor.

15 Other search engines that compete with us are
16 Bing, Yahoo!, Ecosia, and Brave are probably the main ones
17 in the U.S.

18 Q Does DuckDuckGo consider vertical search engines
19 such as Amazon to be competitors that users are likely to
20 switch to or from?

21 A No, not really.

22 Q And today, what is DuckDuckGo's percentage share
23 of the overall U.S. search market?

24 A We're about two and a half percent in the U.S.

25 Q And which search engine has the largest percentage

1 of the U.S. search market?

2 A Google.

3 Q And does DuckDuckGo try to distinguish its search
4 engine from Google's search engine in any way?

5 A Yeah.

6 I mean, in a word, it's privacy.

7 You want me to expand on that?

8 Q Go ahead, please.

9 A Sure.

10 I mean, so when you go online today, if you don't
11 do anything to protect yourself, it's as if someone is, you
12 know following you around everywhere you go, everything you
13 do and recording that, really, every second.

14 All this information is then added together into,
15 you know, what I would think of as a huge dossier about you
16 or what we would call an online profile.

17 So if you use Google, that is, you know, your
18 search history and most of your browsing history based on
19 what you click on, and from their other products, location
20 history, purchase history as well. So these profiles can
21 basically be directly used to cause you harm.

22 So, for example, the ad targeting that is enabled
23 by them have been tied to discrimination for just access to
24 essential goods and services like jobs, housing, education,
25 healthcare, even financial products.

1 Additionally, it can be used to charge you
2 different prices as based on your profiles.

3 And then for Search in particular, I mean, there
4 are many of these harms but relating to Search, as I
5 mentioned earlier from Bing, you know, results may differ
6 based on your profile. So your results may be manipulated,
7 from our perspective at least, based on your user profile
8 without you knowing about it which can bias your kind of
9 conclusions from your search results.

10 So generally we find that a large percentage of
11 Americans would like to avoid these harms. And so to
12 distinguish that on DuckDuckGo, we don't do any profiling at
13 all. In fact, we don't have any individual user, browser,
14 or search histories. A way to think about it is every time
15 you search on DuckDuckGo, it's like it's your first time or
16 sometimes we say, you know, if 100 people search for cat
17 pictures today, we don't really know whether it's like one
18 person or 100 different people.

19 And then I would say also besides harms, just
20 privacy gives you benefits. A lot of people from some
21 research we do, do not like ads that follow them around the
22 Internet all the time. And so if you use our browser and
23 search engine, you effectively avoid what we call these kind
24 of creepy ads, and that's just a more pleasant experience
25 overall.

1 Q And do any of DuckDuckGo's search engine
2 competitors offer by default the level of privacy that
3 DuckDuckGo's search engine offers?

4 A No, I don't believe so.

5 I mean, there are some other private search
6 engines to varying degrees, like Brave offers some privacy,
7 Ecosia offers some privacy, but we don't think to the level
8 that we do.

9 Q And does Google offer by default the level of
10 privacy that DuckDuckGo's search engine offers?

11 A No.

12 Q Does Google offer, even if a user selects the most
13 secure privacy options, the level of privacy that DuckDuckGo
14 offers its users by default?

15 A I don't believe so, no.

16 Q And why is that?

17 A Because we've done several studies over the years,
18 for example, this notion of changing results around when,
19 based on your user profile, which we would call the filter
20 bubble, because it kind of puts you in a bubble based on
21 your profile and other results are filtered out -- we did
22 two pretty deep studies of that in 2012 and 2018, and in
23 that study we looked at people who were signed out, in
24 incognito mode on Chrome, and found still individual results
25 they were getting were very similar to the signed-in mode

1 relative to other people right around them that were not.
2 And so we controlled for things like location, time of day,
3 missing -- all variables we could think of and that was the
4 only thing remaining.

5 Q So you described some studies that DuckDuckGo has
6 done.

7 Has DuckDuckGo conducted any studies to evaluate
8 search engine users' level of concern about Internet
9 privacy?

10 A Yeah.

11 I mean, when we started, there really wasn't a lot
12 of consumer privacy research. So I'd say just in the last,
13 probably since around 2016 when we got really serious about
14 working on this easy button, we've probably done over 50
15 large scale surveys of the American population.

16 Q And before you go on and tell us at a high level
17 what those studies have found, can I ask you to describe how
18 DuckDuckGo performs those studies?

19 A Sure.

20 We generally commission them with a survey panel
21 company who then demographically adjusts them for the
22 American population. We don't conduct them ourselves.

23 And, you know, we have our own user insights team
24 who -- kind of professional survey people. And then
25 sometimes we've also commissioned the entire survey from an

1 external research firm.

2 Q Okay.

3 And now back to the question. At a high level,
4 what have these studies shown?

5 A So at a high level, it shows about 30 to
6 40 percent of Americans have a strong preference for search
7 privacy. To give you some color to that, we often ask a
8 question, if a new search engine were to come along, pick
9 the top factor that would motivate you to switch search
10 engines. And if you've already switched before, what was
11 that factor.

12 So factors include, there's a little more precise
13 language than this in the question, but they're essentially
14 better results; better privacy; fewer ads; better connection
15 to the social values of the company, like climate change;
16 better design; better customization options; and an other
17 category. So you might expect that better results would be
18 the number one thing that people pick. That is not what we
19 find.

20 Consistently, we find better privacy as the pick,
21 the number one factor, about 40 percent of the time. Better
22 results comes in at number two at about 25 percent. Fewer
23 ads is at 15 percent. And then all the rest of the
24 categories, so that ads up to 80, are about 20. So that's
25 one data point.

1 The second one that I would give you would be --
2 because people -- often what we hear from that is, like,
3 what people say or people do online may be different. So we
4 also try to ask very specifically, like, what people are
5 doing and recite back behaviors to us. So we ask things
6 like, do they regularly clear cookies, do they -- have they
7 ever downloaded a privacy app or extension. Have they ever
8 subscribed to, like, a privacy app or service. And we have
9 a number of these.

10 If people say they've done several of them, we put
11 them in what we consider more our target market which is the
12 care and act on privacy group, so they not only have
13 expressed concern, but they've expressly taken actions that
14 show that concern.

15 That comes out about right now at least around a
16 third of Americans and it's been steadily climbing since we
17 started doing this about ten years ago. So both of those
18 triangulate around the same, I'd say between 30 to
19 40 percent of Americans showing a pretty strong privacy
20 preference for search engines.

21 Q And has DuckDuckGo --

22 THE COURT: Counsel, I'm sorry, can I help
23 interrupt?

24 We're a little bit past 11:00, so we're going to
25 take our morning break. It's 11:00 -- a little after 11:05,

1 so we'll resume a little after 11:20.

2 COURTROOM DEPUTY: All rise. The court stands in
3 recess.

4 (Recess from 11:06 a.m. to 11:22 a.m.)

5 COURTROOM DEPUTY: All rise. The Honorable
6 Amit P. Mehta presiding. Again, in session.

7 THE COURT: Thank you, all. Please be seated,
8 everyone.

9 All right. Mr. Hoffman, whenever you're ready.

10 MR. HOFFMAN: Thank you, Your Honor.

11 BY MR. HOFFMAN:

12 Q Mr. Weinberg, when we left off, you were answering
13 the question of whether DuckDuckGo had done any studies
14 about users' concerns about Internet privacy. Had you
15 finished your answer?

16 A I think so.

17 I mean, I -- conclusion is about 30 to 40 percent
18 of Americans express a strong preference for search privacy.

19 Q Okay.

20 Then let me ask you this: Has DuckDuckGo always
21 been a privacy-focused search engine?

22 A We became privacy focused in around 2010. So
23 about a year and a half after I started the company.

24 Q And in 2010 when DuckDuckGo began to emphasize
25 Internet privacy, did that affect the number of searches run

1 on DuckDuckGo?

2 A Yeah.

3 I mean, early on, we had very little searches,
4 just all around. And mainly early adopters are coming to us
5 for a variety of reasons, including like the search modules
6 I was referring to earlier.

7 Over that time period, privacy became the salient
8 feature and the reason why most people were switching to
9 DuckDuckGo, and it's just been increasing since.

10 Q Were there any events you observed that made
11 privacy more relevant to consumers?

12 A Yeah.

13 I mean, so it was a -- it was more of a hidden
14 issue that people weren't really talking about, I'd say
15 before Snowden in 2013.

16 2013, that -- the Snowden revelations created an
17 international press moment for -- really for an entire year,
18 and that educated a lot of people about certainly government
19 surveillance going on.

20 And then, really from then, awareness of privacy
21 has ticked up slowly over time, over that entire decade,
22 2013 to now.

23 The other big moment where there was a really
24 increased amount -- I'd say a lot of this was driven by,
25 again, press -- was Cambridge Analytica in 2018. So that

1 really kicked off almost two years, up until the pandemic
2 started, of nonstop privacy revelations in news -- you know,
3 in the media.

4 Q And you referenced the Snowden revelations. At a
5 high level, what were those?

6 A Edward Snowden was a whistleblower who released a
7 lot of secret documents that showed a bunch about government
8 surveillance programs.

9 One of the programs called -- which is relevant to
10 this, called PRISM, was about the government requesting kind
11 of direct access to big technology companies, including
12 Google, so they could get -- easily search email history,
13 that kind of thing.

14 Q And you referenced Cambridge Analytica and
15 revelations there. Can you tell the Court what the
16 revelations were in Cambridge Analytica?

17 A Sure.

18 Cambridge Analytica was more about Facebook, and
19 some researchers had been using some Facebook data to
20 profile American citizens and for political purpose and,
21 arguably, influence the election.

22 I think it opened up people's eyes a bit wider,
23 though, to kind of what user data was out there, how
24 companies could get access to it through APIs, how it was
25 kind of floating around.

1 And so since then, the coverage has been way wider
2 as to what data is out there, how does it get leaked, how
3 does it line up in other places, that kind of thing.

4 Q So we've talked about the level of privacy the
5 different search engines provide. Let's talk now about the
6 level of privacy that Internet browsers provide.

7 In your experience, Mr. Weinberg, do leading
8 Internet browsers generally have privacy modes?

9 A I would say, yeah, most major browsers have a
10 privacy mode. I don't necessarily believe it provides much
11 privacy protection, but they have a mode.

12 Q And can you explain why you don't believe that
13 most privacy modes offer privacy protection?

14 A Yeah.

15 I mean, historically when they started -- this is
16 kind of another -- things were different a long time ago,
17 right?

18 So when the private mode first kicked off, there
19 wasn't as much online tracking going on. And so the mode
20 was more about wiping your local history. And so if you
21 used the private browsing mode and then closed the window,
22 that history would be wiped such that, you know, your spouse
23 or someone in your household couldn't see your browsing
24 history.

25 But over time, the real privacy threats were more

1 online and websites tracking you behind the scenes. The
2 privacy modes did nothing to prevent any of this tracking.

3 I'd say after many years of complaining about this
4 and at least one class-action lawsuit, major browsers have
5 started to put some privacy protection in privacy mode but
6 definitely not enough to stop the privacy harms I was
7 talking about earlier, and generally no search privacy in
8 the mode.

9 Q And just for reference, do you know the name that
10 Apple gives the privacy mode in its Safari browser?

11 A I think they just call it private mode.

12 Q Okay.

13 And the same question for Google's Chrome browser?

14 A Google calls it incognito mode.

15 Q And do you know the name that Mozilla's Firefox
16 browser uses?

17 A I'm not sure if they have a name for it. I think
18 it's just like new private tab, new private window.

19 Q Okay.

20 And you said earlier that DuckDuckGo also operates
21 a browser. Does DuckDuckGo's browser have a privacy mode?

22 A Our goal is to offer privacy by default. So all
23 our privacy protections are available in all of our windows.

24 Q Okay.

25 And when you say privacy by default, what does

1 that mean?

2 A I mean, when you install the product, you don't
3 have to go into a privacy mode or mess around with settings
4 to make the browser private, it just starts with the privacy
5 protections on by default.

6 Q Now, Mr. Weinberg, is it possible that even if a
7 browser is set to privacy mode, that a search engine could
8 still track a user's private information?

9 A Yes.

10 I mean, oftentimes the browser and the search
11 engine are different companies, and so they're not even
12 coordinating. It just -- generally when you go into a
13 private mode, the browsers aren't stopping online tracking.
14 And so they wouldn't be stopping the search engine that you
15 visit, which could be any search engine, from doing anything
16 on their website.

17 Q And are there ramifications for the privacy of a
18 consumer who pairs a browser set to privacy mode with a
19 search engine that tracks personal information?

20 A Yes.

21 I mean, all the harms I was talking about earlier,
22 a lot of them stem from searching and search privacy. So,
23 you know, if you search for something in private mode, it
24 could follow you around. Like we were talking about with
25 ads, it could -- those ads could be discriminatory. Things

1 could still be added to your profile that could be used for
2 changing your search results, like I was talking about,
3 incognito mode. All of those, tracking could still be
4 happening.

5 Q Earlier you described some studies that DuckDuckGo
6 has commissioned. Has DuckDuckGo commissioned studies
7 regarding consumer misconceptions about privacy protections
8 offered by browsers set to a privacy mode?

9 A Yes.

10 Specifically we went pretty deep into this issue
11 in 2016, and put out a detailed white paper in 2017, that
12 was based on a number of surveys.

13 In general, we found that usage of these modes was
14 very high. I recall something like 45 percent of people
15 saying they used them at some point.

16 There was wide misconceptions about what they do.
17 So we kind of asked people to check off what it did, and the
18 majority of people could not identify what it actually did.

19 A primary misconception was this search privacy
20 issue you're asking about where people thought their
21 searches would be anonymous in private browsing mode, when
22 they're not.

23 We then went on to ask people -- to tell people
24 what it actually did and then ask people how they felt about
25 it and to identify kind of from a range of emotions, and

1 people generally, again, the majority, felt kind of a range
2 of negative emotions, confused, misled, that kind of thing.

3 Q And did DuckDuckGo study whether informed
4 consumers would prefer to pair a browser in privacy mode
5 with a search engine that does not track private
6 information?

7 A Yes.

8 I mean, generally -- and that was part of the
9 reason why we're doing this study in particular was, we had
10 a hunch that that was the case. And, you know, we were
11 trying to make the case to browsers to use us in private
12 mode, and so that is what we found.

13 Q And for a consumer who prefers pairing a browser
14 in privacy mode with a privacy-focused search engine, is it
15 easy for them to switch device defaults to a search engine
16 like DuckDuckGo?

17 A No. I mean, it's generally impossible. There's
18 no -- there's generally no separate setting for a search
19 engine in private mode versus regular mode.

20 Q All right. Well, let's talk about potential
21 methods of extending the reach of DuckDuckGo's search
22 engine.

23 Has DuckDuckGo sought to have its search engine
24 included as an option on any choice screen menus?

25 A Yes, in Europe.

1 Q And what happened there?

2 A There was an antitrust case in 2018, and Google
3 put forth their own remedy of a choice screen, which we --
4 we have no formal role in this process. We weren't kind of
5 asked about it. The EC Commission didn't really include us
6 in the negotiations. So from our point of view, it was kind
7 of immediately flawed.

8 The first version, they wanted to charge us money
9 to participate way more than the profits we make per user.

10 So that and many other things, issues with it,
11 we've been complaining about.

12 The only thing that's really changed is it became
13 free, but we think it's still not designed very well. But
14 we participate now because it's free.

15 Q Okay.

16 Is DuckDuckGo a non-default search option in any
17 browser?

18 A Yes.

19 Q And how effective is it for gaining traffic to be
20 a non-default search engine in a browser?

21 A In general, just being made the option we found
22 not very helpful because users find -- we can't very well
23 instruct people to go to those settings.

24 There's one exception to that, which is there are
25 browsers where -- and iOS is one of these -- where it is

1 impossible to set the search engine unless you're an option.
2 And so that gives us some boost because otherwise, it was
3 completely impossible.

4 But generally, we find just being an option
5 doesn't give us that much.

6 Q Do you find any roadblocks that consumers have in
7 resetting defaults?

8 A Yeah.

9 I mean, I -- so I'd say broadly, the search
10 defaults are kind of the primary barrier for people
11 expressing their search privacy.

12 They're -- like -- as I was just saying, they're
13 extremely powerful. We find it empirically hard to get
14 people to switch.

15 Q And could you expand on why it's difficult to get
16 people to switch defaults?

17 A Sure.

18 So I think there's a few nuances to this.

19 First, it just -- as a practical matter, there's
20 too many steps to get a full substitution of DuckDuckGo to
21 Google.

22 This is because -- Google to DuckDuckGo.

23 This is because there's just so many devices and
24 search defaults.

25 So if you think about it, a typical user is going

1 to have multiple devices they interact with across home,
2 work, family, phone, tablet, desktop, laptop, somewhere
3 between three to seven devices, I would say routinely.

4 Each one of these devices has multiple search
5 defaults on it, the browser defaults and the operating
6 system defaults, some people use multiple browsers,
7 et cetera, sometimes there's multiple search results per
8 device.

9 And so if you just switch one default, say, like,
10 the Android widget, that's just a small fraction of the
11 users' queries, that's not a full substitution of Google to
12 DuckDuckGo, because they're still using and interacting with
13 all their other browser and search defaults.

14 So to really get them to have a real substitution,
15 a real substitute of products, you'd have to switch all the
16 search defaults that they regularly interact with. That's
17 now on the order of like 30 to 50 steps, not like three to
18 five. And it's just too many steps. So, like, that's what
19 we're seeing empirically.

20 We have survey data, we don't have any user data,
21 but we do these surveys of the American population again --
22 we do a lot of surveys because we don't have any user data
23 to see what usage DuckDuckGo gets and, like, how people are
24 using it. We can segment those surveys by our most avid
25 users. So these are users who love our search results, they

1 are recommending us multiple times a month to friends and
2 family. This is like the top end of the range.

3 These people still aren't switching all their
4 search defaults. They are routinely reporting to us that
5 they're full-time on, say, mobile but not Desktop or they're
6 full-time on one browser but not another. And so that's why
7 I say kind of empirically, it just is not happening.

8 Two other nuances that might be worth mentioning
9 is -- that we run into is, I think you just said, you know,
10 it resets sometimes. So that definitely happens. So like
11 on browser and operating system updates, the default can
12 reset. Search functionality can also change which is kind
13 of like a de facto reset. There's a new access point added
14 or it's a little different, and so there's a justification
15 to kind of reset it.

16 What this means essentially is, if you switch some
17 of these defaults, eventually you're going to be forced back
18 on to Google if you do nothing.

19 And then finally I'd say, it's all just way harder
20 than it needs to be. So on Android, we find it takes
21 currently 15 plus steps, there's more taps if you count all
22 the taps, just to switch everything you can and not
23 everything is switchable like the assistant, for example.

24 But it could be easy. So it could be the case.
25 Imagine for a second that you had an operating system

1 setting that switched all the search defaults across the
2 device in actually one step, and now imagine that if you
3 downloaded our app or website, we could take you -- or you
4 downloaded our app or went to our website, we could take you
5 to that setting in one click. That's how easy it could be,
6 but it just doesn't work that way.

7 Q Is that your choice that it doesn't work that way?

8 A No.

9 Q Is there any browser where DuckDuckGo is the
10 default option today?

11 A I believe we're the default in the Tor browser,
12 which is a privacy focused browser.

13 THE COURT: I'm sorry, can you spell that browser?

14 THE WITNESS: T-o-r.

15 BY MR. HOFFMAN:

16 Q And what percentage of the U.S. browser market
17 does Tor have today?

18 A Some immeasurable small amount. I don't know if
19 it's measurable.

20 Q Well, what have you found to be the most
21 successful method of distributing DuckDuckGo's search
22 engine?

23 A When we've been the default for brief periods in
24 different times, that's been the best method.

25 Like in this Tor example, even, we weren't the

1 default and then we were the default.

2 Brave made us the default in some countries for a
3 brief period of time.

4 And so we had kind of a taste of what that looks
5 like. I'd say that's the best way.

6 Q And is DuckDuckGo search engine the default in the
7 DuckDuckGo browser?

8 A Yes.

9 I would say that, as I was mentioning earlier,
10 like, it's an all in one privacy product. So we believe
11 search privacy is essential to get the value proposition of
12 the product.

13 Q And are there any challenges in trying to
14 distribute the DuckDuckGo browser?

15 A Yeah.

16 I mean, so, in fact, we made the browser in
17 part -- in large part because of the friction in search
18 defaults. So believe it or not we find it easier to get
19 people to adopt our browser than to get people to try to
20 convince them to switch to different search defaults.

21 The browser faces its own issues, though, like,
22 for example, it's hard, in some case, to switch the browser
23 default in a similar way.

24 Also, we face competition from Google's use of
25 their other properties, like if you go to Gmail or YouTube,

1 they'll ask you to download Chrome constantly if you're on
2 another browser.

3 THE COURT: I just want to add, just as a
4 practical question, if I go to an app store and download
5 DuckDuckGo, the DuckDuckGo app is both a browser and search
6 engine or is it just search engine? Can you tell me what
7 gets downloaded?

8 THE WITNESS: Yeah, I mean, I think that it's a
9 browser, but it has the search engine built in.

10 I mean, all the browsers since about 2010 have
11 that address bar where you just type, search right into the
12 address bar.

13 THE COURT: Right.

14 THE WITNESS: So it's both.

15 THE COURT: It's both.

16 THE WITNESS: Yeah.

17 THE COURT: I wanted to confirm that. Thank you.

18 BY MR. HOFFMAN:

19 Q Now, Mr. Weinberg, without naming names and we'll
20 get into that in the closed session later, has DuckDuckGo
21 ever pitched the idea of being the default in a browser's
22 private browsing mode?

23 A Yes.

24 I mean, we -- after doing -- we had the hunch
25 about people's expectations there, we confirmed it in our

1 research. And so we thought it was a great pitch to
2 browsers honestly where -- and the pitch was essentially,
3 hey, we have direct evidence that we think you're misleading
4 your users, like, your users think they're getting search
5 privacy in this mode but they're not, you should really use
6 a private search engine and we really took that pitch pretty
7 far and wide.

8 Q And when DuckDuckGo made that proposal to
9 different browsers, did it face any obstacles?

10 A Yes.

11 I mean, we generally saw a lot of interest.
12 I mean, I think there was a lot of genuine concern about
13 search privacy.

14 But pretty much with all the major browsers, at
15 least, we hit an obstacle with their people's Google's
16 contracts.

17 And we ultimately decided, this was after like
18 three years of trying this, that it was a quixotic exercise
19 because of the contracts.

20 MR. HOFFMAN: Okay, Your Honor, at this time, that
21 concludes the questions that I think I'm allowed to ask in
22 open court. I think my colleague from the states has some
23 open court questions and then we could resume in closed
24 session?

25 THE COURT: Okay.

1 MR. CONRAD: Good morning, Your Honor. Joseph
2 Conrad for the State of Nebraska and for the plaintiff
3 States.

4 THE COURT: Good morning.

5 BY MR. CONRAD:

6 Q Good morning, Mr. Weinberg.

7 First, if you could just satisfy my curiosity,
8 I've been sitting there just curious.

9 What prompted you to name the company DuckDuckGo?

10 A Oh.

11 Unfortunately it was not a great story.

12 The mascot -- the idea for a mascot came before
13 the name, wanted a cute mascot, tried to think of a name
14 that would go with the cute mascot.

15 Q Got it. Thank you.

16 So you talked with my colleague, I think, about
17 what you referred to as search modules. And could you
18 explain where you get the content that fit into those
19 modules?

20 A Sure.

21 I mean, as I was saying, there really are many
22 dozens of distinct types of search modules, and each one has
23 its own index, so if you want to get really complicated, set
24 of indexes sometimes.

25 And so because of their vertical nature they're

1 going to come, each one is going to be pretty different as
2 to what the content is going to be.

3 I referenced Apple for maps. You know, we
4 partnered with Tripadvisor, some of them, like, FAQs -- some
5 of them, like, Calculator, we'll just make ourselves.
6 Something like info about people and places, we generally
7 get from Wikipedia but that's from indexing ourselves, not
8 from them directly.

9 Q And what motivated DuckDuckGo to first develop
10 these features, or excuse me, those modules?

11 A Well, I actually started myself. The whole reason
12 for starting the company myself was to improve my own Google
13 results initially. And part of the initial motivation was
14 actually going to Wikipedia a lot. So the first code that I
15 ended up writing was crawling and indexing Wikipedia and
16 making search models for Wikipedia and putting them on top
17 of the search results.

18 Q And how did that strategy develop over time?

19 A We -- I thought it was the future.

20 We ended up really making that a core strategy of
21 the company early on from, like, 2000 maybe -- let me get
22 the dates wrong, '11 to '14 maybe. And we actually created
23 a whole open source platform where developers could code all
24 sorts of different search modules for us and the idea was to
25 get pretty niche modules. We ended up with basically

1 thousands of these in the end.

2 All sorts of things, like, if you were into a
3 certain programming language, you might have the programming
4 language for that -- modules for that programming language
5 documentation. Or if you were really into Pokémon cards or
6 something, we could have a Pokémon directed search module.

7 It ended up not being as attractive a way to get
8 people to switch search engines as I would have liked so we
9 stopped focusing on it as much but that was kind of the
10 strategy at that time.

11 Q And does DuckDuckGo continue to develop these
12 modules?

13 A Yeah.

14 We -- I had mentioned earlier there's about 20
15 that I think are essential so we now focus our efforts on
16 those essential ones and we continue to develop them.

17 Q And does DuckDuckGo do any testing or
18 experimentation with regards to these modules?

19 A Yes.

20 Q And can you just explain for the Court what this
21 testing or experimentation looks like?

22 A Sure.

23 I mean, there's not just one type of
24 experimentation or test. We will -- I think the most common
25 would be like an AB test or what they call a split test

1 where you have two versions of something going on at once
2 and you're looking at what people are clicking on or
3 engaging with on both versions and seeing which one is
4 better by whatever endpoint you want.

5 We also will do other things, though. We'll do a
6 qualitative test by having people walk through things and
7 tell us what they're thinking or seeing. We'll do survey
8 tests, like I was -- like, surveys like I was talking about
9 before. There's a wide range of methodologies you could
10 use.

11 Q And does the number of users that DuckDuckGo
12 impact the quality of the testing or experimentation it
13 conducts?

14 A Yeah.

15 I mean, we are very limited in the amount of
16 on-site experimentation we can do, which is partly why we
17 use all these other methodologies to try to be a proxy for
18 what we could get if we could run more AB tests live on the
19 site.

20 Q Thank you. Those are my questions.

21 THE COURT: Can I ask one question, one additional
22 question, which is -- and you may have answered this, I
23 apologize.

24 In terms of search quality and the quality of
25 results, what does DuckDuckGo do with the data it receives

1 from Bing to create its own search results page?

2 THE WITNESS: So --

3 THE COURT: And to distinguish its search results
4 page?

5 THE WITNESS: Yeah.

6 So we're only getting some of the information that
7 we need to make a search result page from Bing. We're
8 mainly getting the traditional links and ads. So all these
9 search modules we have to do ourselves.

10 And so we have to develop -- and I'd say a large
11 part of the technology is developing a relevancy engine of
12 where to place what on the page. Like, do you put maps on
13 top of the links here, or should you put it under the third
14 link.

15 And if you don't put the thing that people want on
16 top, because of the way people click, so much -- and it gave
17 so much more than the thing on top, you have a perceived
18 quality issue.

19 I would also say, though, that, like, I don't
20 believe there's an overall metric for quality. I think
21 it's -- each query is kind of subjective to some degree,
22 and, you know, each vertical has its own metrics. So it's
23 not like we're -- we can make a topline measurement of it.

24 THE COURT: So if somebody were to enter a query
25 that would fall outside the modules that you've referred to,

1 the 20 or so that you focus on, what would the search
2 results be and where would they come from?

3 THE WITNESS: Yeah.

4 I mean, I would say they're mainly from Bing at
5 that point.

6 Most searches, I think, now have modules on them.
7 And so, like, if you -- say my Google and Bing, if you
8 search almost any query, there's going to be other stuff on
9 the page. So that's becoming a more rare experience.

10 But if you just have traditional links, we would
11 be getting those from Bing.

12 There are some changes, like I was saying, that
13 might be different. The ones that Bing sends us and what
14 they would display for themselves might be different because
15 of, say, like privacy.

16 There are also some other differences that there
17 might be, we have some flexibility around that.

18 THE COURT: And when you say "traditional links,"
19 I'm not -- can you expound on what you mean by that?

20 THE WITNESS: Yeah.

21 Otherwise referred to as kind of the 10 blue
22 links. I think those are the links that people think about
23 when they think about search engines. They don't often
24 think about the modules, which is why I was talking about
25 them.

1 And so I just mean like regular links to websites.

2 THE COURT: Right. What we've been referring to
3 as sort of organic --

4 THE WITNESS: Organic links. Yeah, that would be
5 a good term, yeah.

6 THE COURT: All right.

7 All right. Thank you. I appreciate that.

8 All right. So why don't we go ahead and then move
9 into closed session, and we'll ask if you are not associated
10 with any of the parties or with DuckDuckGo, to please exit
11 from the courtroom. Thank you.

12 (Pause)

13 THE COURT: All right, Counsel. It's going to
14 take a -- we've got the courtroom connected to a media room
15 downstairs. That's how -- that's about how sophisticated we
16 are with technology. So it's going to take us a few minutes
17 to get that line disconnected before we can proceed.

18 THE WITNESS: Got it.

19 (Pause)

20 THE COURT: We're still waiting. It's going to
21 take a couple minutes.

22 MR. HOFFMAN: Sure. Thank you, Your Honor.

23 (Pause)

24 MR. HOFFMAN: Your Honor, may I approach the
25 witness with a binder?

1 THE COURT: You may.

2 MR. HOFFMAN: May I approach the bench,
3 Your Honor?

4 THE WITNESS: Can I look at this?

5 THE COURT: He'll direct you to certain documents
6 when he's ready.

7 (Pause)

8 THE COURT: Sorry it's taking so long.

9 We're ready to go.

10 MR. HOFFMAN: Okay. Thank you, Your Honor.

11 BY MR. HOFFMAN:

12 Q Mr. Weinberg, when we left off, I asked you if
13 DuckDuckGo had ever pitched to different browsers that
14 DuckDuckGo could be the default in their private browsing
15 mode.

16 Now, specifically let me ask you if DuckDuckGo
17 ever proposed to Apple that DuckDuckGo could be the default
18 in Safari's private browsing mode?

19 A Yes, many, many times.

20 Q And when did DuckDuckGo first make that pitch to
21 Apple?

22 A So we had been trying to become a search option in
23 Safari first. That took, itself, several years, and that
24 happened in 2014.

25 As I mentioned before, if you don't have a

1 contract with Apple, you can't be a search option. So we
2 got that first search contract in 2014.

3 Shortly after that, I believe even in 2014, we
4 started pitching this idea for a DuckDuckGo search and
5 private browsing mode.

6 We did it in 2014, '15. I think in 2016, we got
7 our first kind of response back.

8 Our take was that they were actually really
9 interested in this.

10 The people we were talking to were generally
11 DuckDuckGo users themselves interested in privacy.

12 Q Just so it's clear, the people you were talking to
13 at Apple were --

14 A At Apple, yeah.

15 So at that time, this was mainly Rhonda Stratton,
16 who became our partner, manager, at Apple, and Brian Croll,
17 who was an executive in product marketing. Those were our
18 kind of primary high-level contacts.

19 They both were DuckDuckGo users, deeply interested
20 in privacy, thought this was a good idea.

21 From those conversations, we kind of identified
22 Craig Federighi was the executive, the main -- highest level
23 project executive.

24 THE COURT: I'm sorry, what was the name?

25 THE WITNESS: Craig Federighi.

1 He's -- I'm not sure exactly their titles. He's
2 like an SVP on their main leadership page.

3 They -- so we tried to push to get a meeting with
4 him, really to pitch this.

5 That did occur in 2017.

6 Q And where did this meeting in 2017 take place?

7 A It took place -- most all our meetings took place,
8 including this one, at Apple headquarters because, you know,
9 that was before Apple Park so it was like in the main
10 Cupertino place.

11 Q Okay.

12 And do you remember what month of 2017 this
13 meeting took place?

14 A Yeah, it was in October.

15 Generally we had been coming back once a year
16 around that. So they have a yearly cycle of their -- of
17 releasing iPhones and iOS and Mac iOS. And so it comes out
18 in September. They announce things in June. They think
19 about what they're going to do in the fall. And then they
20 hurriedly program it in the spring.

21 And so we tried to come back in the fall and kind
22 of make our pitch at the time when they were thinking about
23 roadmapping for the next cycle.

24 Q So now we're talking about a meeting at Apple
25 headquarters in Cupertino in October 2017. Can you tell me

1 who you recall notable from Apple that attended this
2 meeting?

3 A Yeah.

4 I mean, it was a big meeting. We were in a really
5 big conference room, so we did get the meeting with Craig.

6 There were other -- a bunch of other executives
7 there. Bud Tribble I remember being there. He's a very
8 longtime Apple person. I think he was on, like, the
9 original Macintosh team. So he's kind of like a senior
10 fellow executive type.

11 The head of Safari was there at the time,
12 Darin Adler.

13 Brian Croll was there. Rhonda, who I mentioned.

14 I believe there were some Siri folks there that we
15 never saw again, so I don't remember who they are.

16 And some people from privacy, too.

17 Q And what do you recall the substance of this
18 October 2017 meeting at Apple headquarters to be?

19 A So --

20 MR. SAFTY: Your Honor, objection to the extent
21 this is eliciting hearsay testimony.

22 THE COURT: I think he was just asking generally
23 what the subject was. I don't think he asked what anybody
24 said.

25 Go ahead.

1 THE WITNESS: Yeah, so we were -- we essentially
2 wanted to level up our pitch because we hadn't been
3 successful yet, and so we were hoping to make the most
4 compelling pitch we could to Craig.

5 So we did -- we basically did two things in our
6 pitch that we hadn't done before.

7 One is, I mentioned -- you had asked me previously
8 about private browsing research we did. So part of the
9 motivation for that was for -- for these and other meetings
10 like this.

11 And in particular, we segmented the data by Apple
12 users so we could specifically tell Apple what their users
13 thought about private browsing mode, what they expected from
14 it, you know, do they want it, private search for private
15 browsing, et cetera, and that data was pretty compelling
16 from our perspective so we put that up.

17 The second part of our pitch was, we thought we
18 could, in partnership with them, make DuckDuckGo the best
19 search option on Apple devices for Apple users by
20 integrating their content into search modules. And so, for
21 example, in particular, we had pitched Apple News, Apple
22 Maps, Apple Music, Apple TV.

23 And if you think about like maps for a second, if
24 you go on Google, you get Google Maps. If you're an Apple
25 user and like Apple Maps, you would prefer to see Apple Maps

1 for a couple reasons.

2 One is, when you click into the Apple Maps, it's
3 going to be seamless, it's going to look the same. And it's
4 not just that it looks the same, it's like different
5 directions, points of interest can differ. So it's just a
6 much more seamless appearance if the search modules match
7 the apps you're going to click in.

8 And same for music, TV, news, et cetera. So our
9 general pitch was, Work with us, let's incorporate all of
10 Apple content into the search engine, and it will be a more
11 compelling search experience overall.

12 BY MR. HOFFMAN:

13 Q And what was your impression of how this meeting
14 went?

15 A My impression of the meeting is it went very well.

16 I mean, so I've pitched lots of things to Apple
17 over the years. If there's no interest, their move is
18 basically silence. I mean, there's lots of awkward
19 silences. And so you have to, like, you know...

20 So this case, I actually had to move things along
21 because there was so much engagement. The second half of
22 the pitch about the content, I remember having to, like,
23 let's go talk about this because there was so much talk
24 about the private browsing.

25 Craig in particular kind of led discussion from

1 Apple's side, but, yeah, there were lots of discussions
2 around implementation, what implementation could look like,
3 about DuckDuckGo itself that people in the room weren't
4 totally aware of, like some of those questions like the
5 judge was asking me, like how exactly the results worked,
6 the search modules, et cetera.

7 Q Okay.

8 And this October 2017 meeting that we were talking
9 about, did it lead to another meeting with Apple to discuss
10 options for Safari's private browsing mode?

11 A Yeah.

12 So I would say we -- it kind of accelerated
13 everything.

14 Our general idea was, you know, we didn't think
15 Craig was going to be involved in everything day to day
16 because he had so much to do, but if he gave kind of
17 blessing to the team to go and figure this out, we could
18 then progress with the rest of the people in the room.
19 That's essentially what happened.

20 So we came back the next summer and --

21 Q And when you say "back," is that back to
22 Cupertino?

23 A Yeah, back to Cupertino.

24 And there had been talk about implementation. And
25 so we flagged that as like we thought that was going to be a

1 primary concern of theirs.

2 So when you say private search or private browsing
3 mode, that could mean a lot of different things the way it
4 looks and how users interact with it.

5 So we came back with a presentation that offered
6 several alternatives to give them some ideas. Apple, I
7 would say, is also very visual. So they really want to see
8 what it's going to look like. They want to imagine what it
9 looks like in their product, so we tried to design it fully,
10 like take the full screens as to like something they
11 would do.

12 And so we offered several ideas for this, like a
13 drop-down, like we're the default but there's a drop-down
14 where you can change it, or you could toggle something that
15 said, like, you want to turn on private search or private
16 browsing when you open private browsing mode.

17 We offered one that was, like, you could activate
18 it. So there was, like, a message about private search
19 educating consumers, and if you click "activate," it would
20 take you to a setting that you could toggle.

21 So we presented all of this basically at the
22 meeting.

23 Q And I didn't get a chance to ask you but
24 do you remember any notable Apple executives at this meeting
25 in the summer of 2018?

1 A So the crowd for this was, again, Rhonda and Brian
2 and Darin, now, kind of picked up as another executive that
3 we worked on this with, also expressed to be a DuckDuckGo
4 user who was running Safari at that time.

5 Q And when you say Rhonda, that's Rhonda Stratton?

6 A Rhonda Stratton, yeah.

7 Q Darin is Darin Adler?

8 A Darin Adler, Rhonda.

9 I'd say at all of our meetings, there were other
10 Apple people there often, like, sometimes somebody from
11 privacy, sometimes somebody from legal. Sometimes --
12 because we also discussed things about our other privacy
13 technologies, so sometimes there's like API or extension
14 people there. Like, I remember John Davis, I think, might
15 have been at this meeting.

16 Q And we're talking about this summer 2018 meeting.
17 What was your impression of how that meeting went?

18 A My impression from this point on -- or our
19 impression was that they were really serious about a
20 potentially for the next year's release.

21 So this is 2018. And part of the reason I think
22 that is we had been going back once a year basically, you
23 know, to Apple headquarters.

24 But Darin asked us in the meeting to come back
25 basically as soon as possible to brainstorm what privacy

1 integrations could look like, including this one, kind of a
2 full integration of DuckDuckGo technology into Apple Safari.

3 And they also made references to roadmaps and
4 things like that.

5 Q And you mentioned a presentation you prepared for
6 Apple for this summer 2018 meeting. Did DuckDuckGo send
7 that presentation to Apple after the meeting?

8 A Wouldn't have been me who did it, but that was our
9 protocol, was to send all our materials to the external
10 party after the meeting.

11 Q And, Mr. Weinberg, I'll direct your attention to
12 the tab UPX0818 in your binder, and I'll ask Mr. Barkey to
13 display UPX0818 on the screen.

14 MR. HOFFMAN: And, Your Honor, we have
15 DuckDuckGo's 902(11) declaration for this document but
16 I understand Google has a hearsay objection.

17 THE WITNESS: I don't see it in the binder, but I
18 see it on the screen.

19 MR. HOFFMAN: Okay.

20 MR. SAFTY: No objection to admitting this
21 exhibit.

22 THE COURT: So UPX818 will be admitted.

23 MR. HOFFMAN: Okay. Thank you, Your Honor.

24 THE COURT: I'm sorry. Do you not have it in your
25 binder?

1 THE WITNESS: Would it be the tab?

2 THE COURT: It should be behind the tab, yes.

3 THE WITNESS: Yeah. I don't see 818.

4 (Plaintiff's Exhibit UPX818
5 received into evidence.)

6 THE COURT: Can you all just check and make sure
7 he's got the exhibit in front of him. It's on the screen
8 but...

9 THE WITNESS: Now, I do see it. It's hidden
10 behind another tab. I've got it. My bad.

11 BY MR. HOFFMAN:

12 Q Okay, great. And you can use the binder or you
13 can use the monitor. I'm guessing with your profession, you
14 may be more interested in the monitor.

15 A Yeah.

16 Q Do you recognize this document?

17 A Yeah.

18 Q And can you tell the Court what it is?

19 A Sure.

20 This is kind of what he says. This is a summary
21 of our meeting sent by Prakash who was leading this media
22 engagement -- business development engagement at the time.

23 Q When you say Prakash, what is Prakash's last name?

24 A Swaminathan, I think, is how you pronounce it.

25 Q And attached to this email, was there the

1 presentation that you described you prepared for Apple at
2 the summer 2018 meeting?

3 A Yes.

4 Q So now I'll direct your attention to page 3 of
5 this document. It has the Bates number ending in 552.001.

6 A Yep.

7 Q Do you recognize this document?

8 A Yeah. I mean, on the screen is Apple logo and the
9 DuckDuckGo logo. We generally put this up at the beginning
10 of a presentation, you know, to be like let's work together
11 kind of thing.

12 Q Okay.

13 And then I'll ask you to flip to the next page
14 which is Bates number ending 552.002. I'll ask you if you
15 recognize this page.

16 A Yep, same thing. We put this at most of our
17 presentations to just reinforce that we feel similarly about
18 privacy.

19 Q Okay. Thank you.

20 And, finally, I'll ask you to turn to page 11 of
21 this exhibit which is 552.009.

22 And I'll ask you if you recognize these
23 depictions.

24 A Yeah, these were the different implementations,
25 ideas I was referencing. And then we kind of ended with the

1 one we thought might be most appealing to them where we --
2 this is the way their private browsing mode looked at the
3 time. And so they had this explanation of it at the top and
4 so we would, in this idea, we would add this private search
5 piece underneath.

6 Q Are you talking about the phone screen on the left
7 right now?

8 A Yes, phone screen on the left, where a user then
9 could understand, try to understand their search is more
10 private than private browsing mode unless they activated
11 private search and private browsing. If they clicked
12 "activate," it would take them over to the OS operating
13 system search setting where there would be this toggle that
14 they could activate it.

15 Q Can you describe for the Court what the phone
16 screen on the right depicts in this exhibit?

17 A Yes, that is the Safari search engine setting
18 screen with our addition to it at the bottom where it says
19 private browsing mode, where you would be able to enable
20 private search and private browsing mode.

21 Q So was this the way Safari appeared at the time of
22 your presentation or was this your proposal to Apple?

23 A This was a proposal to Apple.

24 And I would say that we weren't -- we never
25 proposed them to use exactly what we did. I mean, this is a

1 depiction of what they could potentially do. We're trying
2 to give them visual ideas that they could take back and
3 think about how they wanted to do it.

4 Q Okay. Thank you. You can put that exhibit aside.

5 THE COURT: Can I ask you a question?

6 Why was it designed this way or why did you
7 propose a design to, it looks like it would actually require
8 the user to activate it as opposed to having it already be
9 set as the default in privacy mode?

10 THE WITNESS: We had already experienced some
11 conversations around some understanding that they wouldn't
12 do a default in private browsing mode because of their
13 Google contract. And so we were already trying to get
14 something that would work.

15 THE COURT: Thank you.

16 BY MR. HOFFMAN:

17 Q So we were just talking about the presentation
18 that was prepared for the summer 2018 meeting. Did that
19 summer 2018 meeting with Apple lead to another meeting with
20 Apple to discuss Safari's private browsing mode?

21 A Yes.

22 So I mentioned Darin had asked us to come back
23 pretty much immediately and brainstorm how our integrations
24 could work. And so we did that as soon as we could prepare
25 for it. So we came back about a month and a half later, it

1 was in September of that year.

2 Q Okay.

3 So now we're talking about a September 2018
4 meeting that, again, is in Cupertino; is that right?

5 A That's correct.

6 THE COURT: I'm sorry, '18 or '19?

7 THE WITNESS: '18.

8 THE COURT: '18. Okay.

9 BY MR. HOFFMAN:

10 Q And what do you recall the substance of this
11 September 2018 meeting at Apple's headquarters to be?

12 A So we -- it was really about -- you know, they had
13 asked us to give them all their ideas for what -- or give --
14 present ideas for how DuckDuckGo privacy technology could be
15 integrated into Safari and especially private browsing mode.

16 So we also produced a lot of other privacy
17 technology that kind of blocks different hidden trackers
18 across the web.

19 And if you think about when I -- when you
20 originally asked me about how DuckDuckGo works and we have
21 are these different privacy protections and they're on by
22 default, you know, the thought was if they offer this
23 privacy mode, maybe they could offer a lot more privacy
24 protection in addition to private search in this mode.

25 And what of all of our technology might they

1 integrate.

2 So we came with a bunch of ideas, leading with the
3 private browsing one -- private search and private browsing
4 one, I mean, but also thinks about using our tracker
5 blocking list to kind of block hidden trackers on private
6 mode. Increasing encryption is another thing that we do.
7 And so we covered all that.

8 And there was -- I seem to remember this meeting
9 because it was Darin's meeting and his team is mainly all
10 engineers, and so there were a few non-engineers there but
11 it was stacked with engineers who are just -- who talk very
12 differently. I mean, I'm used to it, but not normally Apple
13 speak, I would say. The more frank, more engineering
14 focused, that kind of stuff.

15 Q And, again, we're talking about this
16 September 2018 meeting at Apple headquarters.

17 What was your impression of how this meeting went?

18 A We were very excited about this meeting.

19 I mean, they expressed that they were -- it was
20 the first meeting where anyone had expressed they were
21 really considering this for the 2019 release, not just like
22 going to talk about it at a roadmap meeting but they're
23 trying to put it on the roadmap. They're interested, they
24 want to do it, which had never happened before.

25 So we were coming out very excited.

1 The -- I'd say they hadn't figured out the design
2 yet so we're still presenting the designs and talking about
3 that.

4 And they hadn't figured out, even with this design
5 or the designs they wanted to do, which they didn't really
6 tell us, how it would work with their Google contract.

7 Q Okay.

8 So you said you were excited. Despite the
9 excitement, did you leave the meeting thinking that Apple
10 had any concerns about implementing your proposal?

11 A Yeah.

12 I mean, the explicit next step was, I mentioned
13 about the contract, was they were going to -- they had
14 identified pretty clearly that the people in the room could
15 not resolve this issue around their Google contract and that
16 the next step was they were going to go figure that out.

17 Q Okay.

18 And you mentioned the Google contract a few times.
19 What do you understand to be the Google contract?

20 A I understand what I'm referring to --

21 THE COURT: I'm sorry. Objection.

22 Basis?

23 MR. SAFTY: To the extent it's calling upon the
24 witness to speculate about things that are beyond his
25 personal knowledge.

1 THE COURT: Well, I think he was asked about what
2 his understanding is. He wasn't asked to speculate beyond
3 that, so...

4 MR. SCHMIDTLEIN: If he's seen the Google
5 contract, that would be shocking.

6 THE COURT: Well, I suspect he's not going to
7 quote the text of it, but has a general understanding of
8 what its terms are.

9 THE WITNESS: I have not seen the Google contract.

10 What I'm referring to is -- I'm sure the contract
11 is even wider -- but the search portion of the contract and
12 allowing things to be or not be default.

13 BY MR. HOFFMAN:

14 Q Did DuckDuckGo -- and, again, we're talking about
15 the September 2018 meeting.

16 Did DuckDuckGo prepare a write-up of the
17 September 2018 meeting with Apple?

18 A You mean like internally?

19 Q Yes.

20 A Yeah.

21 I mean, we would typically make a write-up for all
22 major external meetings. So the person who's kind of in
23 charge of the meeting usually -- we have multiple people go
24 in, so somebody there is actually in charge of listening and
25 taking notes, and they would write up what happened, next

1 steps, all that kind of stuff.

2 Q Was this a standard practice at DuckDuckGo?

3 A Yes, standard practice and -- and now.

4 Q Okay.

5 And what is the purpose of preparing these
6 write-ups?

7 A Multiple reasons.

8 Make sure everyone's on the same page. Make sure
9 we capture all the action items. Make sure people who
10 aren't there can be up-to-date on what happened because a
11 lot of people, like, for example, this, participated in this
12 presentation, couldn't actually go.

13 Q Okay.

14 And in what format are these write-ups prepared?

15 A We use a software, a piece of software called
16 Asana, which is a project management tool that we organize
17 kind of the whole company around.

18 We don't -- we don't really use email. So
19 anything you think would be in an email would be on Asana
20 instead. It's got threaded conversations. It's not chat,
21 we have that too, but this is more for permanent record and
22 conversation that everyone can see.

23 We're a distributed company, so it's important
24 that we write everything down, and people are in all
25 different time zones and most things are async in this

1 company.

2 THE COURT: When you say you are a distributed
3 company, what do you mean by that?

4 THE WITNESS: We have been -- we've never -- we
5 have this mailing address, and you could call it our central
6 office, but we've been -- all of our team members have been
7 around the world since day one.

8 THE COURT: I see. Okay.

9 BY MR. HOFFMAN:

10 Q Okay.

11 Now, Mr. Weinberg, I'd ask you to turn in your
12 binder, or to look on the screen, at UPX0666.

13 MR. HOFFMAN: And I'll ask Mr. Barkey to display
14 that.

15 BY MR. HOFFMAN:

16 Q And I'll ask you, Mr. Weinberg, if you recognize
17 this document.

18 A Yes, this looks to be the contemporaneous meeting
19 notes we're talking about from that meeting.

20 Q The September 2018 meeting?

21 A Yes.

22 Q Okay.

23 MR. HOFFMAN: And, Your Honor, we have
24 DuckDuckGo's 902(11) declaration for this document as well.
25 And I understand that Google has an objection.

1 MR. SAFTY: Your Honor, we object to the
2 introduction to the extent that plaintiffs intend to rely on
3 the embedded hearsay for the truth of the matter;
4 specifically, statements purportedly made by Apple
5 employees.

6 THE COURT: Okay. Well, do you intend to point
7 him to any out-of-court statements?

8 MR. HOFFMAN: I do, Your Honor.

9 At the bottom of page 1, there's a paragraph that
10 begins with "Private browsing opt-in," and the statements in
11 here we're not offering for the truth of the matter but to
12 corroborate the conversations that DuckDuckGo had with
13 Apple, and to give a complete picture of the negotiations,
14 and then to show the effect that they had on Mr. Weinberg
15 and DuckDuckGo going forward.

16 MR. SAFTY: Your Honor, if I may be heard on that
17 point? They are offering it for the truth of the matter.
18 They're offering it to corroborate the verbal hearsay that
19 he's been testifying about for the last 20 minutes.

20 THE COURT: Well, he hasn't actually testified
21 about any hearsay, Counsel, let's get that straight. He
22 hasn't offered any statement from out of court that would
23 qualify as hearsay.

24 It's 12:25. Let's take our lunch break so I can
25 think about this. We'll return at 1:30.

1 Mr. Weinberg, during the lunch break, I'll ask you
2 not to discuss your testimony with anyone other than speak
3 to your counsel, of course, and we'll see everybody at 1:30.

4 Thank you.

5 COURTROOM DEPUTY: All rise.

6 This Court stands in recess.

7 (Recess from 12:25 p.m. to 1:30 p.m.)
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C E R T I F I C A T E

I, William P. Zaremba, RMR, CRR, certify that the foregoing is a correct transcript from the record of proceedings in the above-titled matter.

Date: September 21, 2023



William P. Zaremba, RMR, CRR

<p>BY MR. CONRAD: [1] 1965/5</p> <p>BY MR. HOFFMAN: [13] 1936/17 1938/8 1949/11 1961/15 1963/18 1972/11 1977/12 1982/11 1985/16 1986/9 1989/13 1991/9 1991/15</p> <p>BY MR. SMURZYNSKI: [9] 1895/8 1897/12 1902/7 1903/5 1905/17 1912/4 1917/14 1917/20 1922/21</p> <p>BY MS. MURDOCK-PARK: [4] 1893/1 1894/22 1926/3 1932/22</p> <p>COURTROOM DEPUTY: [7] 1889/3 1889/7 1936/5 1936/8 1949/2 1949/5 1993/5</p> <p>MR. CAVANAUGH: [1] 1917/10</p> <p>MR. CONRAD: [1] 1965/1</p> <p>MR. HOFFMAN: [15] 1935/22 1936/3 1936/11 1949/10 1964/20 1971/22 1971/24 1972/2 1972/10 1981/14 1981/19 1981/23 1991/13 1991/23 1992/8</p> <p>MR. SAFTY: [5] 1975/20 1981/20 1988/23 1992/1 1992/16</p> <p>MR. SCHMIDTLEIN: [1] 1989/4</p> <p>MR. SMURZYNSKI: [9] 1889/18 1903/2 1905/15 1909/17 1916/24 1917/18 1924/2 1933/13 1935/12</p> <p>MS. MURDOCK-PARK: [12] 1889/24 1890/3 1892/23 1894/21 1917/3 1917/7 1924/8 1924/12 1924/15 1932/20 1933/11 1935/8</p> <p>THE COURT: [74] 1889/5 1889/14 1889/21 1889/25 1892/22 1894/20 1895/4 1896/20 1897/11 1899/22 1899/25 1901/12 1902/5 1902/25 1903/4 1909/18 1917/5 1917/9 1917/11 1924/4 1924/7</p>	<p>1924/10 1924/13 1924/18 1924/24 1925/23 1932/21 1933/16 1935/6 1935/14 1935/19 1936/2 1936/9 1936/12 1937/22 1938/1 1938/7 1948/22 1949/7 1961/13 1963/3 1963/13 1963/15 1963/17 1964/25 1965/4 1968/21 1969/3 1969/24 1970/18 1971/2 1971/6 1971/13 1971/20 1972/1 1972/5 1972/8 1973/24 1975/22 1981/22 1981/24 1982/2 1982/6 1985/5 1985/15 1986/6 1986/8 1988/21 1989/1 1989/6 1991/2 1991/8 1992/6 1992/20</p> <p>THE WITNESS: [35] 1892/25 1896/24 1899/24 1900/11 1901/17 1909/23 1924/6 1924/22 1924/25 1933/20 1935/18 1936/10 1937/25 1938/3 1961/14 1963/8 1963/14 1963/16 1969/2 1969/5 1970/3 1970/20 1971/4 1971/18 1972/4 1973/25 1976/1 1981/17 1982/1 1982/3 1982/9 1985/10 1986/7 1989/9 1991/4</p> <hr/> <p>'11 [1] 1966/22 '14 [1] 1966/22 '15 [1] 1973/6 '18 [3] 1986/6 1986/7 1986/8 '19 [1] 1986/6 '90s [1] 1938/22 'stealing [1] 1926/20</p> <hr/> <p>0 0340 [1] 1886/4</p> <hr/> <p>1 10 [1] 1896/6 10 blue [1] 1970/21 100 [3] 1940/18 1944/16 1944/18 100 percent [1] 1901/25 10036-6710 [1] 1886/19 100X [1] 1940/14 11 [4] 1913/16 1981/15 1983/20 1991/24 1100 [1] 1886/3 1133 [1] 1886/18 11:00 [2] 1948/24</p>	<p>1948/25 11:05 [1] 1948/25 11:06 [1] 1949/4 11:20 [1] 1949/1 11:22 [1] 1949/4 12 other [1] 1937/19 12:25 [2] 1992/24 1993/7 12th [1] 1887/3 1300 [1] 1886/14 15 [2] 1896/6 1960/21 15 percent [1] 1947/23 19 [1] 1901/2 1:30 [3] 1992/25 1993/3 1993/7</p> <hr/> <p>2 20 [7] 1895/20 1895/20 1939/8 1947/24 1967/14 1970/1 1992/19 20-3010 [1] 1885/4 2000 [1] 1966/21 20001 [1] 1887/12 20005 [1] 1887/4 2000s [1] 1938/24 20024 [1] 1887/7 2008 [1] 1937/5 2010 [3] 1949/22 1949/24 1963/10 2012 [1] 1945/22 2013 [3] 1950/15 1950/16 1950/22 2014 [5] 1912/11 1972/24 1973/2 1973/3 1973/6 2016 [8] 1905/25 1906/12 1908/13 1909/21 1916/15 1946/13 1955/11 1973/6 2017 [7] 1955/11 1974/5 1974/6 1974/12 1974/25 1975/18 1978/8 2018 [21] 1910/1 1912/12 1921/11 1921/18 1923/13 1945/22 1950/25 1957/2 1979/25 1980/16 1980/21 1981/6 1983/2 1985/18 1985/19 1986/3 1986/11 1987/16 1989/15 1989/17 1991/20 2019 [1] 1987/21 202 [5] 1886/4 1886/8 1887/4 1887/8 1887/13 2021 [6] 1912/15 1920/17 1920/25 1921/3 1923/16 1923/18 2022 [1] 1923/14 2023 [2] 1885/5 1994/7 203 [1] 1930/20 20530 [1] 1886/8 21 [2] 1885/5 1994/7</p>	<p>212 [1] 1886/20 2200 [1] 1886/19 228 [2] 1902/22 1903/3 25 [1] 1940/19 25 percent [1] 1947/22 250 [1] 1938/10 26th [1] 1921/11 2793 [1] 1886/20</p> <hr/> <p>3 30 [4] 1947/5 1948/18 1949/17 1959/17 300 [1] 1897/2 3010 [1] 1885/4 301st [1] 1897/3 307-0340 [1] 1886/4 3249 [1] 1887/13 333 [1] 1887/12 335-2793 [1] 1886/20 354-3249 [1] 1887/13</p> <hr/> <p>4 40 percent [4] 1947/6 1947/21 1948/19 1949/17 434-5000 [2] 1887/4 1887/8 445-8082 [1] 1886/8 448 [1] 1917/16 45 percent [1] 1955/14 450 [1] 1886/7</p> <hr/> <p>5 50 [4] 1909/12 1940/18 1946/14 1959/17 5000 [2] 1887/4 1887/8 508-6000 [1] 1886/15 51 [1] 1929/20 552.001 [1] 1983/5 552.002 [1] 1983/14 552.009 [1] 1983/21 57 [1] 1930/5 5th [1] 1886/7</p> <hr/> <p>6 60 [2] 1909/12 1915/15 6000 [1] 1886/15 6710 [1] 1886/19 680 [1] 1887/7</p> <hr/> <p>7 720 [1] 1886/15 725 [1] 1887/3 7th [1] 1886/14</p> <hr/> <p>8 80 [1] 1947/24 80203 [1] 1886/15 8082 [1] 1886/8 818 [1] 1982/3 8907 [1] 1930/5</p> <hr/> <p>9 902 [2] 1981/15 1991/24 904 [1] 1906/11 905 [1] 1907/18 907 [1] 1929/19 919 [1] 1908/16</p>	<p>9:45 [1] 1885/6</p> <hr/> <p>A a.m [3] 1885/6 1949/4 1949/4 AB [2] 1967/25 1968/18 abilities [1] 1919/11 ability [1] 1908/1 able [5] 1900/9 1909/1 1916/17 1918/15 1984/19 about [134] above [3] 1915/7 1940/17 1994/4 above-titled [1] 1994/4 abroad [1] 1923/22 academia [1] 1914/13 accelerate [1] 1911/23 accelerated [3] 1911/3 1911/3 1978/12 access [6] 1907/15 1907/15 1943/23 1951/11 1951/24 1960/13 accomplish [1] 1920/14 accurate [1] 1920/24 achieve [1] 1918/19 achieved [1] 1915/19 acquire [1] 1919/11 acquires [1] 1911/12 acronym [1] 1914/3 across [4] 1915/1 1959/1 1961/1 1986/18 act [1] 1948/12 action [2] 1953/4 1990/9 actions [1] 1948/13 activate [5] 1979/17 1979/19 1984/12 1984/14 1985/8 activated [1] 1984/10 activities [1] 1931/13 activity [1] 1937/20 actually [21] 1899/14 1900/17 1908/6 1909/14 1911/6 1929/13 1939/5 1941/1 1941/5 1955/18 1955/24 1961/2 1966/11 1966/14 1966/22 1973/8 1977/20 1985/7 1989/24 1990/12 1992/20 ad [2] 1942/4 1943/22 adapted [2] 1919/21 1920/2 add [2] 1963/3 1984/4 added [3] 1943/14 1955/1 1960/13 adding [1] 1896/12 addition [4] 1942/1 1942/2 1984/18 1986/24 additional [2] 1898/10 1968/21</p>
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Additionally [2] 1942/8 1944/1	Alexander [1] 1927/3	alternatives [1] 1979/6	anybody [2] 1899/13 1975/23	approach [6] 1905/15 1908/4 1909/17 1932/20 1971/24 1972/2
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address [3] 1963/11 1963/12 1991/5	all [75] 1895/21 1895/23 1897/16 1901/24 1902/6 1905/22 1905/25 1906/2 1906/14 1907/2 1907/18 1910/11 1910/21 1914/16 1915/1 1920/13 1922/17 1924/7 1925/1 1925/10 1925/12 1925/21 1928/21 1932/11 1935/15 1935/20 1939/11 1943/14 1944/13 1944/22 1946/3 1947/23 1949/2 1949/5 1949/7 1949/9 1950/4 1953/22 1953/23 1954/21 1955/3 1956/20 1959/13 1959/15 1960/3 1960/19 1960/21 1961/1 1962/10 1963/10 1964/14 1966/23 1967/2 1968/17 1969/8 1971/6 1971/7 1971/8 1971/13 1974/7 1977/9 1979/21 1980/9 1981/9 1982/6 1986/13 1986/25 1987/7 1987/9 1989/21 1990/1 1990/9 1990/24 1991/6 1993/5	am [1] 1937/3	anything [3] 1943/11 1954/15 1990/19	are [84] 1896/8 1896/13 1896/14 1897/13 1901/13 1901/15 1902/16 1903/20 1904/4 1904/11 1904/25 1905/13 1906/21 1907/8 1907/19 1908/8 1909/2 1911/6 1914/7 1916/20 1919/1 1919/5 1920/11 1920/21 1921/19 1923/19 1925/9 1925/10 1927/4 1928/2 1928/12 1931/14 1931/19 1931/20 1933/19 1935/15 1937/6 1938/2 1939/6 1939/8 1940/10 1940/24 1941/8 1941/13 1942/15 1942/16 1942/19 1944/4 1945/5 1945/21 1947/24 1948/4 1950/4 1953/23 1954/11 1954/17 1957/24 1958/10 1959/23 1959/25 1960/1 1960/4 1962/13 1965/21 1967/15 1968/2 1968/15 1968/20 1970/12 1970/16 1970/22 1971/9 1971/16 1975/15 1984/6 1986/21 1987/11 1988/24 1989/8 1990/14 1990/24 1990/25 1991/2 1992/17
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admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	AMIT [2] 1885/9 1949/6	appearance [1] 1977/6	
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	Amit P. Mehta [1] 1949/6	APPEARANCES [2] 1885/11 1886/22	
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	among [2] 1915/19 1916/15	appeared [1] 1984/21	
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admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	amounts [2] 1907/15 1923/10	Apple [50] 1923/1 1939/23 1953/10 1966/3 1972/17 1972/21 1973/1 1973/13 1973/14 1973/16 1974/8 1974/9 1974/24 1975/1 1975/8 1975/18 1976/11 1976/12 1976/19 1976/19 1976/21 1976/21 1976/22 1976/22 1976/24 1976/25 1976/25 1977/2 1977/10 1977/16 1978/9 1979/6 1979/24 1980/10 1980/23 1981/2 1981/6 1981/7 1983/1 1983/8 1984/22 1984/23 1985/19 1985/20 1987/12 1987/16 1988/9 1989/17 1992/4 1992/13	
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	among [2] 1915/19 1916/15	Apple's [2] 1978/1 1986/11	
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	amount [8] 1918/12 1925/16 1930/22 1931/17 1932/4 1950/24 1961/18 1968/15	application [7] 1907/9 1910/10 1931/4 1932/13 1933/23 1933/24 1934/9	
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admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	Android [2] 1959/10 1960/20	appreciate [2] 1938/18 1971/7	
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	announce [1] 1974/18		
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	announced [1] 1932/16		
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	anonymous [1] 1955/21		
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	another [18] 1897/7 1899/8 1899/22 1911/20 1919/23 1923/8 1930/22 1931/17 1935/2 1940/6 1952/16 1960/6 1963/2 1978/9 1980/2 1982/10 1985/19 1987/6		
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admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	antitrust [3] 1886/7 1886/12 1957/2		
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	anxious [1] 1909/8		
admission [1] 1917/6	admitted [4] 1888/10 1888/15 1917/11 1981/22	any [32] 1898/9 1915/23 1917/5 1931/25 1933/3 1935/6 1941/11 1943/4		

A	1985/22 1986/13 1986/20 1989/1 1989/2 asking [4] 1904/7 1955/20 1975/22 1978/5 aspect [1] 1895/24 assertions [1] 1927/19 asset [1] 1907/17 assistant [1] 1960/23 associated [3] 1917/4 1925/10 1971/9 async [1] 1990/25 attached [1] 1982/25 attempt [1] 1934/17 attend [1] 1905/23 attended [1] 1975/1 attention [3] 1921/9 1981/11 1983/4 attention to [1] 1981/11 attractive [1] 1967/7 audiences [1] 1903/19 Australia [1] 1899/9 available [3] 1896/11 1932/4 1953/23 Avenue [3] 1886/18 1887/7 1887/12 average [1] 1914/25 avid [1] 1959/24 avoid [2] 1944/11 1944/23 aware [1] 1978/4 awareness [1] 1950/20 away [2] 1912/2 1942/14 awkward [1] 1977/18	basically [7] 1943/21 1966/25 1976/5 1977/18 1979/21 1980/22 1980/25 Basis [1] 1988/22 Bates [3] 1930/5 1983/5 1983/14 be [120] beat [1] 1910/11 beaten [2] 1923/6 1923/8 beats [1] 1922/9 became [5] 1915/5 1949/22 1950/7 1957/12 1973/16 because [39] 1904/4 1907/14 1907/14 1910/16 1911/12 1926/11 1927/9 1928/14 1931/8 1931/12 1932/4 1934/16 1934/19 1939/16 1941/10 1945/17 1945/20 1948/2 1957/14 1957/22 1958/2 1958/22 1958/23 1959/12 1959/22 1962/17 1964/19 1965/25 1969/16 1970/14 1974/8 1976/2 1977/21 1977/23 1978/16 1980/12 1985/12 1987/9 1990/10 become [2] 1910/19 1972/22 becoming [1] 1970/9 been [31] 1896/6 1902/4 1905/19 1907/2 1909/23 1912/6 1921/7 1924/16 1936/3 1943/23 1948/16 1949/21 1950/9 1951/19 1952/1 1957/11 1961/23 1961/24 1965/8 1971/2 1972/22 1974/15 1976/2 1978/24 1980/15 1980/22 1981/8 1991/4 1991/6 1991/6 1992/19 before [20] 1885/9 1898/4 1898/14 1909/18 1910/11 1913/1 1913/19 1924/10 1924/16 1936/5 1946/16 1947/10 1950/15 1965/12 1968/9 1971/17 1972/25 1974/9 1976/6 1987/24 began [5] 1910/23 1913/10 1913/11 1916/7 1949/24 begin [4] 1907/13 1913/18 1920/7 1924/10	beginning [2] 1939/18 1983/9 begins [4] 1898/14 1917/16 1922/19 1992/10 begun [1] 1911/22 behavior [1] 1905/1 behaviors [1] 1948/5 behind [4] 1903/7 1953/1 1982/2 1982/10 being [9] 1917/22 1918/3 1919/21 1927/4 1957/21 1958/4 1963/21 1967/7 1975/7 believe [17] 1911/11 1916/25 1917/7 1926/25 1927/3 1930/1 1931/11 1945/4 1945/15 1952/10 1952/12 1961/11 1962/10 1962/18 1969/20 1973/3 1975/14 believed [1] 1914/20 BELKNAP [1] 1886/17 below [2] 1939/1 1940/16 bench [2] 1885/9 1972/2 benchmark [2] 1914/10 1916/4 benchmarks [2] 1914/9 1923/7 benefit [3] 1930/12 1930/15 1930/16 benefits [2] 1930/10 1944/20 BERT [36] 1910/1 1910/3 1910/9 1910/11 1912/7 1912/12 1914/8 1915/4 1915/6 1915/6 1915/12 1915/14 1915/21 1915/24 1918/4 1918/14 1919/4 1919/8 1919/15 1919/21 1921/22 1923/9 1923/13 1931/11 1931/25 1932/1 1932/3 1932/7 1932/8 1932/9 1933/4 1933/7 1933/23 1933/25 1934/3 1934/5 besides [1] 1944/19 best [5] 1912/1 1934/17 1961/24 1962/5 1976/18 bet [1] 1897/4 better [10] 1914/20 1947/14 1947/14 1947/14 1947/16 1947/16 1947/17 1947/20 1947/21 1968/4 between [9] 1895/14 1895/25 1902/9 1903/20 1918/4 1924/20 1934/13 1948/18 1959/3	beyond [2] 1988/24 1989/2 bias [1] 1944/8 big [10] 1909/25 1911/8 1922/4 1923/18 1926/15 1930/3 1950/23 1951/11 1975/4 1975/5 biggest [3] 1906/24 1927/14 1932/7 billions [1] 1930/15 binder [9] 1902/21 1929/25 1930/1 1971/25 1981/12 1981/17 1981/25 1982/12 1991/12 Bing [17] 1939/25 1940/1 1940/4 1941/3 1941/5 1941/8 1941/9 1941/17 1942/1 1942/16 1944/5 1969/1 1969/7 1970/4 1970/7 1970/11 1970/13 Bing's [1] 1941/18 bit [14] 1896/18 1899/3 1904/2 1905/10 1907/21 1909/7 1912/24 1919/7 1919/19 1930/21 1930/25 1934/23 1948/24 1951/22 blissing [1] 1978/17 block [1] 1987/5 blocking [1] 1987/5 blocks [1] 1986/17 blue [1] 1970/21 board [3] 1910/21 1914/25 1915/5 body [1] 1922/5 bold [1] 1921/15 boost [5] 1896/1 1901/9 1902/15 1929/10 1958/2 boosted [4] 1928/5 1928/19 1928/21 1929/11 boosts [3] 1928/3 1928/10 1928/17 both [8] 1899/9 1935/25 1948/17 1963/5 1963/14 1963/15 1968/3 1973/19 bottom [4] 1922/19 1940/13 1984/18 1992/9 boxes [2] 1938/25 1939/3 brainstorm [2] 1980/25 1985/23 Brave [3] 1942/16 1945/6 1962/2 break [4] 1921/14 1948/25 1992/24 1993/1 breakthrough [2] 1910/24 1911/1 Brian [3] 1973/16
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B	busy [2] 1903/16 1904/1 button [5] 1937/15 1938/4 1938/5 1942/9 1946/14	1910/7 1911/18 1934/10 1936/20 1940/10 1940/11 1956/10 1956/11 1957/2 1960/24 1962/22 1977/20 cases [3] 1897/2 1920/7 1934/17 casual [1] 1940/21 cat [1] 1944/16 categories [1] 1947/24 category [1] 1947/17 cause [1] 1943/21 Cavanaugh [1] 1886/17 caveats [1] 1899/3 Center [1] 1886/13 central [1] 1991/5 CEO [1] 1937/3 certain [3] 1897/19 1967/3 1972/5 certainly [4] 1903/2 1931/1 1931/23 1950/18 Certified [1] 1887/10 certify [1] 1994/2 cetera [5] 1940/19 1959/7 1976/15 1977/8 1978/6 CH [1] 1887/11 challenge [2] 1907/1 1931/14 challenges [5] 1914/18 1914/24 1915/11 1915/13 1962/13 challenging [2] 1916/20 1916/22 chance [1] 1979/23 change [5] 1907/5 1910/20 1947/15 1960/12 1979/14 changed [3] 1909/22 1941/11 1957/12 changes [1] 1970/12 changing [2] 1945/18 1955/2 charge [4] 1944/1 1957/8 1989/23 1989/24 Charles [2] 1887/2 1887/6 chart [2] 1895/21 1927/23 chat [1] 1990/20 check [4] 1914/21 1914/23 1955/17 1982/6 chest [1] 1922/7 China [1] 1914/15 choice [3] 1956/24 1957/3 1961/7 choose [1] 1941/1 Christmas [2] 1910/10 1921/21 Chrome [4] 1937/17 1945/24 1953/13 1963/1 circular [1] 1928/14	combined [1] 1910/12 come [11] 1899/3 1907/20 1913/1 1923/24 1930/16 1947/8 1966/1 1970/2 1974/21 1980/24 1985/22 comes [4] 1922/8 1947/22 1948/15 1974/17 coming [3] 1950/4 1974/15 1987/25 comment [1] 1927/5 comments [1] 1927/4 commission [2] 1946/20 1957/5 commissioned [3] 1946/25 1955/6 1955/6 common [1] 1967/24 communicated [1] 1917/23 companies [3] 1951/11 1951/24 1954/11 company [16] 1923/8 1923/22 1937/3 1937/11 1939/13 1939/14 1946/21 1947/15 1949/23 1965/9 1966/12 1966/21 1990/17 1990/23 1991/1 1991/3 comparison [1] 1918/4 compelling [3] 1976/4 1976/15 1977/11 compete [1] 1942/15 competing [1] 1915/3 competition [1] 1962/24 competitor [3] 1931/25 1933/4 1942/14 competitors [3] 1942/12 1942/19 1945/2 complaining [2] 1953/3 1957/11 complete [1] 1992/13 completed [1] 1912/14 completely [1] 1958/3 complex [2] 1897/10 1900/11 complicated [7] 1903/7 1904/5 1904/12 1909/23 1913/24 1930/25 1965/23 component [4] 1896/23 1901/4 1928/2 1928/5 components [9] 1895/12 1895/15 1895/16 1895/20 1895/22 1899/13 1901/13 1901/24 1927/24 comprehension [3] 1915/11 1916/21 1918/9 computation [7] 1918/7 1918/11
Brian... [2] 1975/13 1980/1 Brian Croll [1] 1973/16 brief [2] 1961/23 1962/3 bring [1] 1925/6 broadly [1] 1958/9 Broadway [1] 1886/14 browbeat [1] 1905/4 browser [36] 1937/17 1937/24 1938/1 1944/13 1944/22 1953/10 1953/13 1953/16 1953/21 1953/21 1954/4 1954/7 1954/10 1954/18 1956/4 1956/13 1957/17 1957/20 1959/5 1959/13 1960/6 1960/11 1961/9 1961/11 1961/12 1961/13 1961/16 1962/7 1962/14 1962/16 1962/19 1962/21 1962/22 1963/2 1963/5 1963/9 browser's [1] 1963/21 browsers [14] 1952/6 1952/8 1952/9 1953/4 1954/13 1955/8 1956/11 1957/25 1959/6 1963/10 1964/2 1964/9 1964/14 1972/13 browsing [28] 1937/20 1943/18 1952/21 1952/23 1955/21 1963/22 1972/14 1972/18 1973/5 1976/8 1976/13 1976/15 1977/24 1978/10 1979/2 1979/16 1979/16 1984/2 1984/10 1984/11 1984/19 1984/20 1985/12 1985/20 1986/15 1987/3 1987/3 1992/10 Bruce [1] 1886/11 bubble [2] 1945/20 1945/20 Bud [1] 1975/7 Bud Tribble [1] 1975/7 building [1] 1913/6 built [4] 1925/2 1934/13 1937/18 1963/9 bullet [9] 1917/24 1918/3 1918/17 1919/3 1932/23 1933/3 1933/18 1933/24 1934/2 bunch [6] 1913/15 1919/25 1925/18 1951/7 1975/6 1987/2 busier [1] 1904/12 business [1] 1982/22	Calculator [1] 1966/5 call [9] 1927/25 1937/16 1939/2 1943/16 1944/23 1945/19 1953/11 1967/25 1991/5 called [10] 1897/13 1897/19 1910/4 1914/17 1915/11 1915/18 1919/16 1951/9 1951/10 1990/15 calling [2] 1939/22 1988/23 calls [1] 1953/14 Cambridge [4] 1950/25 1951/14 1951/16 1951/18 came [7] 1899/9 1915/4 1965/12 1978/20 1979/5 1985/25 1987/2 can [61] 1896/16 1896/20 1897/1 1897/22 1898/2 1899/22 1901/6 1901/9 1902/15 1905/7 1905/11 1911/19 1913/18 1913/20 1916/8 1920/2 1923/10 1923/19 1925/11 1925/13 1929/17 1930/20 1931/25 1933/4 1937/8 1940/3 1941/15 1942/7 1943/20 1944/1 1944/8 1946/17 1948/22 1951/15 1952/12 1959/24 1960/11 1960/12 1960/22 1961/13 1963/6 1967/20 1968/16 1968/21 1969/23 1970/19 1971/17 1972/4 1974/25 1977/5 1979/14 1982/6 1982/12 1982/13 1982/18 1984/15 1985/4 1985/5 1990/10 1990/22 1992/24 can't [5] 1905/4 1907/2 1941/25 1957/22 1973/1 capture [4] 1912/23 1913/3 1913/7 1990/9 cards [1] 1967/5 care [1] 1948/12 careful [1] 1931/8 Carr [1] 1886/13 carries [1] 1922/20 case [13] 1897/3		

<p>C</p> <p>computation... [5] 1918/13 1930/23 1931/1 1931/5 1931/18</p> <p>computational [1] 1912/22</p> <p>computer [3] 1887/14 1909/1 1914/19</p> <p>computer-aided [1] 1887/14</p> <p>computers [6] 1904/8 1907/2 1907/10 1907/11 1909/5 1914/11</p> <p>concept [1] 1902/8</p> <p>concern [6] 1903/25 1946/8 1948/13 1948/14 1964/12 1979/1</p> <p>concerned [1] 1903/19</p> <p>concerns [2] 1949/14 1988/10</p> <p>concludes [1] 1964/21</p> <p>conclusion [3] 1899/5 1923/9 1949/17</p> <p>conclusions [1] 1944/9</p> <p>conduct [1] 1946/22</p> <p>conducted [1] 1946/7</p> <p>conducts [1] 1968/13</p> <p>conference [1] 1975/5</p> <p>confident [1] 1902/15</p> <p>confirm [1] 1963/17</p> <p>confirmed [1] 1963/25</p> <p>confused [1] 1956/2</p> <p>connected [1] 1971/14</p> <p>connection [4] 1903/20 1903/22 1910/4 1947/14</p> <p>connections [1] 1900/6</p> <p>CONNOLLY [2] 1887/3 1887/6</p> <p>Conrad [1] 1965/2</p> <p>consequence [3] 1918/14 1930/22 1931/17</p> <p>consider [4] 1942/11 1942/14 1942/18 1948/11</p> <p>consideration [2] 1922/20 1922/24</p> <p>considered [1] 1941/22</p> <p>considering [2] 1922/14 1987/21</p> <p>Consistently [1] 1947/20</p> <p>constantly [1] 1963/1</p> <p>Constitution [1] 1887/12</p> <p>constructed [1] 1916/1</p> <p>consumer [5] 1886/12 1946/12 1954/18 1955/7 1956/13</p> <p>consumers [4] 1950/11 1956/4 1958/6 1979/19</p>	<p>contacted [1] 1916/7</p> <p>contacts [1] 1973/18</p> <p>contains [1] 1913/25</p> <p>contemplate [1] 1908/22</p> <p>contemplation [1] 1921/14</p> <p>contemporaneous [1] 1991/18</p> <p>content [8] 1909/3 1939/20 1939/24 1965/18 1966/2 1976/20 1977/10 1977/22</p> <p>context [4] 1908/13 1938/19 1940/6 1940/20</p> <p>continue [5] 1916/10 1917/1 1929/11 1967/11 1967/16</p> <p>CONTINUED [1] 1887/1</p> <p>continues [1] 1926/8</p> <p>contract [12] 1973/1 1973/2 1985/13 1988/6 1988/13 1988/15 1988/18 1988/19 1989/5 1989/9 1989/10 1989/11</p> <p>contracts [2] 1964/16 1964/19</p> <p>contributes [1] 1930/11</p> <p>contributing [1] 1926/11</p> <p>controlled [1] 1946/2</p> <p>conversation [1] 1990/22</p> <p>conversations [4] 1973/21 1985/11 1990/20 1992/12</p> <p>conveyed [1] 1918/4</p> <p>convince [1] 1962/20</p> <p>cookies [1] 1948/6</p> <p>cool [1] 1905/11</p> <p>coordinating [1] 1954/12</p> <p>copies [1] 1930/1</p> <p>core [1] 1966/20</p> <p>corporations [2] 1914/14 1914/14</p> <p>correct [6] 1908/13 1926/8 1929/22 1932/1 1986/5 1994/3</p> <p>corroborate [2] 1992/12 1992/18</p> <p>could [82] 1897/9 1900/22 1902/20 1904/1 1904/1 1909/5 1909/14 1911/10 1912/25 1913/7 1914/15 1914/20 1914/21 1917/15 1917/18 1917/22 1920/7 1920/16 1922/18 1922/22 1922/25 1923/8 1923/11 1924/18</p>	<p>1926/14 1927/11 1927/12 1927/24 1931/12 1932/18 1933/3 1933/16 1936/21 1939/17 1946/3 1951/12 1951/24 1954/7 1954/15 1954/24 1954/25 1954/25 1955/1 1955/1 1955/3 1955/18 1958/15 1960/24 1960/24 1961/3 1961/4 1961/5 1964/23 1965/7 1965/17 1966/23 1967/6 1968/9 1968/18 1968/18 1972/14 1972/17 1976/4 1976/12 1976/18 1978/2 1978/17 1979/3 1979/14 1979/17 1979/20 1981/1 1984/9 1984/14 1985/1 1985/2 1985/24 1985/24 1986/14 1986/23 1988/14 1991/5</p> <p>couldn't [4] 1904/8 1907/25 1952/23 1990/12</p> <p>counsel [11] 1902/25 1924/10 1926/5 1929/18 1929/25 1930/22 1935/7 1948/22 1971/13 1992/21 1993/3</p> <p>count [1] 1960/21</p> <p>countries [1] 1962/2</p> <p>couple [2] 1971/21 1977/1</p> <p>course [3] 1928/22 1929/25 1993/3</p> <p>court [19] 1885/1 1887/9 1887/11 1895/7 1906/8 1917/22 1936/22 1937/8 1940/3 1949/2 1951/15 1964/22 1964/23 1967/20 1982/18 1984/15 1992/7 1992/22 1993/6</p> <p>courtroom [2] 1971/11 1971/14</p> <p>cover [2] 1902/21 1905/20</p> <p>coverage [2] 1933/25 1952/1</p> <p>covered [1] 1987/7</p> <p>COVID [5] 1900/25 1900/25 1901/1 1901/2 1902/1</p> <p>COVID-19 [1] 1901/2</p> <p>Craig [6] 1973/22 1973/25 1975/5 1976/4 1977/25 1978/15</p> <p>Craig Federighi [1] 1973/22</p> <p>crash [1] 1902/2</p> <p>crawling [1] 1966/15</p>	<p>crazy [1] 1909/8</p> <p>create [2] 1941/19 1969/1</p> <p>created [4] 1913/13 1915/10 1950/16 1966/22</p> <p>creates [1] 1941/3</p> <p>creation [1] 1915/22</p> <p>creators [1] 1915/10</p> <p>creepy [1] 1944/24</p> <p>Croll [2] 1973/16 1975/13</p> <p>cross [2] 1888/4 1935/10</p> <p>crowd [1] 1980/1</p> <p>CRR [2] 1994/2 1994/8</p> <p>Cupertino [5] 1974/10 1974/25 1978/22 1978/23 1986/4</p> <p>curiosity [1] 1965/7</p> <p>curious [1] 1965/8</p> <p>current [1] 1899/8</p> <p>currently [2] 1936/25 1960/21</p> <p>curve [1] 1898/8</p> <p>customization [1] 1947/16</p> <p>cute [2] 1965/13 1965/14</p> <p>CV [1] 1885/4</p> <p>cycle [2] 1974/16 1974/23</p>	<p>1968/25 1976/11 1976/15</p> <p>date [2] 1990/10 1994/7</p> <p>dated [1] 1900/22</p> <p>dates [3] 1901/6 1921/2 1966/22</p> <p>dating [1] 1900/6</p> <p>Davis [1] 1980/14</p> <p>day [7] 1885/7 1897/23 1938/12 1946/2 1978/15 1978/15 1991/7</p> <p>de [1] 1960/13</p> <p>deal [2] 1912/3 1923/18</p> <p>deals [1] 1904/22</p> <p>decade [2] 1921/25 1950/21</p> <p>decades [1] 1898/6</p> <p>December [2] 1908/13 1921/11</p> <p>December 26th [1] 1921/11</p> <p>deceptive [2] 1912/24 1929/16</p> <p>decide [1] 1904/17</p> <p>decided [1] 1964/17</p> <p>decisions [1] 1903/15</p> <p>deck [1] 1906/10</p> <p>declaration [2] 1981/15 1991/24</p> <p>deep [14] 1897/8 1906/20 1907/24 1908/15 1922/5 1922/24 1923/3 1923/5 1923/20 1924/4 1924/20 1925/3 1945/22 1955/10</p> <p>deeply [2] 1918/15 1973/19</p> <p>DeepRank [2] 1931/10 1932/13</p> <p>default [26] 1945/2 1945/9 1945/14 1953/22 1953/25 1954/5 1957/16 1957/20 1959/9 1960/11 1961/10 1961/11 1961/23 1962/1 1962/1 1962/2 1962/6 1962/23 1963/21 1972/14 1972/17 1979/13 1985/9 1985/12 1986/22 1989/12</p> <p>defaults [15] 1956/15 1958/7 1958/10 1958/16 1958/24 1959/5 1959/5 1959/6 1959/13 1959/16 1960/4 1960/17 1961/1 1962/18 1962/20</p> <p>Defendant [2] 1885/7 1887/2</p> <p>DEFENDANT'S [2] 1888/10 1917/12</p> <p>definitely [3] 1931/24</p>
<p>D</p>			<p>D.C [6] 1885/5 1886/3 1886/8 1887/4 1887/7 1887/12</p> <p>damaging [1] 1929/14</p> <p>Darin [7] 1975/12 1980/2 1980/7 1980/7 1980/8 1980/24 1985/22</p> <p>Darin Adler [1] 1975/12</p> <p>Darin's [1] 1987/9</p> <p>data [52] 1896/8 1896/9 1896/11 1896/14 1896/16 1896/18 1897/17 1898/10 1899/2 1899/17 1899/21 1902/15 1902/17 1904/22 1907/16 1908/10 1908/10 1911/16 1911/17 1918/19 1918/23 1919/2 1919/4 1919/5 1924/21 1925/1 1925/4 1925/6 1925/13 1925/15 1925/16 1925/19 1925/21 1932/4 1932/11 1933/5 1933/7 1933/18 1934/8 1934/10 1934/14 1935/5 1947/25 1951/19 1951/23 1952/2 1959/20 1959/20 1959/22</p>	

D	1972/20 1973/6 1974/5 1974/6 1975/5 1976/5 1976/5 1976/8 1978/9 1981/6 1981/8 1984/25 1985/6 1985/18 1985/24 1988/9 1989/14 1989/16 did you [4] 1921/18 1937/4 1985/6 1988/9 didn't [6] 1901/1 1926/24 1957/5 1978/14 1979/23 1988/5 differ [3] 1940/4 1944/5 1977/5 difference [1] 1895/25 differences [4] 1941/7 1941/12 1941/15 1970/16 different [35] 1895/11 1895/22 1896/11 1901/13 1904/24 1919/7 1920/3 1926/10 1940/23 1940/25 1941/2 1941/6 1941/9 1941/14 1944/2 1944/18 1948/3 1952/5 1952/16 1954/11 1960/14 1961/24 1962/20 1964/9 1966/1 1966/24 1970/13 1970/14 1972/13 1977/4 1979/3 1983/24 1986/17 1986/21 1990/25 differently [2] 1905/11 1987/12 difficult [1] 1958/15 diminished [1] 1925/5 diminishing [3] 1897/14 1898/7 1898/15 Dintzer [1] 1886/2 direct [8] 1888/4 1921/9 1936/15 1951/11 1964/3 1972/5 1981/11 1983/4 direct evidence [1] 1964/3 directed [1] 1967/6 directions [2] 1939/7 1977/5 directly [5] 1909/5 1935/4 1935/10 1943/21 1966/8 disagree [1] 1927/6 disagreed [1] 1935/2 disconnected [1] 1971/17 discrimination [1] 1943/23 discriminatory [1] 1954/25 discuss [3] 1978/9 1985/20 1993/2 discussed [2] 1906/23 1980/12 discussion [1] 1977/25	discussions [1] 1978/1 1974/12 1979/24 display [4] 1941/9 1970/14 1981/13 1991/13 disruption [1] 1922/11 distinct [2] 1941/3 1965/22 distinguish [3] 1943/3 1944/12 1969/3 distribute [1] 1962/14 distributed [2] 1990/23 1991/2 distributing [1] 1961/21 distribution [1] 1897/19 DISTRICT [3] 1885/1 1885/1 1885/10 division [2] 1886/7 1940/1 do [80] 1895/12 1897/2 1899/25 1900/19 1902/12 1903/13 1905/3 1905/8 1907/2 1907/11 1909/14 1910/5 1913/18 1913/18 1913/20 1913/22 1916/13 1916/17 1918/9 1918/10 1920/22 1921/16 1927/6 1927/11 1928/23 1930/8 1931/9 1932/25 1935/6 1935/11 1936/25 1939/21 1943/11 1943/13 1944/12 1944/21 1944/21 1945/1 1945/8 1948/3 1948/6 1948/6 1952/7 1953/9 1953/15 1955/16 1958/6 1959/21 1959/22 1960/18 1967/17 1968/5 1968/5 1968/7 1968/16 1968/25 1969/9 1969/12 1974/12 1974/19 1975/17 1976/14 1978/16 1979/11 1979/24 1981/24 1982/9 1982/16 1983/7 1985/1 1985/3 1985/12 1986/10 1987/6 1987/24 1988/5 1988/19 1991/3 1992/6 1992/8 do you [9] 1895/12 1907/11 1927/6 1936/25 1969/12 1975/17 1986/10 1988/19 1992/6 Do you have [1] 1935/6 do you know [1] 1953/9 Do you recognize [2] 1982/16 1983/7 do you remember [2]	1974/12 1979/24 Do you see [5] 1916/13 1920/22 1921/16 1930/8 1932/25 document [27] 1899/21 1902/20 1905/18 1908/13 1909/2 1909/6 1909/19 1912/18 1913/25 1914/1 1916/16 1917/4 1921/6 1926/5 1929/17 1932/19 1932/23 1933/2 1933/13 1933/22 1935/10 1981/15 1982/16 1983/5 1983/7 1991/17 1991/24 documentation [1] 1967/5 documents [8] 1902/16 1902/19 1907/25 1928/16 1928/18 1928/22 1951/7 1972/5 does [30] 1897/16 1898/9 1898/19 1899/18 1899/25 1900/8 1900/8 1901/11 1902/12 1918/19 1925/6 1928/15 1938/9 1938/11 1938/17 1942/11 1942/18 1943/3 1945/9 1945/12 1952/2 1952/3 1953/21 1953/25 1956/5 1961/17 1967/11 1967/17 1968/11 1968/25 doesn't [4] 1939/10 1958/5 1961/6 1961/7 doing [9] 1904/14 1916/6 1919/12 1929/13 1948/5 1948/17 1954/15 1956/9 1963/24 DOJ [1] 1886/2 don't [52] 1895/20 1896/8 1896/9 1899/3 1899/17 1900/16 1900/19 1901/25 1903/22 1904/14 1908/6 1911/9 1915/17 1916/18 1916/22 1917/1 1917/8 1921/2 1925/8 1927/9 1927/13 1932/6 1932/10 1934/16 1934/20 1935/3 1941/4 1943/10 1944/12 1944/13 1944/17 1945/4 1945/7 1945/15 1946/22 1952/10 1952/12 1954/2 1959/20 1959/22 1961/18 1969/15 1969/19 1970/23 1971/8 1972/25 1975/15	1975/23 1981/17 1982/3 1990/18 1990/18 done [8] 1921/24 1935/15 1945/17 1946/6 1946/14 1948/10 1949/13 1976/6 dossier [1] 1943/15 down [10] 1899/14 1919/3 1920/20 1922/18 1923/17 1939/1 1940/9 1979/13 1979/13 1990/24 download [4] 1923/19 1938/6 1963/1 1963/4 downloaded [4] 1948/7 1961/3 1961/4 1963/7 downstairs [1] 1971/15 dozens [3] 1921/24 1939/12 1965/22 Dr [2] 1912/5 1914/2 Dr. [17] 1895/9 1897/13 1903/6 1905/18 1909/20 1917/4 1917/15 1921/6 1922/22 1924/2 1924/4 1924/18 1926/4 1930/8 1932/23 1933/17 1935/15 Dr. Lehman [17] 1895/9 1897/13 1903/6 1905/18 1909/20 1917/4 1917/15 1921/6 1922/22 1924/2 1924/4 1924/18 1926/4 1930/8 1932/23 1933/17 1935/15 dramatic [1] 1922/11 dramatically [1] 1902/16 draw [2] 1899/4 1925/2 drawn [1] 1918/21 drive [1] 1903/23 driven [1] 1950/24 driving [1] 1907/9 drop [2] 1979/13 1979/13 drop-down [2] 1979/13 1979/13 DuckDuckGo [75] 1937/1 1937/2 1937/4 1937/8 1937/10 1937/25 1938/6 1938/9 1938/11 1938/17 1940/4 1941/18 1941/18 1942/11 1942/18 1943/3 1944/12 1944/15 1945/13 1946/5 1946/7 1946/18 1948/21 1949/13 1949/20 1949/24 1950/1 1950/9 1953/20 1955/5 1955/6 1956/3 1956/16 1956/23 1957/16
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<p>D</p> <p>DuckDuckGo... [40] 1958/20 1958/22 1959/12 1959/23 1961/9 1962/6 1962/7 1962/14 1963/5 1963/5 1963/20 1964/8 1965/9 1966/9 1967/11 1967/17 1968/11 1968/25 1971/10 1972/13 1972/14 1972/16 1972/17 1972/20 1973/4 1973/11 1973/19 1976/18 1978/3 1980/3 1981/2 1981/6 1983/9 1986/14 1986/20 1989/14 1989/16 1990/2 1992/12 1992/15</p> <p>DuckDuckGo's [10] 1937/6 1942/22 1945/1 1945/3 1945/10 1953/21 1956/21 1961/21 1981/15 1991/24</p> <p>during [1] 1993/1 DX237 [1] 1912/6 DX241 [3] 1916/24 1917/11 1917/12</p>	<p>eliciting [1] 1975/21 else [2] 1904/10 1910/13 email [17] 1886/4 1886/9 1886/16 1886/20 1887/5 1887/8 1921/10 1921/10 1921/20 1922/1 1926/8 1926/24 1937/20 1951/12 1982/25 1990/18 1990/19 embarrassing [1] 1909/15 embed [1] 1916/1 embedded [1] 1992/3 emotions [2] 1955/25 1956/2 emphasize [1] 1949/24 empirical [1] 1897/18 empirically [4] 1940/16 1958/13 1959/19 1960/7 employ [1] 1938/9 employed [1] 1934/11 employees [1] 1992/5 enable [1] 1984/19 enabled [1] 1943/22 encryption [1] 1987/6 end [7] 1905/24 1906/12 1909/21 1921/18 1923/13 1960/2 1967/1 ended [5] 1966/15 1966/20 1966/25 1967/7 1983/25 ending [3] 1929/19 1983/5 1983/14 endpoint [1] 1968/4 ends [3] 1906/11 1908/16 1930/5 engagement [3] 1977/21 1982/22 1982/22 engaging [1] 1968/3 engine [45] 1897/23 1898/11 1899/25 1900/5 1900/8 1937/13 1937/18 1938/2 1938/12 1939/10 1939/25 1942/3 1942/12 1942/25 1943/4 1943/4 1944/23 1945/1 1945/3 1945/10 1946/8 1947/8 1949/21 1954/7 1954/11 1954/14 1954/15 1954/19 1956/5 1956/14 1956/15 1956/19 1956/22 1956/23 1957/20 1958/1 1961/22 1962/6 1963/6 1963/6 1963/9 1964/6 1969/11 1977/10 1984/17 engineering [1] 1987/13 engineers [5] 1921/24 1926/19 1987/10</p>	<p>1987/10 1987/11 engines [11] 1924/25 1938/21 1938/24 1942/15 1942/18 1945/6 1947/10 1948/20 1952/5 1967/8 1970/23 enough [5] 1899/14 1920/12 1921/3 1924/24 1953/6 ensuing [1] 1909/22 ensure [1] 1902/2 enter [1] 1969/24 entire [3] 1946/25 1950/17 1950/21 Eric [1] 1906/5 Erin [1] 1886/6 erin.murdock [1] 1886/9 erin.murdock-park [1] 1886/9 especially [1] 1986/15 essential [6] 1911/17 1939/9 1943/24 1962/11 1967/15 1967/16 essentially [7] 1915/19 1922/4 1947/13 1960/16 1964/2 1976/1 1978/19 established [1] 1898/6 et [6] 1885/3 1940/19 1959/7 1976/15 1977/8 1978/6 et cetera [3] 1940/19 1959/7 1977/8 Europe [1] 1956/25 evaluate [3] 1901/14 1928/13 1946/7 evaluated [1] 1927/24 evaluation [2] 1928/20 1929/10 even [17] 1896/12 1899/14 1900/25 1915/13 1923/1 1926/17 1927/16 1929/12 1929/13 1943/25 1945/12 1954/6 1954/11 1961/25 1973/3 1988/4 1989/11 events [1] 1950/10 eventually [1] 1960/17 ever [6] 1899/23 1948/7 1948/7 1963/21 1972/13 1972/17 every [7] 1910/24 1910/25 1911/1 1923/22 1938/12 1943/13 1944/14 everybody [1] 1993/3 everyone [3] 1905/23 1949/8 1990/22 everyone's [1] 1990/8 everything [15] 1902/3 1904/10 1910/13 1915/5 1915/5 1921/23 1922/9 1922/12 1938/6</p>	<p>1943/12 1960/22 1960/23 1978/13 1978/15 1990/24 everywhere [2] 1923/19 1943/12 evidence [8] 1897/18 1905/19 1912/6 1917/12 1921/7 1932/19 1964/3 1982/4 evolved [1] 1915/18 evolving [1] 1899/23 exact [2] 1921/2 1921/2 exactly [5] 1916/18 1935/3 1974/1 1978/5 1984/25 EXAMINATION [2] 1926/2 1936/15 example [18] 1896/2 1899/6 1900/2 1908/5 1913/14 1919/21 1920/10 1925/8 1926/16 1931/10 1939/23 1943/22 1945/18 1960/23 1961/25 1962/22 1976/21 1990/11 examples [4] 1905/14 1919/25 1920/4 1920/6 excelled [1] 1923/5 exception [1] 1957/24 excited [3] 1987/18 1987/25 1988/8 excitement [1] 1988/9 excuse [1] 1966/10 executive [7] 1912/19 1914/4 1973/17 1973/22 1973/23 1975/10 1980/2 executives [2] 1975/6 1979/24 exercise [1] 1964/18 exhibit [7] 1917/12 1981/21 1982/4 1982/7 1983/21 1984/16 1985/4 exhibited [1] 1915/14 EXHIBITS [2] 1888/8 1888/13 existing [2] 1910/12 1920/21 exit [1] 1971/10 expand [2] 1943/7 1958/15 expanded [1] 1937/14 expect [2] 1940/11 1947/17 expectations [1] 1963/25 expected [1] 1976/13 expense [1] 1931/18 expensive [3] 1931/19 1931/20 1941/24 experience [9] 1903/14 1904/25 1937/16 1940/23 1941/3 1944/24 1952/7 1970/9 1977/11</p>	<p>experienced [3] 1922/11 1923/2 1985/10 experimentation [5] 1967/18 1967/21 1967/24 1968/12 1968/16 experiments [4] 1927/25 1928/1 1928/10 1934/3 explain [4] 1940/3 1952/12 1965/18 1967/20 explanation [1] 1984/3 explicit [1] 1988/12 exploring [2] 1907/13 1934/6 expound [1] 1970/19 express [1] 1949/18 expressed [4] 1948/13 1980/3 1987/19 1987/20 expressing [1] 1958/11 expressly [1] 1948/13 extend [1] 1933/6 extending [1] 1956/21 extension [2] 1948/7 1980/13 extent [3] 1975/20 1988/23 1992/2 external [3] 1947/1 1981/9 1989/22 extract [1] 1904/15 extremely [1] 1958/13 eyes [1] 1951/22</p>
<p>E</p> <p>each [11] 1899/2 1914/24 1915/22 1920/10 1930/6 1930/10 1959/4 1965/22 1966/1 1969/21 1969/22 earlier [10] 1916/2 1942/10 1944/5 1950/6 1953/7 1953/20 1954/21 1955/5 1962/9 1967/14 early [5] 1932/8 1934/2 1950/3 1950/4 1966/21 easier [1] 1962/18 easily [1] 1951/12 easy [8] 1937/15 1938/4 1938/5 1942/9 1946/14 1956/15 1960/24 1961/5 EC [1] 1957/5 Ecosia [2] 1942/16 1945/7 educated [1] 1950/18 educating [1] 1979/19 education [1] 1943/24 Edward [1] 1951/6 effect [3] 1897/20 1942/4 1992/14 effective [1] 1957/19 effectively [2] 1918/16 1944/23 effects [1] 1941/15 effort [3] 1896/5 1902/2 1913/10 efforts [1] 1967/15 election [1] 1951/21</p>	<p>E</p> <p>each [11] 1899/2 1914/24 1915/22 1920/10 1930/6 1930/10 1959/4 1965/22 1966/1 1969/21 1969/22 earlier [10] 1916/2 1942/10 1944/5 1950/6 1953/7 1953/20 1954/21 1955/5 1962/9 1967/14 early [5] 1932/8 1934/2 1950/3 1950/4 1966/21 easier [1] 1962/18 easily [1] 1951/12 easy [8] 1937/15 1938/4 1938/5 1942/9 1946/14 1956/15 1960/24 1961/5 EC [1] 1957/5 Ecosia [2] 1942/16 1945/7 educated [1] 1950/18 educating [1] 1979/19 education [1] 1943/24 Edward [1] 1951/6 effect [3] 1897/20 1942/4 1992/14 effective [1] 1957/19 effectively [2] 1918/16 1944/23 effects [1] 1941/15 effort [3] 1896/5 1902/2 1913/10 efforts [1] 1967/15 election [1] 1951/21</p>	<p>E</p> <p>each [11] 1899/2 1914/24 1915/22 1920/10 1930/6 1930/10 1959/4 1965/22 1966/1 1969/21 1969/22 earlier [10] 1916/2 1942/10 1944/5 1950/6 1953/7 1953/20 1954/21 1955/5 1962/9 1967/14 early [5] 1932/8 1934/2 1950/3 1950/4 1966/21 easier [1] 1962/18 easily [1] 1951/12 easy [8] 1937/15 1938/4 1938/5 1942/9 1946/14 1956/15 1960/24 1961/5 EC [1] 1957/5 Ecosia [2] 1942/16 1945/7 educated [1] 1950/18 educating [1] 1979/19 education [1] 1943/24 Edward [1] 1951/6 effect [3] 1897/20 1942/4 1992/14 effective [1] 1957/19 effectively [2] 1918/16 1944/23 effects [1] 1941/15 effort [3] 1896/5 1902/2 1913/10 efforts [1] 1967/15 election [1] 1951/21</p>	<p>E</p> <p>each [11] 1899/2 1914/24 1915/22 1920/10 1930/6 1930/10 1959/4 1965/22 1966/1 1969/21 1969/22 earlier [10] 1916/2 1942/10 1944/5 1950/6 1953/7 1953/20 1954/21 1955/5 1962/9 1967/14 early [5] 1932/8 1934/2 1950/3 1950/4 1966/21 easier [1] 1962/18 easily [1] 1951/12 easy [8] 1937/15 1938/4 1938/5 1942/9 1946/14 1956/15 1960/24 1961/5 EC [1] 1957/5 Ecosia [2] 1942/16 1945/7 educated [1] 1950/18 educating [1] 1979/19 education [1] 1943/24 Edward [1] 1951/6 effect [3] 1897/20 1942/4 1992/14 effective [1] 1957/19 effectively [2] 1918/16 1944/23 effects [1] 1941/15 effort [3] 1896/5 1902/2 1913/10 efforts [1] 1967/15 election [1] 1951/21</p>	<p>F</p> <p>face [3] 1899/19 1962/24 1964/9 Facebook [2] 1951/18 1951/19 faces [1] 1962/21 fact [3] 1926/20 1944/13 1962/16 facto [1] 1960/13 factor [4] 1896/11 1947/9 1947/11 1947/21 factors [1] 1947/12 facts [1] 1918/6 Fair [2] 1921/3 1924/24 fairly [3] 1913/20 1915/14 1929/1 fall [3] 1969/25 1974/19 1974/21 familiar [1] 1897/13 family [2] 1959/2 1960/2 FAQs [1] 1966/4 far [6] 1896/19 1899/14 1919/4 1928/9 1942/14 1964/7 fast [4] 1901/19 1911/23 1921/2 1939/18 Fast-forward [1] 1939/18</p>

F	1966/9 1966/14 1972/20 1972/23 1973/2 1973/7 1987/20	1958/20 1959/11 1960/5 1960/6 1979/10 1981/2	1942/1 1942/5 1942/5 1951/12 1951/24 1952/2 1958/13 1958/15 1958/20 1959/14 1962/11 1962/18 1962/19 1963/20 1965/18 1965/23 1966/7 1966/21 1966/25 1967/7 1968/18 1971/17 1974/3 1975/5 1976/24 1979/23 1985/13 1992/21	1971/13 1971/16 1971/20 1974/19 1977/3 1977/3 1977/7 1978/15 1978/25 1979/8 1980/22 1987/22 1988/13 1988/16 1989/6 1992/15
feature [1] 1950/8	first-generation [1] 1912/11	full-time [2] 1960/5 1960/6	gets [5] 1904/12 1919/20 1940/18 1959/23 1963/7	good [12] 1895/9 1897/18 1919/20 1919/25 1934/12 1935/22 1936/18 1965/1 1965/4 1965/6 1971/5 1973/20
features [2] 1903/16 1966/10	fit [1] 1965/18	fully [2] 1933/7 1979/9	getting [8] 1902/11 1904/22 1928/3 1945/25 1964/4 1969/6 1969/8 1970/11	Good morning [3] 1935/22 1936/18 1965/4
Federighi [2] 1973/22 1973/25	five [2] 1924/19 1959/18	function [2] 1925/20 1940/15	giant [1] 1919/13	goods [1] 1943/24
feedback [2] 1923/10 1934/24	flagged [1] 1978/25	functionality [1] 1960/12	give [13] 1912/18 1913/14 1919/18 1920/4 1938/19 1947/7 1948/1 1958/5 1979/6 1985/2 1986/13 1986/13 1992/13	GOOGLE [56] 1885/6 1887/2 1897/17 1898/10 1898/13 1898/18 1905/8 1906/8 1907/12 1908/11 1910/5 1911/22 1914/3 1914/13 1915/24 1916/5 1916/6 1916/9 1918/24 1921/4 1922/25 1923/7 1923/12 1923/21 1931/21 1932/3 1932/4 1934/12 1934/13 1935/9 1942/13 1942/14 1943/2 1943/17 1945/9 1945/12 1951/12 1953/14 1957/2 1958/21 1958/22 1959/11 1960/18 1966/12 1970/7 1976/24 1976/24 1981/16 1985/13 1988/6 1988/15 1988/18 1988/19 1989/4 1989/9 1991/25
feeds [1] 1942/4	flagship [1] 1937/16	fundamental [2] 1907/9 1907/22	given [3] 1906/24 1926/15 1928/1	Google's [12] 1895/11 1897/19 1898/11 1915/22 1922/3 1923/4 1931/11 1932/7 1943/4 1953/13 1962/24 1964/15
feel [2] 1912/2 1983/17	flawed [1] 1957/7	further [6] 1923/15 1924/3 1933/11 1935/13 1940/9 1942/6	gives [4] 1933/5 1944/20 1953/10 1958/2	got [24] 1897/9 1897/11 1900/5 1902/5 1902/22 1910/25 1913/8 1916/4 1924/7 1928/6 1928/16 1928/19 1929/9 1932/14 1938/7 1946/13 1965/15 1971/14 1971/18 1973/2 1973/6 1982/7 1982/10 1990/20
fellow [1] 1975/10	flexibility [1] 1970/17	future [6] 1906/22 1922/2 1929/2 1930/12 1939/15 1966/19	GLUE [3] 1914/17 1914/21 1915/10	gotten [1] 1915/1
felt [6] 1909/8 1909/15 1910/24 1922/3 1955/24 1956/1	flip [2] 1940/22 1983/13		Gmail [1] 1962/25	government [3] 1950/18 1951/7 1951/10
few [15] 1898/19 1909/2 1910/22 1911/1 1917/24 1919/3 1920/4 1920/6 1920/8 1920/10 1924/9 1958/18 1971/16 1987/10 1988/18	floating [1] 1951/25	G	go [35] 1902/8 1906/2 1906/10 1906/15 1913/25 1917/18 1917/21 1919/24 1920/16 1924/11 1926/7 1926/13 1927/11 1929/17 1929/18 1930/20 1943/8 1943/10 1943/12 1946/16 1954/3 1954/12 1957/23 1962/25 1963/4 1965/14 1971/8 1972/9 1975/25 1976/24 1977/23 1978/17 1988/16 1989/23 1990/12	gradually [1] 1897/7
few-shot [3] 1919/3 1920/8 1920/10	Floor [1] 1886/14	G-a-b-r-i-e-l [1] 1936/24	goal [2] 1896/7 1953/22	graph [1] 1939/4
fewer [4] 1919/4 1928/3 1947/14 1947/22	focus [4] 1939/15 1941/21 1967/15 1970/1	Gabriel [3] 1935/24 1936/14 1936/24	goes [1] 1928/20	graphic [2] 1930/6
field [1] 1909/14	focused [5] 1949/21 1949/22 1956/14 1961/12 1987/14	gaining [1] 1957/19	going [38] 1897/4 1911/24 1922/15 1923/17 1924/13 1929/7 1929/9 1929/9 1935/13 1939/2 1940/10 1948/24 1950/19 1952/19 1958/25 1960/17 1966/1 1966/1 1966/2 1966/14 1968/1 1970/8	
figure [5] 1902/18 1906/25 1925/17 1978/17 1988/16	following [1] 1943/12	game [3] 1908/1 1923/3 1923/5		
figured [2] 1988/1 1988/4	fonts [1] 1941/14	gave [4] 1903/7 1906/12 1969/16 1978/16		
files [1] 1933/2	football [1] 1900/7	general [6] 1917/21 1955/13 1957/21 1977/9 1978/14 1989/7		
fill [1] 1896/14	forced [1] 1960/17	generalization [4] 1896/1 1896/6 1896/13 1897/7		
filling [1] 1896/9	foregoing [1] 1994/3	generalize [2] 1896/7 1897/9		
filter [1] 1945/19	form [1] 1904/19	generalized [1] 1896/21		
filtered [1] 1945/21	formal [2] 1906/8 1957/4	generally [17] 1925/20 1944/10 1946/20 1952/8 1953/7 1954/12 1956/1 1956/8 1956/17 1956/18 1958/4 1964/11 1966/6 1973/10 1974/15 1975/22 1983/9		
finally [3] 1941/13 1960/19 1983/20	format [1] 1990/14	generate [2] 1918/18 1938/17		
financial [1] 1943/25	forth [2] 1921/15 1957/3	generation [4] 1912/11 1912/12 1912/13 1917/25		
find [13] 1896/25 1913/10 1916/21 1929/24 1944/10 1947/19 1947/20 1957/22 1958/4 1958/6 1958/13 1960/20 1962/18	Fortunately [2] 1923/4 1933/5	gentler [1] 1899/20		
fine [2] 1919/16 1919/22	forward [6] 1906/10 1906/15 1917/15 1917/19 1939/18 1992/15	genuine [1] 1964/12		
fine-tuning [2] 1919/16 1919/22	found [10] 1910/11 1918/5 1931/12 1937/4 1945/24 1946/17 1955/13 1956/12 1957/21 1961/20	get [56] 1898/3 1898/15 1900/7 1900/10 1901/19 1904/1 1905/8 1907/10 1907/11 1908/25 1909/5 1909/18 1912/14 1919/25 1924/15 1924/16 1925/15 1928/11 1928/19 1928/22 1929/11 1938/6 1940/9 1940/17 1940/18 1940/24 1941/5 1941/8		
finish [1] 1909/20	founded [1] 1937/3			
finished [1] 1949/15	four [1] 1910/25			
Firefox [1] 1953/15	fourth [1] 1905/24			
firm [1] 1947/1	fraction [1] 1959/10			
first [34] 1902/23 1906/16 1906/19 1907/6 1907/24 1908/14 1909/11 1909/12 1910/9 1910/24 1912/11 1918/3 1920/18 1927/2 1927/20 1932/9 1932/17 1933/14 1933/17 1933/23 1934/8 1940/12 1944/15 1952/18 1957/8 1958/19 1965/7	frank [1] 1987/13			
	free [3] 1937/17 1957/13 1957/14			
	fresh [1] 1901/16			
	freshness [3] 1900/13 1901/4 1901/24			
	friction [1] 1962/17			
	friends [1] 1960/1			
	front [4] 1905/18 1912/5 1921/6 1982/7			
	fronts [1] 1910/2			
	full [8] 1910/8 1910/17			

<p>G</p> <p>graphic... [1] 1930/10</p> <p>great [5] 1907/7 1907/13 1964/1 1965/11 1982/12</p> <p>greater [1] 1918/14</p> <p>gritty [1] 1902/11</p> <p>group [1] 1948/12</p> <p>growing [1] 1921/1</p> <p>grows [5] 1897/25 1897/25 1897/25 1898/6 1898/13</p> <p>Grushetsky [3] 1927/1 1927/3 1927/6</p> <p>guess [14] 1895/18 1897/22 1907/6 1908/24 1909/11 1909/18 1910/5 1911/22 1912/3 1912/16 1924/20 1924/22 1924/23 1925/22</p> <p>guessing [2] 1922/15 1982/13</p> <p>guy [1] 1927/10</p>	<p>1978/19 1987/24 1989/25 1990/10</p> <p>happening [2] 1955/4 1960/7</p> <p>happens [2] 1900/25 1960/10</p> <p>happy [2] 1924/15 1926/19</p> <p>hard [8] 1899/4 1904/2 1904/5 1915/8 1919/12 1924/22 1958/13 1962/22</p> <p>harder [4] 1902/18 1915/13 1915/15 1960/19</p> <p>hardware [1] 1933/9</p> <p>harm [1] 1943/21</p> <p>harms [5] 1944/4 1944/11 1944/19 1953/6 1954/21</p> <p>has [32] 1896/6 1897/19 1898/13 1898/18 1905/19 1907/1 1908/4 1909/22 1911/6 1916/25 1928/21 1937/17 1942/25 1946/5 1946/7 1948/21 1949/20 1950/21 1952/1 1955/6 1955/6 1956/23 1959/4 1963/9 1963/20 1964/22 1965/22 1969/22 1981/16 1983/5 1989/7 1991/25</p> <p>hasn't [2] 1992/20 1992/22</p> <p>have [99] 1895/20 1896/8 1896/9 1898/9 1899/2 1899/4 1899/17 1901/6 1902/4 1902/14 1902/17 1904/9 1904/23 1907/2 1907/15 1908/23 1910/17 1911/9 1911/15 1912/5 1917/8 1923/11 1923/20 1924/2 1924/8 1924/9 1924/16 1932/15 1933/6 1934/12 1935/6 1935/13 1936/5 1937/14 1937/23 1938/4 1938/4 1939/5 1939/10 1940/8 1940/20 1941/15 1942/3 1943/23 1944/13 1946/17 1946/23 1947/4 1947/6 1948/6 1948/7 1948/8 1948/12 1952/8 1952/9 1952/11 1953/4 1953/17 1953/21 1954/3 1956/23 1957/4 1958/6 1959/1 1959/14 1959/15 1959/20 1959/20 1959/22 1961/17 1961/20 1963/10 1964/3 1967/3 1967/6 1967/8 1968/1</p>	<p>1968/22 1969/9 1969/10 1969/17 1970/6 1970/10 1970/17 1972/25 1974/16 1977/19 1980/15 1981/8 1981/14 1981/24 1986/20 1989/9 1989/23 1990/21 1991/4 1991/5 1991/6 1991/23</p> <p>haven't [1] 1935/3</p> <p>having [4] 1935/9 1968/6 1977/22 1985/8</p> <p>he [12] 1912/19 1927/10 1975/8 1975/22 1975/23 1978/16 1978/16 1982/20 1989/1 1989/2 1992/20 1992/21</p> <p>He'll [1] 1972/5</p> <p>he's [11] 1927/7 1927/8 1972/6 1974/1 1974/1 1975/7 1975/9 1982/7 1989/4 1989/6 1992/19</p> <p>head [7] 1902/10 1902/13 1911/9 1912/16 1932/3 1933/5 1975/11</p> <p>head-start [2] 1932/3 1933/5</p> <p>headquarters [7] 1937/6 1974/8 1974/25 1975/18 1980/23 1986/11 1987/16</p> <p>healthcare [1] 1943/25</p> <p>hear [1] 1948/2</p> <p>heard [1] 1992/16</p> <p>hearsay [8] 1917/1 1917/7 1975/21 1981/16 1992/3 1992/18 1992/21 1992/23</p> <p>heavy [1] 1923/11</p> <p>help [5] 1901/16 1905/4 1905/7 1925/13 1948/22</p> <p>helpful [2] 1934/18 1957/22</p> <p>helping [1] 1911/17</p> <p>her [1] 1900/20</p> <p>here [12] 1907/6 1908/24 1911/12 1914/12 1922/14 1927/7 1927/10 1934/8 1934/15 1940/7 1969/13 1992/11</p> <p>here's [4] 1897/3 1900/2 1919/23 1919/23</p> <p>hey [2] 1910/25 1964/3</p> <p>hidden [4] 1950/13 1982/9 1986/17 1987/5</p> <p>high [9] 1916/4 1917/24 1925/15 1946/16 1947/3 1947/5 1951/5 1955/14</p>	<p>1973/18</p> <p>high-level [2] 1917/24 1973/18</p> <p>higher [2] 1921/4 1921/5</p> <p>highest [4] 1915/1 1915/2 1915/2 1973/22</p> <p>highlight [1] 1933/3</p> <p>highlighted [1] 1923/9</p> <p>him [3] 1974/4 1982/7 1992/7</p> <p>hint [1] 1899/3</p> <p>hired [1] 1934/12</p> <p>his [5] 1927/4 1927/5 1987/9 1988/24 1989/2</p> <p>historically [1] 1952/15</p> <p>histories [1] 1944/14</p> <p>history [10] 1909/10 1909/12 1943/18 1943/18 1943/20 1943/20 1951/12 1952/20 1952/22 1952/24</p> <p>hit [1] 1964/15</p> <p>Hoffman [3] 1935/23 1936/19 1949/9</p> <p>holes [3] 1896/9 1896/14 1896/16</p> <p>holiday [2] 1910/10 1921/21</p> <p>home [3] 1903/24 1935/17 1959/1</p> <p>honestly [1] 1964/2</p> <p>Honor [30] 1905/15 1909/17 1916/24 1917/3 1917/10 1924/9 1924/12 1932/20 1933/12 1933/13 1935/8 1935/12 1935/22 1935/25 1936/4 1936/11 1949/10 1964/20 1965/1 1971/22 1971/24 1972/3 1972/10 1975/20 1981/14 1981/23 1991/23 1992/1 1992/8 1992/16</p> <p>Honor's [1] 1924/15</p> <p>HONORABLE [2] 1885/9 1949/5</p> <p>hoping [1] 1976/3</p> <p>hours [1] 1897/3</p> <p>household [1] 1952/23</p> <p>housing [1] 1943/24</p> <p>how [52] 1896/10 1896/23 1897/16 1898/19 1899/25 1899/25 1900/8 1900/8 1900/9 1901/6 1902/12 1903/14 1903/16 1903/16 1904/14 1907/10 1907/11 1909/22 1914/2 1914/23 1927/24 1929/4 1931/6 1937/21 1938/9 1938/11</p>	<p>1938/17 1938/23 1940/3 1946/17 1951/23 1951/24 1952/2 1952/2 1955/24 1957/19 1959/23 1961/5 1966/18 1971/15 1971/15 1977/13 1978/5 1979/4 1980/17 1982/24 1985/3 1985/23 1986/14 1986/20 1987/17 1988/6</p> <p>However [1] 1915/17</p> <p>huge [7] 1904/21 1911/20 1923/4 1923/9 1933/25 1941/15 1943/15</p> <p>huh [1] 1933/10</p> <p>human [6] 1904/25 1915/7 1915/19 1916/11 1918/18 1935/5</p> <p>human-level [2] 1915/19 1916/11</p> <p>human-rated [1] 1935/5</p> <p>humanlike [1] 1911/15</p> <p>humans [1] 1909/4</p> <p>hunch [2] 1956/10 1963/24</p> <p>hundred [2] 1938/13 1938/14</p> <p>hundreds [1] 1898/20</p> <p>hurriedly [1] 1974/20</p> <p>hustled [1] 1932/14</p> <p>hype [1] 1909/16</p> <hr/> <p>I</p> <p>I also [1] 1907/12</p> <p>I believe [9] 1916/25 1917/7 1926/25 1927/3 1930/1 1931/11 1961/11 1973/3 1975/14</p> <p>I can [1] 1992/24</p> <p>I can't [1] 1905/4</p> <p>I did [1] 1912/1</p> <p>I didn't [1] 1979/23</p> <p>I don't [11] 1903/22 1917/8 1932/6 1932/10 1934/16 1945/4 1945/15 1952/10 1969/19 1975/15 1975/23</p> <p>I guess [8] 1895/18 1897/22 1908/24 1909/11 1909/18 1911/22 1912/3 1912/16</p> <p>I have [4] 1904/23 1924/2 1935/13 1989/9</p> <p>I haven't [1] 1935/3</p> <p>I just [4] 1902/8 1933/16 1941/4 1971/1</p> <p>I mean [33] 1914/12 1943/6 1943/10 1944/3 1945/5 1946/11 1949/17 1950/3</p>
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I	1960/19 1962/5 1969/10 1980/9 1988/1 1991/11	impact [2] 1897/16 1968/12	1941/20 1966/13	1922/13
I mean... [25] 1950/13 1952/15 1954/2 1954/10 1954/21 1956/8 1956/17 1958/9 1962/16 1963/8 1963/10 1964/11 1964/12 1965/21 1967/23 1968/15 1970/4 1975/4 1977/16 1977/18 1984/25 1987/4 1987/12 1987/19 1989/21	I'll [10] 1981/11 1981/12 1983/4 1983/13 1983/14 1983/20 1983/22 1991/13 1991/16 1993/1	implementation [3] 1978/2 1978/2 1978/24	innovative [2] 1939/16 1941/22	is [240] is there [2] 1917/5 1961/9
I recall [1] 1955/14	I'm [30] 1897/4 1899/22 1904/21 1905/9 1908/24 1916/18 1922/14 1924/11 1926/16 1927/5 1927/14 1929/24 1932/10 1937/22 1939/2 1948/22 1953/17 1961/13 1964/21 1970/19 1973/24 1974/1 1981/24 1982/13 1986/6 1987/12 1988/20 1988/21 1989/10 1989/10	implementations [1] 1983/24	input [3] 1911/5 1920/4 1920/5	isn't [1] 1932/11
I say [1] 1960/7	I'm going [1] 1939/2	implementing [1] 1988/10	inputs [3] 1919/4 1919/5 1919/18	issue [5] 1950/14 1955/10 1955/20 1969/18 1988/15
I think [55] 1895/24 1898/5 1900/24 1901/23 1904/20 1906/23 1907/8 1907/20 1909/7 1909/8 1911/8 1911/11 1912/17 1912/19 1916/2 1916/21 1918/5 1923/16 1923/17 1923/21 1923/24 1923/25 1925/4 1925/5 1925/5 1925/13 1925/18 1925/20 1926/10 1927/22 1929/4 1932/7 1932/15 1933/20 1933/24 1935/4 1938/22 1951/22 1953/11 1953/17 1960/9 1963/8 1964/12 1964/21 1964/22 1967/15 1967/24 1969/20 1970/6 1970/22 1973/6 1975/8 1975/22 1980/21 1989/1	I'm just [1] 1929/24	implications [5] 1898/9 1906/21 1911/23 1922/2 1923/12	insights [1] 1946/23	issues [2] 1957/10 1962/21
I thought [5] 1907/16 1911/16 1922/7 1939/14 1966/19	I'm not [1] 1970/19	implicently [1] 1903/19	inspire [1] 1905/9	it [233]
I understand [3] 1981/16 1988/20 1991/25	I'm not sure [2] 1953/17 1974/1	important [6] 1900/24 1904/4 1907/17 1908/9 1908/10 1990/23	install [1] 1954/2	it's [93] 1895/19 1895/23 1897/3 1898/5 1898/20 1899/4 1901/3 1901/14 1901/22 1902/17 1902/18 1903/3 1904/5 1909/23 1911/1 1911/3 1911/13 1912/17 1912/22 1913/4 1913/19 1913/22 1913/22 1915/12 1919/12 1921/10 1922/3 1923/25 1924/22 1925/21 1928/13 1928/14 1929/5 1929/9 1929/13 1929/15 1930/1 1930/5 1930/6 1932/19 1934/5 1934/15 1934/16 1934/25 1935/2 1938/5 1939/19 1940/8 1940/13 1941/24 1941/24 1943/6 1943/11 1944/15 1944/15 1944/17 1948/16 1948/25 1950/9 1953/18 1956/17 1957/13 1957/14 1958/15 1959/18 1960/14 1960/19 1961/19 1962/10 1962/22 1963/8 1963/14 1963/15 1969/21 1969/22 1971/13 1971/16 1971/20 1972/8 1973/12 1977/2 1977/3 1977/3 1977/4 1977/5 1979/8 1982/7 1982/9 1988/23 1990/20 1990/20 1990/23 1992/24
I want [3] 1926/4 1926/7 1926/13	I'm sorry [8] 1899/22 1924/11 1948/22 1961/13 1973/24 1981/24 1986/6 1988/21	impossible [4] 1905/9 1956/17 1958/1 1958/3	instead [4] 1909/3 1910/8 1910/17 1990/20	itself [5] 1926/18 1927/17 1942/3 1972/23 1978/3
I wanted [2] 1905/7 1963/17	I'm sure [1] 1989/10	impression [7] 1923/2 1977/13 1977/15 1980/17 1980/18 1980/19 1987/17	instruct [1] 1957/23	
I was [23] 1903/12 1903/18 1903/19 1903/23 1905/3 1908/21 1911/4 1916/19 1922/15 1924/13 1935/13 1942/9 1950/6 1953/6 1954/21 1955/2 1958/12 1962/9 1965/21 1968/8 1970/12 1970/24 1983/25	I've [5] 1898/3 1936/3 1965/8 1977/16 1982/10	impressive [1] 1915/9	integrate [1] 1987/1	
I will [2] 1900/2 1924/9	I'm going [1] 1939/2	improve [2] 1920/21 1966/12	integrated [1] 1986/15	
I'd [18] 1921/9 1921/13 1929/18 1933/14 1939/8 1942/1 1946/12 1948/18 1950/14 1950/24 1953/3 1958/9	I'm just [1] 1929/24	improvement [1] 1914/8	integrating [1] 1976/20	
	I'm not [1] 1970/19	incentive [1] 1942/6	integration [1] 1981/1 1985/23	
	I'm not sure [2] 1953/17 1974/1	include [3] 1902/18 1947/12 1957/5	intelligences [1] 1909/10	
	I'm sorry [8] 1899/22 1924/11 1948/22 1961/13 1973/24 1981/24 1986/6 1988/21	included [1] 1956/24	intend [2] 1992/2 1992/6	
	I'm sure [1] 1989/10	including [4] 1950/5 1951/11 1974/8 1981/1	intended [1] 1905/13	
	I've [5] 1898/3 1936/3 1965/8 1977/16 1982/10	incognito [3] 1945/24 1953/14 1955/3	interact [4] 1911/16 1959/1 1959/16 1979/4	
	Ian [2] 1935/23 1936/18	incorporate [1] 1977/9	interacting [1] 1959/12	
	Ian Hoffman [1] 1935/23	increase [1] 1934/1	interest [3] 1964/11 1977/5 1977/17	
	idea [10] 1909/8 1909/14 1928/1 1963/21 1965/12 1966/24 1973/4 1973/20 1978/14 1984/4	increased [1] 1950/24	interested [5] 1973/9 1973/11 1973/19 1982/14 1987/23	
	ideas [7] 1979/6 1979/12 1983/25 1985/2 1986/13 1986/14 1987/2	increasing [2] 1950/9 1987/6	interleaved [1] 1927/4	
	identical [1] 1940/21	increasingly [1] 1938/25	internal [1] 1919/19	
	identified [3] 1921/19 1973/21 1988/14	indeed [1] 1923/20	internally [1] 1989/18	
	identify [4] 1900/9 1901/16 1955/18 1955/25	index [8] 1888/2 1888/8 1888/13 1938/22 1939/11 1941/17 1941/19 1965/23	international [1] 1950/17	
	images [2] 1911/6 1939/7	indexes [3] 1939/6 1939/12 1965/24	Internet [9] 1918/22 1919/6 1937/10 1944/22 1946/8 1949/14 1949/25 1952/6 1952/8	
	imagine [5] 1897/23 1929/7 1960/25 1961/2 1979/8	indexing [3] 1939/22 1966/7 1966/15	interpret [3] 1904/6 1904/15 1909/4	
	immeasurable [1] 1961/18	indication [1] 1934/21	interrupt [2] 1937/22 1948/23	
	immediately [2] 1957/7 1985/23	individual [2] 1944/13 1945/24	introduced [2] 1905/6 1933/14	
		induction [1] 1930/17	introduction [2] 1923/14 1992/2	
		influence [1] 1951/21	intuitive [1] 1940/9	
		info [1] 1966/6	invented [1] 1932/8	
		inform [1] 1925/13	invest [3] 1942/7 1942/7 1942/8	
		informally [1] 1912/10	investment [1] 1923/4	
		information [8] 1902/3 1904/15 1934/23 1943/14 1954/8 1954/19 1956/6 1969/6	invited [1] 1905/23	
		informed [1] 1956/3	involved [2] 1910/8 1978/15	
		initial [2] 1920/5 1966/13	involvement [1] 1915/22	
		initially [3] 1919/9	iOS [3] 1957/25 1974/17 1974/17	
			iPhones [1] 1974/17	
			irrelevant [2] 1910/13	

J	Kenneth [3] 1886/2 1887/2 1887/6 kenneth.dintzer2 [1] 1886/5 kicked [2] 1951/1 1952/18 killer [1] 1915/12 kind [73] 1896/8 1896/15 1897/2 1899/18 1899/19 1900/17 1901/3 1904/22 1904/23 1904/25 1909/23 1910/13 1910/20 1912/18 1919/11 1922/7 1922/10 1922/12 1922/16 1927/22 1929/3 1931/1 1932/16 1937/16 1938/18 1939/11 1940/6 1941/14 1942/5 1942/6 1944/8 1944/23 1945/20 1946/24 1951/10 1951/13 1951/23 1951/25 1952/3 1952/16 1955/17 1955/25 1956/1 1956/2 1957/4 1957/6 1958/10 1960/7 1960/12 1960/15 1962/4 1967/9 1969/21 1970/21 1973/7 1973/18 1973/21 1974/21 1975/9 1977/25 1978/12 1978/16 1980/2 1981/1 1982/20 1983/11 1983/25 1986/17 1987/5 1987/14 1989/22 1990/1 1990/17 kinds [3] 1897/8 1922/16 1925/9 knock [1] 1910/21 know [58] 1899/8 1900/19 1901/1 1901/18 1901/23 1901/25 1904/14 1906/21 1906/23 1908/10 1909/7 1909/10 1910/4 1910/15 1913/13 1913/19 1915/17 1916/18 1916/19 1916/21 1917/1 1920/11 1921/2 1921/24 1922/3 1925/8 1925/8 1925/15 1926/14 1935/3 1935/25 1940/11 1941/10 1943/12 1943/15 1943/17 1944/5 1944/16 1944/17 1946/23 1951/2 1952/22 1953/9 1953/15 1954/23 1956/10 1960/9 1961/18 1966/3	1969/22 1974/8 1976/14 1977/19 1978/14 1980/23 1983/10 1986/12 1986/22 knowing [1] 1944/8 knowledge [3] 1920/24 1939/3 1988/25 known [1] 1937/12 ksmurzynski [1] 1887/8	leader [2] 1914/25 1915/5 leadership [3] 1903/11 1921/19 1974/2 leading [4] 1937/10 1952/7 1982/21 1987/2 leaked [1] 1952/2 learn [7] 1904/19 1908/24 1911/10 1911/15 1911/17 1911/19 1913/17 learned [1] 1922/6 learning [12] 1897/8 1906/20 1907/24 1908/15 1911/19 1919/4 1920/9 1922/12 1923/11 1924/6 1925/3 1925/11 least [9] 1900/23 1912/13 1913/22 1916/25 1934/21 1944/7 1948/15 1953/4 1964/15 leave [1] 1988/9 led [1] 1977/25 left [6] 1911/22 1921/4 1949/12 1972/12 1984/6 1984/8 legal [1] 1980/11 Lehman [18] 1895/9 1897/13 1903/6 1905/18 1909/20 1912/5 1917/4 1917/15 1921/6 1922/22 1924/2 1924/4 1924/18 1926/4 1930/8 1932/23 1933/17 1935/15 less [6] 1896/19 1906/8 1925/19 1934/25 1940/9 1941/9 let [4] 1912/10 1949/20 1966/21 1972/16 let's [9] 1914/9 1929/23 1952/5 1956/20 1977/9 1977/23 1983/10 1992/21 1992/24 Let's see [1] 1929/23 letters [1] 1914/2 level [20] 1898/15 1915/7 1915/19 1916/11 1917/22 1917/24 1945/2 1945/7 1945/9 1945/13 1946/8 1946/16 1947/3 1947/5 1951/5 1952/4 1952/6 1973/18 1973/22 1976/2 license [3] 1939/17 1939/19 1939/24 licenses [1] 1941/18 like [142] liked [1] 1967/8 likely [4] 1925/12 1926/17 1927/16 1942/19 limitations [1] 1908/4 limited [3] 1913/22	1941/21 1968/15 line [4] 1901/6 1907/6 1952/3 1971/17 linearly [1] 1898/1 link [2] 1942/6 1969/14 linking [1] 1940/24 links [15] 1900/10 1938/22 1939/17 1939/19 1941/8 1941/10 1942/2 1969/8 1969/13 1970/10 1970/18 1970/22 1970/22 1971/1 1971/4 list [1] 1987/5 listening [1] 1989/24 little [19] 1899/2 1902/17 1904/2 1905/10 1909/7 1912/24 1919/7 1919/12 1919/19 1930/21 1930/25 1934/23 1938/19 1947/12 1948/24 1948/25 1949/1 1950/3 1960/14 live [2] 1927/25 1968/18 LLC [1] 1885/6 LLP [2] 1886/18 1887/3 local [1] 1952/20 location [2] 1943/19 1946/2 lodged [1] 1916/25 logarithmically [1] 1898/7 logo [2] 1983/8 1983/9 long [8] 1897/20 1901/22 1902/9 1902/17 1913/24 1931/6 1952/16 1972/8 long-tail [2] 1902/9 1902/17 longtime [1] 1975/8 look [12] 1897/9 1901/5 1903/14 1905/20 1929/12 1940/21 1972/4 1977/3 1978/2 1979/8 1981/1 1991/12 looked [5] 1899/14 1911/23 1927/23 1945/23 1984/2 looking [3] 1900/21 1910/20 1968/2 looks [9] 1905/24 1917/24 1962/4 1967/21 1977/4 1979/4 1979/9 1985/7 1991/18 lot [28] 1900/4 1901/1 1915/3 1918/6 1918/7 1918/7 1918/10 1922/6 1925/9 1925/20 1927/7 1939/1 1940/24 1941/1 1944/20 1946/11 1950/18 1950/24 1951/7 1954/22 1959/22 1964/11 1964/12 1966/14
John [2] 1887/2 1980/14 jon.sallet [1] 1886/16 Jonathan [1] 1886/11 Joseph [1] 1965/1 journey [2] 1909/24 1912/8 Jr [1] 1886/17 jschmidlein [1] 1887/5 judge [3] 1885/10 1912/8 1978/5 Judicial [1] 1886/13 July [3] 1920/17 1920/25 1921/3 jumped [1] 1911/6 June [1] 1974/18 junior [2] 1910/16 1922/10 just [89] 1898/16 1902/8 1902/21 1905/4 1907/24 1908/7 1909/2 1909/3 1909/6 1910/1 1910/7 1910/11 1910/12 1910/17 1911/1 1911/3 1911/4 1911/13 1911/24 1911/24 1914/9 1915/4 1917/16 1917/21 1919/12 1920/4 1920/6 1920/6 1920/7 1921/22 1921/23 1922/8 1922/10 1922/11 1922/16 1924/4 1924/14 1929/24 1933/16 1938/5 1939/10 1940/22 1941/4 1941/8 1942/14 1943/23 1944/19 1944/24 1946/12 1950/4 1950/9 1953/9 1953/11 1953/18 1954/4 1954/12 1957/21 1958/4 1958/12 1958/19 1958/23 1959/9 1959/10 1959/18 1960/7 1960/9 1960/19 1960/22 1961/6 1963/3 1963/3 1963/6 1963/11 1965/7 1965/8 1966/5 1967/20 1967/23 1970/10 1971/1 1973/12 1975/22 1977/4 1977/5 1982/6 1983/17 1985/17 1987/11 1987/21 JUSTICE [2] 1886/2 1886/6 justification [1] 1960/14	L language [36] 1907/7 1907/11 1911/12 1911/15 1911/17 1912/9 1912/20 1912/21 1912/23 1912/25 1913/4 1913/5 1913/6 1913/7 1913/11 1913/13 1913/17 1914/12 1914/17 1914/20 1917/17 1917/25 1918/5 1918/15 1918/18 1919/8 1919/10 1919/11 1919/17 1920/2 1923/18 1931/3 1947/13 1967/3 1967/4 1967/4 laptop [1] 1959/2 large [20] 1898/23 1898/25 1907/15 1910/12 1911/19 1911/25 1912/9 1912/20 1912/21 1914/8 1918/21 1920/2 1923/18 1923/20 1931/4 1934/11 1944/10 1946/15 1962/17 1969/10 large-scale [1] 1931/4 largely [5] 1923/5 1923/10 1923/24 1925/1 1925/3 larger [4] 1913/6 1913/8 1913/8 1913/8 largest [1] 1942/25 last [8] 1896/6 1926/5 1926/7 1926/7 1937/14 1946/12 1982/23 1992/19 lately [1] 1907/21 latency [4] 1930/24 1931/6 1931/11 1931/14 later [4] 1915/18 1915/25 1963/20 1985/25 latest [1] 1900/8 launched [3] 1931/21 1932/14 1932/15 LAW [1] 1886/11 lawsuit [1] 1953/4 layout [1] 1904/17 layouts [1] 1941/14 lead [3] 1933/6 1978/9 1985/19			
keep [2] 1896/11 1901/3 keeps [1] 1930/17 Kelce [1] 1900/7	K keep [2] 1896/11 1901/3 keeps [1] 1930/17 Kelce [1] 1900/7			

L	1944/6 many [26] 1895/21 1896/12 1898/23 1899/4 1902/14 1903/16 1908/11 1913/25 1916/11 1920/7 1922/5 1923/22 1931/9 1931/9 1937/21 1938/9 1938/11 1944/4 1953/3 1957/10 1958/20 1958/23 1959/18 1965/21 1972/19 1972/19 maps [9] 1939/7 1966/3 1969/12 1976/22 1976/23 1976/24 1976/25 1976/25 1977/2 margin [1] 1910/12 marked [5] 1905/19 1912/6 1914/2 1921/7 1934/12 market [4] 1942/23 1943/1 1948/11 1961/16 marketing [2] 1909/16 1973/17 mascot [4] 1965/12 1965/12 1965/13 1965/14 masses [1] 1919/13 match [1] 1977/6 materials [1] 1981/9 math [1] 1913/18 mathematics [1] 1902/12 matter [6] 1915/17 1958/19 1992/3 1992/11 1992/17 1994/4 may [22] 1900/3 1905/15 1909/17 1911/11 1919/7 1924/8 1932/15 1932/20 1936/11 1936/12 1937/23 1940/7 1940/12 1944/5 1944/6 1948/3 1968/22 1971/24 1972/1 1972/2 1982/14 1992/16 maybe [16] 1895/19 1899/8 1899/10 1899/10 1899/12 1900/19 1907/7 1908/25 1910/24 1912/24 1916/16 1925/6 1932/17 1966/21 1966/22 1986/23 me [23] 1903/10 1903/11 1909/25 1910/1 1910/14 1911/8 1912/10 1912/12 1918/25 1927/9 1927/12 1935/1 1943/7 1949/20 1963/6 1966/10 1966/21 1972/16 1974/25	1976/7 1978/5 1981/8 1986/20 mean [45] 1904/20 1914/2 1914/12 1927/11 1943/6 1943/10 1944/3 1945/5 1946/11 1949/17 1950/3 1950/13 1952/15 1954/1 1954/2 1954/10 1954/21 1956/8 1956/17 1958/9 1962/16 1963/8 1963/10 1963/24 1964/11 1964/12 1965/21 1967/23 1968/15 1970/4 1970/19 1971/1 1975/4 1977/16 1977/18 1979/3 1983/8 1984/25 1987/4 1987/12 1987/19 1988/12 1989/18 1989/21 1991/3 meaning [1] 1911/12 means [4] 1911/12 1935/15 1939/22 1960/16 measurable [1] 1961/19 measure [1] 1914/15 measurement [2] 1928/24 1969/23 measures [1] 1899/20 mechanical [1] 1887/14 mechanism [1] 1908/23 media [3] 1951/3 1971/14 1982/21 meeting [42] 1974/3 1974/6 1974/13 1974/24 1975/2 1975/4 1975/5 1975/18 1977/13 1977/15 1978/8 1978/9 1979/22 1979/24 1980/15 1980/16 1980/17 1980/24 1981/6 1981/7 1981/10 1982/21 1983/2 1985/18 1985/19 1985/19 1986/4 1986/11 1987/8 1987/9 1987/16 1987/17 1987/18 1987/20 1987/22 1988/9 1989/15 1989/17 1989/23 1991/18 1991/19 1991/20 meetings [5] 1905/22 1974/7 1976/9 1980/9 1989/22 MEHTA [2] 1885/9 1949/6 members [1] 1991/6 memorization [2] 1895/25 1896/2 memorize [1] 1918/6	memory [2] 1918/7 1932/17 mentioned [14] 1915/21 1918/25 1931/25 1941/4 1941/20 1944/5 1967/14 1972/25 1975/13 1976/7 1981/5 1985/22 1988/12 1988/18 mentioning [3] 1942/10 1960/8 1962/9 menus [1] 1956/24 Merit [1] 1887/10 mess [1] 1954/3 message [2] 1904/16 1979/18 method [2] 1961/21 1961/24 methodologies [2] 1968/9 1968/17 methods [1] 1956/21 metric [2] 1926/15 1969/20 metrics [3] 1926/18 1927/16 1969/22 Microsoft [5] 1922/25 1932/15 1939/20 1939/25 1940/1 Microsoft's [1] 1939/25 mid [1] 1938/24 mid-2000s [1] 1938/24 might [19] 1899/6 1899/20 1907/4 1908/24 1908/25 1908/25 1924/16 1938/18 1940/10 1940/11 1947/17 1960/8 1967/3 1970/13 1970/14 1970/17 1980/14 1984/1 1986/25 mildly [2] 1899/21 1902/19 milestone [5] 1909/25 1910/13 1911/21 1912/8 1917/17 million [2] 1938/13 1938/14 millions [1] 1898/21 mimmick [1] 1913/12 mind [3] 1896/12 1922/9 1941/1 mine [2] 1924/17 1927/4 minimal [1] 1908/1 minute [2] 1924/8 1929/24 minutes [3] 1971/16 1971/21 1992/19 misconception [1] 1955/19 misconceptions [2] 1955/7 1955/16 misleading [4] 1927/22 1928/12 1928/14 1964/3	misled [1] 1956/2 missed [1] 1937/23 missing [1] 1946/3 mistakes [1] 1922/6 ML [9] 1922/24 1923/3 1923/5 1923/6 1923/15 1923/20 1924/4 1924/5 1924/20 ML-based [1] 1923/6 mobile [1] 1960/5 mode [46] 1945/24 1945/25 1952/10 1952/11 1952/18 1952/19 1952/21 1953/5 1953/8 1953/10 1953/11 1953/14 1953/21 1954/3 1954/7 1954/13 1954/18 1954/23 1955/3 1955/8 1955/21 1956/4 1956/12 1956/14 1956/19 1956/19 1963/22 1964/5 1972/15 1972/18 1973/5 1976/13 1978/10 1979/3 1979/16 1984/2 1984/10 1984/19 1984/20 1985/9 1985/12 1985/20 1986/15 1986/23 1986/24 1987/6 model [5] 1898/5 1912/20 1912/21 1917/25 1919/19 models [8] 1912/9 1912/25 1913/3 1913/7 1914/7 1920/2 1923/18 1966/16 modes [4] 1952/8 1952/13 1953/2 1955/13 modifies [1] 1919/18 modify [1] 1899/20 module [1] 1967/6 modules [25] 1939/2 1939/5 1939/15 1939/21 1941/2 1941/4 1941/23 1942/7 1950/5 1965/17 1965/19 1965/22 1966/10 1966/24 1966/25 1967/4 1967/12 1967/18 1969/9 1969/25 1970/6 1970/24 1976/20 1977/6 1978/6 moment [3] 1910/14 1950/17 1950/23 monetize [1] 1942/2 money [1] 1957/8 monitor [2] 1982/13 1982/14 monster [1] 1912/18 month [3] 1960/1 1974/12 1985/25 months [1] 1911/2 more [58] 1895/24
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<p>M</p> <p>more... [57] 1896/12 1897/9 1897/10 1899/21 1899/21 1901/9 1901/9 1902/14 1902/16 1902/19 1903/15 1904/12 1904/25 1906/15 1913/7 1913/21 1914/7 1916/3 1918/15 1918/16 1924/13 1926/14 1926/16 1927/15 1927/20 1928/3 1928/6 1929/12 1931/13 1931/21 1933/8 1935/2 1937/15 1940/13 1940/13 1941/5 1944/24 1947/12 1948/11 1950/11 1950/13 1951/18 1952/20 1952/25 1957/9 1960/21 1968/18 1969/17 1970/9 1977/6 1977/10 1982/14 1984/9 1986/23 1987/13 1987/13 1990/21</p> <p>morning [8] 1885/7 1895/9 1935/22 1936/18 1948/25 1965/1 1965/4 1965/6</p> <p>most [21] 1925/17 1928/9 1937/12 1939/20 1939/21 1941/4 1942/13 1943/18 1945/12 1950/8 1952/9 1952/13 1959/24 1961/20 1967/24 1970/6 1974/7 1976/3 1983/16 1984/1 1990/25</p> <p>motivate [2] 1905/4 1947/9</p> <p>motivated [1] 1966/9</p> <p>motivation [3] 1907/14 1966/13 1976/9</p> <p>move [4] 1897/8 1971/8 1977/17 1977/20</p> <p>Mozilla's [1] 1953/15</p> <p>Mr. [18] 1927/6 1936/9 1936/18 1936/25 1949/9 1949/12 1952/7 1954/6 1963/19 1965/6 1972/12 1981/11 1981/12 1991/11 1991/13 1991/16 1992/14 1993/1</p> <p>Mr. Barkey [2] 1981/12 1991/13</p> <p>Mr. Grushetsky [1] 1927/6</p> <p>Mr. Hoffman [1] 1949/9</p> <p>Mr. Weinberg [14] 1936/9 1936/18 1936/25 1949/12</p>	<p>1952/7 1954/6 1963/19 1965/6 1972/12 1981/11 1991/11 1991/16 1992/14 1993/1</p> <p>Ms. [1] 1924/11</p> <p>Ms. Murdock [1] 1924/11</p> <p>much [27] 1899/17 1906/8 1909/13 1915/13 1915/15 1916/8 1923/21 1925/5 1925/18 1925/18 1934/25 1935/16 1939/19 1940/23 1940/24 1952/10 1952/19 1958/5 1964/14 1967/9 1969/16 1969/17 1977/6 1977/21 1977/23 1978/16 1985/23</p> <p>multiple [11] 1901/15 1910/2 1933/8 1938/4 1959/1 1959/4 1959/6 1959/7 1960/1 1989/23 1990/7</p> <p>MUM [23] 1912/14 1912/16 1915/19 1915/22 1916/8 1916/23 1917/17 1917/25 1918/4 1918/14 1918/19 1918/21 1918/23 1919/9 1920/14 1920/21 1923/14 1923/16 1923/17 1930/21 1930/23 1931/18 1931/21</p> <p>Murdock [2] 1886/6 1924/11</p> <p>Murdock-Park [1] 1886/6</p> <p>music [2] 1976/22 1977/8</p> <p>my [19] 1903/25 1904/16 1911/9 1912/1 1923/1 1924/22 1927/14 1932/17 1934/24 1936/18 1964/22 1965/7 1965/16 1966/12 1968/20 1970/7 1977/15 1980/18 1982/10</p> <p>myself [2] 1966/11 1966/12</p>	<p>names [1] 1963/19</p> <p>naming [1] 1963/19</p> <p>natural [1] 1899/18</p> <p>nature [1] 1965/25</p> <p>navboost [24] 1898/12 1898/16 1898/19 1898/23 1899/18 1900/5 1901/15 1902/9 1902/19 1926/16 1926/19 1926/20 1927/15 1927/20 1928/9 1928/13 1928/15 1928/20 1928/21 1928/24 1929/8 1929/12 1929/15 1931/22</p> <p>near [1] 1928/18</p> <p>nearly [1] 1940/21</p> <p>Nebraska [1] 1965/2</p> <p>necessarily [1] 1952/10</p> <p>necessary [1] 1902/4</p> <p>need [15] 1895/17 1895/20 1896/18 1904/18 1904/18 1905/2 1906/25 1909/4 1918/6 1918/7 1918/10 1920/13 1934/20 1942/3 1969/7</p> <p>needed [3] 1912/2 1930/23 1931/18</p> <p>needing [1] 1929/24</p> <p>needs [2] 1933/8 1960/20</p> <p>negative [1] 1956/2</p> <p>negotiations [2] 1957/6 1992/13</p> <p>network [1] 1942/4</p> <p>never [6] 1913/19 1922/9 1975/15 1984/24 1987/24 1991/4</p> <p>Nevertheless [1] 1923/6</p> <p>new [16] 1886/19 1896/18 1898/3 1900/1 1900/9 1900/15 1914/19 1915/10 1920/5 1920/7 1923/5 1923/6 1947/8 1953/18 1953/18 1960/13</p> <p>news [6] 1901/5 1911/4 1939/7 1951/2 1976/21 1977/8</p> <p>next [17] 1909/18 1909/25 1910/22 1912/8 1917/19 1919/3 1920/16 1935/20 1935/24 1940/18 1974/23 1978/20 1980/20 1983/13 1988/12 1988/16 1989/25</p> <p>nice [3] 1901/3 1932/3 1933/5</p> <p>niche [1] 1966/25</p> <p>nitty [1] 1902/11</p> <p>nitty-gritty [1] 1902/11</p>	<p>no [32] 1885/4 1900/14 1904/18 1905/1 1917/8 1917/10 1918/25 1919/1 1919/1 1919/1 1922/9 1924/2 1924/12 1924/13 1924/13 1926/23 1931/11 1933/11 1935/8 1935/13 1942/21 1945/4 1945/11 1945/15 1953/7 1956/17 1956/18 1956/18 1957/4 1961/8 1977/17 1981/20</p> <p>non [3] 1957/16 1957/20 1987/10</p> <p>non-default [2] 1957/16 1957/20</p> <p>non-engineers [1] 1987/10</p> <p>nonintuitive [1] 1940/6</p> <p>nonstop [1] 1951/2</p> <p>nope [1] 1917/8</p> <p>normally [1] 1987/12</p> <p>not [70] 1895/19 1896/4 1899/11 1899/13 1901/14 1904/20 1906/25 1907/13 1909/13 1909/16 1911/18 1911/24 1913/22 1914/2 1916/19 1917/4 1918/7 1919/24 1925/12 1925/21 1926/19 1928/13 1929/5 1929/25 1932/10 1932/17 1934/18 1934/22 1938/4 1942/7 1942/21 1944/21 1946/1 1947/18 1948/12 1953/6 1953/17 1954/11 1955/18 1955/22 1956/5 1957/13 1957/22 1959/11 1959/17 1960/5 1960/6 1960/7 1960/22 1962/18 1964/5 1965/11 1966/7 1967/7 1967/23 1969/23 1970/19 1971/9 1974/1 1977/4 1981/24 1987/12 1987/21 1988/15 1989/6 1989/9 1989/12 1990/20 1992/11 1993/2</p> <p>notable [3] 1923/23 1975/1 1979/24</p> <p>notably [1] 1939/20</p> <p>notes [3] 1895/18 1989/25 1991/19</p> <p>nothing [2] 1953/2 1960/18</p> <p>noticing [2] 1911/4 1912/25</p> <p>notion [3] 1897/6 1905/6 1945/18</p>	<p>nouns [1] 1913/1</p> <p>November [1] 1923/14</p> <p>now [28] 1896/1 1900/6 1900/22 1923/18 1924/19 1930/14 1930/21 1939/9 1947/3 1948/15 1950/22 1952/5 1954/6 1957/14 1959/17 1961/2 1963/19 1967/15 1970/6 1972/16 1974/24 1980/2 1982/9 1983/4 1984/7 1986/3 1990/3 1991/11</p> <p>nuances [2] 1958/18 1960/8</p> <p>number [24] 1895/10 1895/15 1895/22 1897/24 1898/24 1898/24 1898/25 1898/25 1899/1 1903/1 1920/19 1920/20 1920/24 1921/1 1921/4 1947/18 1947/21 1947/22 1948/9 1949/25 1955/12 1968/11 1983/5 1983/14</p> <p>numbers [1] 1919/13</p> <p>NW [4] 1886/3 1886/7 1887/3 1887/12</p> <p>NY [1] 1886/19</p>
O				
				<p>oath [1] 1936/7</p> <p>object [2] 1935/9 1992/1</p> <p>objection [10] 1917/1 1917/5 1917/8 1917/8 1917/10 1975/20 1981/16 1981/20 1988/21 1991/25</p> <p>observations [1] 1904/11</p> <p>observe [5] 1904/10 1904/14 1908/2 1928/15 1929/9</p> <p>observed [1] 1950/10</p> <p>observer [1] 1940/21</p> <p>obstacle [1] 1964/15</p> <p>obstacles [1] 1964/9</p> <p>obtains [1] 1897/17</p> <p>obvious [2] 1895/19 1904/20</p> <p>occur [1] 1974/5</p> <p>October [4] 1974/14 1974/25 1975/18 1978/8</p> <p>off [9] 1898/15 1910/21 1916/5 1923/5 1949/12 1951/1 1952/18 1955/17 1972/12</p> <p>offer [8] 1921/13 1945/2 1945/9 1945/12 1952/13 1953/22 1986/22 1986/23</p> <p>offered [5] 1955/8</p>

<p>O</p> <p>offered... [4] 1979/5 1979/12 1979/17 1992/22</p> <p>offering [3] 1992/11 1992/17 1992/18</p> <p>offers [5] 1945/3 1945/6 1945/7 1945/10 1945/14</p> <p>office [1] 1991/6</p> <p>Official [1] 1887/11</p> <p>often [8] 1901/5 1913/2 1929/4 1929/6 1947/7 1948/2 1970/23 1980/10</p> <p>oftentimes [1] 1954/10</p> <p>oh [3] 1925/11 1938/1 1965/10</p> <p>okay [40] 1914/5 1917/9 1918/2 1925/12 1930/3 1930/4 1930/19 1931/16 1935/14 1936/2 1938/1 1938/16 1940/2 1947/2 1949/19 1953/12 1953/19 1953/24 1957/15 1964/20 1964/25 1972/10 1974/11 1978/7 1981/19 1981/23 1982/12 1983/12 1983/19 1985/4 1986/2 1986/8 1988/7 1988/17 1990/4 1990/13 1991/8 1991/10 1991/22 1992/6</p> <p>old [4] 1900/18 1900/20 1901/2 1901/6</p> <p>older [1] 1896/17</p> <p>once [4] 1901/18 1968/1 1974/15 1980/22</p> <p>one [72] 1895/14 1895/18 1897/6 1897/22 1897/23 1899/7 1899/7 1899/16 1900/2 1900/17 1901/7 1901/8 1901/18 1901/23 1905/3 1906/15 1907/8 1910/3 1911/8 1912/19 1913/14 1916/19 1916/25 1919/20 1922/19 1922/24 1924/13 1924/16 1926/14 1929/3 1930/2 1930/3 1933/15 1935/1 1938/4 1938/14 1938/22 1939/3 1939/11 1939/13 1940/16 1940/17 1944/17 1947/18 1947/21 1947/25 1948/1 1951/9 1953/4 1957/24 1957/25 1959/4 1959/9 1960/6 1961/2 1961/5 1962/10 1965/22 1966/1</p>	<p>1967/23 1968/3 1968/21 1968/21 1974/8 1976/7 1977/2 1979/17 1981/1 1984/1 1987/3 1987/4 1991/7</p> <p>one's [1] 1913/20</p> <p>one-half [2] 1940/16 1940/17</p> <p>ones [6] 1896/18 1901/9 1916/15 1942/16 1967/16 1970/13</p> <p>online [7] 1937/20 1943/10 1943/16 1948/3 1952/19 1953/1 1954/13</p> <p>only [7] 1898/18 1907/13 1910/17 1946/4 1948/12 1957/12 1969/6</p> <p>open [6] 1895/7 1936/1 1964/22 1964/23 1966/23 1979/16</p> <p>OpenAI [1] 1923/23</p> <p>opened [1] 1951/22</p> <p>operate [1] 1901/15</p> <p>operates [1] 1953/20</p> <p>operating [5] 1939/11 1959/5 1960/11 1960/25 1984/12</p> <p>opportunity [3] 1903/10 1903/11 1933/6</p> <p>opposed [1] 1985/8</p> <p>opt [1] 1992/10</p> <p>opt-in [1] 1992/10</p> <p>option [9] 1956/24 1957/16 1957/21 1958/1 1958/4 1961/10 1972/22 1973/1 1976/19</p> <p>options [3] 1945/13 1947/16 1978/10</p> <p>order [3] 1918/19 1920/13 1959/17</p> <p>orders [1] 1933/8</p> <p>organic [2] 1971/3 1971/4</p> <p>organization [3] 1904/21 1905/23 1906/1</p> <p>organizations [1] 1905/10</p> <p>organize [1] 1990/16</p> <p>orient [1] 1917/16</p> <p>original [1] 1975/9</p> <p>originally [2] 1939/14 1986/20</p> <p>OS [1] 1984/12</p> <p>other [41] 1895/16 1899/12 1899/13 1900/19 1914/13 1915/19 1925/1 1930/7 1931/13 1934/3 1934/7 1937/19 1937/20 1939/2 1939/20 1939/22 1941/7 1942/8 1942/15 1943/19</p>	<p>1945/5 1945/21 1946/1 1947/16 1950/23 1952/3 1957/10 1959/13 1960/8 1962/25 1968/5 1968/17 1970/8 1970/16 1975/6 1975/6 1976/9 1980/9 1980/12 1986/16 1993/2</p> <p>others [2] 1900/16 1900/16</p> <p>otherwise [5] 1905/9 1911/13 1928/4 1958/2 1970/21</p> <p>our [67] 1899/12 1901/1 1901/24 1902/2 1903/25 1904/19 1907/25 1908/3 1910/11 1917/3 1922/7 1923/6 1933/5 1933/6 1933/8 1934/17 1935/24 1937/12 1937/16 1937/17 1938/3 1941/9 1942/13 1942/14 1944/7 1944/22 1946/23 1948/11 1948/25 1953/22 1953/23 1953/23 1957/6 1959/24 1959/25 1961/3 1961/4 1961/4 1962/19 1963/25 1967/15 1973/7 1973/8 1973/16 1973/17 1974/7 1974/22 1976/2 1976/5 1976/16 1976/17 1977/8 1978/14 1980/9 1980/12 1980/18 1981/8 1981/9 1982/21 1983/16 1984/18 1985/23 1986/25 1987/4 1991/5 1991/6 1992/24</p> <p>ourselves [6] 1939/21 1941/5 1946/22 1966/5 1966/7 1969/9</p> <p>out [24] 1902/18 1906/25 1910/11 1911/18 1911/19 1920/19 1923/4 1924/19 1925/17 1927/12 1945/21 1945/23 1948/15 1951/23 1952/2 1955/11 1974/17 1978/17 1987/25 1988/1 1988/4 1988/16 1992/7 1992/22</p> <p>outperformed [1] 1921/23</p> <p>outputs [1] 1919/18</p> <p>outside [4] 1922/25 1923/21 1926/19 1969/25</p> <p>over [22] 1896/5 1897/24 1898/6 1912/2 1921/14 1921/21</p>	<p>1921/24 1922/6 1922/20 1925/2 1929/1 1934/14 1937/14 1945/17 1946/14 1950/7 1950/21 1950/21 1952/25 1966/18 1977/17 1984/12</p> <p>overall [4] 1942/23 1944/25 1969/20 1977/11</p> <p>own [11] 1908/3 1916/6 1939/5 1941/19 1946/23 1957/3 1962/21 1965/23 1966/12 1969/1 1969/22</p> <hr/> <p>P</p> <p>P. [1] 1949/6</p> <p>p.m [2] 1993/7 1993/7</p> <p>page [45] 1896/3 1899/14 1902/21 1903/16 1904/1 1904/5 1904/10 1904/12 1904/18 1906/2 1906/10 1906/24 1907/1 1907/18 1907/23 1908/7 1908/16 1909/2 1909/3 1910/8 1911/14 1914/1 1920/20 1922/19 1926/7 1926/8 1927/2 1929/19 1930/5 1940/8 1940/9 1940/12 1941/2 1969/1 1969/4 1969/7 1969/12 1970/9 1974/2 1983/4 1983/13 1983/15 1983/20 1990/8 1992/9</p> <p>page 1 [1] 1992/9</p> <p>page 3 [1] 1983/4</p> <p>pages [7] 1900/21 1900/22 1910/18 1925/10 1928/19 1940/21 1940/23</p> <p>paid [1] 1923/5</p> <p>pair [1] 1956/4</p> <p>pairing [1] 1956/13</p> <p>pairs [2] 1934/11 1954/18</p> <p>pandemic [1] 1951/1</p> <p>panel [1] 1946/20</p> <p>Paoli [1] 1937/7</p> <p>paper [1] 1955/11</p> <p>paragraph [5] 1914/6 1922/19 1922/22 1926/13 1992/9</p> <p>parallel [2] 1931/9 1931/13</p> <p>park [3] 1886/6 1886/9 1974/9</p> <p>part [9] 1927/20 1956/8 1962/17 1962/17 1966/13 1969/11 1976/8 1976/17 1980/21</p> <p>participate [2] 1957/9</p>	<p>1957/14</p> <p>participated [1] 1990/11</p> <p>particular [10] 1896/3 1896/3 1903/25 1919/14 1919/16 1944/3 1956/9 1976/11 1976/21 1977/25</p> <p>particularly [3] 1902/1 1912/18 1914/14</p> <p>parties [1] 1971/10</p> <p>partly [1] 1968/16</p> <p>partner [1] 1973/16</p> <p>partnered [1] 1966/4</p> <p>partners [1] 1939/23</p> <p>partnership [1] 1976/18</p> <p>parts [3] 1927/7 1927/8 1927/12</p> <p>party [1] 1981/10</p> <p>pass [1] 1923/24</p> <p>passage [7] 1909/2 1909/6 1910/8 1910/17 1919/23 1919/24 1934/11</p> <p>past [9] 1898/13 1922/17 1923/3 1928/16 1928/19 1929/1 1930/11 1930/15 1948/24</p> <p>patch [1] 1896/16</p> <p>path [1] 1923/17</p> <p>patterns [7] 1896/25 1897/8 1912/23 1913/4 1913/7 1913/11 1913/17</p> <p>PATTERSON [1] 1886/17</p> <p>pause [4] 1914/9 1971/19 1971/23 1972/7</p> <p>pbwt.com [1] 1886/20</p> <p>PC [1] 1923/20</p> <p>Pennsylvania [1] 1937/7</p> <p>people [98] 1897/2 1897/4 1899/7 1899/9 1900/4 1900/10 1903/12 1903/13 1903/15 1904/2 1904/8 1904/9 1904/16 1904/21 1904/24 1904/25 1905/4 1905/10 1908/2 1908/6 1908/23 1909/13 1911/13 1911/16 1913/3 1913/6 1913/12 1913/21 1914/11 1914/12 1914/12 1914/13 1914/13 1915/3 1916/21 1926/10 1926/11 1928/25 1929/4 1930/6 1930/16 1934/11 1937/21 1938/9 1938/23 1939/3 1941/16 1944/16 1944/18 1944/20</p>
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P	picture [3] 1899/16 1925/15 1992/13	positive [7] 1926/17 1927/15 1927/21 1928/7 1928/9 1929/12 1929/16	1941/3 1945/22 1948/19 1955/10 1964/6 1964/14 1966/1 1966/25 1976/15 1985/23 1988/14	1972/18 1973/5 1976/8 1976/13 1976/14 1976/14 1977/24 1978/10 1979/2 1979/2 1979/15 1979/15 1979/16 1979/18 1984/2 1984/4 1984/10 1984/10 1984/11 1984/11 1984/19 1984/20 1984/20 1985/12 1985/20 1986/15 1986/24 1987/3 1987/3 1987/3 1987/5 1992/10
people... [48] 1945/23 1946/1 1946/24 1947/18 1948/2 1948/3 1948/3 1948/4 1948/10 1950/8 1950/14 1950/18 1955/14 1955/17 1955/18 1955/20 1955/23 1955/23 1955/24 1956/1 1957/23 1958/10 1958/14 1958/16 1959/6 1959/23 1960/3 1962/19 1962/19 1966/6 1967/8 1968/2 1968/6 1969/15 1969/16 1970/22 1973/10 1973/12 1975/16 1978/3 1978/18 1980/10 1980/14 1988/14 1989/23 1990/9 1990/11 1990/24	pictures [1] 1944/17	possibility [1] 1908/22	Prettyman [1] 1887/11	probability [1] 1898/3
per [3] 1918/13 1957/9 1959/7	piece [3] 1940/6 1984/5 1990/15	possibly [1] 1907/5	prevent [1] 1953/2	probably [6] 1907/17 1910/21 1925/21 1942/16 1946/13 1946/14
perceived [1] 1969/17	pieces [1] 1910/21	potentially [2] 1980/20 1985/1	preview [1] 1908/7	problem [8] 1900/12 1906/24 1907/10 1907/13 1907/22 1920/5 1921/22 1922/10
percent [9] 1901/25 1942/24 1947/6 1947/21 1947/22 1947/23 1948/19 1949/17 1955/14	pitch [13] 1938/3 1964/1 1964/2 1964/6 1972/20 1974/4 1974/22 1976/2 1976/4 1976/6 1976/17 1977/9 1977/22	power [1] 1926/20	previews [1] 1904/13	procedure [1] 1919/15
percentage [5] 1898/14 1942/22 1942/25 1944/10 1961/16	pitched [4] 1963/21 1972/13 1976/21 1977/16	powerful [5] 1907/9 1914/7 1916/3 1926/15 1958/13	previous [1] 1922/12	proceed [2] 1936/11 1971/17
perfectly [2] 1902/4 1916/22	pitching [1] 1973/4	Prabhakar [1] 1912/17	previously [3] 1897/21 1928/7 1976/7	proceedings [4] 1885/9 1887/14 1889/2 1994/4
perform [2] 1918/15 1920/7	place [8] 1907/7 1907/13 1969/12 1974/6 1974/7 1974/7 1974/10 1974/13	practice [3] 1940/22 1990/2 1990/3	PRISM [1] 1951/10	process [3] 1919/10 1919/16 1957/4
performance [4] 1915/6 1915/14 1915/20 1916/11	placed [1] 1936/7	practices [1] 1922/6	privacy [81] 1937/10 1937/15 1937/19 1942/8 1942/9 1943/6 1944/20 1945/2 1945/6 1945/7 1945/10 1945/13 1945/13 1946/9 1946/12 1947/7 1947/14 1947/20 1948/7 1948/8 1948/12 1948/19 1949/14 1949/18 1949/21 1949/22 1949/25 1950/7 1950/11 1950/20 1951/2 1952/4 1952/6 1952/8 1952/10 1952/11 1952/13 1952/13 1952/25 1953/2 1953/5 1953/5 1953/6 1953/7 1953/10 1953/21 1953/22 1953/23 1953/25 1954/3 1954/4 1954/7 1954/17 1954/18 1954/22 1955/7 1955/8 1955/19 1956/4 1956/14 1956/14 1958/11 1961/12 1962/10 1962/11 1964/5 1964/13 1970/15 1973/11 1973/20 1975/16 1980/11 1980/12 1980/25 1983/18 1985/9 1986/14 1986/16 1986/21 1986/23 1986/23	processes [1] 1913/12
performing [1] 1915/7	places [2] 1952/3 1966/6	Prakash [2] 1982/21 1982/23	private [52] 1937/12 1937/18 1941/10 1945/5 1952/18 1952/21 1953/11 1953/18 1953/18 1954/4 1954/8 1954/13 1954/23 1955/21 1956/5 1956/11 1956/19 1963/22 1964/6 1972/14	processing [1] 1897/24
performs [1] 1946/18	plaintiff [3] 1886/10 1936/14 1965/2	Prakash's [1] 1982/23	produced [2] 1887/14 1986/16	production [1] 1912/15
period [2] 1950/7 1962/3	PLAINTIFF's [3] 1888/5 1888/15 1982/4	precise [1] 1947/12	produces [1] 1897/20	products [5] 1920/22 1938/4 1943/19 1943/25 1959/15
periodically [1] 1905/22	plaintiffs [6] 1885/4 1886/2 1895/10 1916/25 1935/20 1992/2	precision [2] 1926/17 1927/16	product [8] 1937/15 1937/16 1938/5 1954/2 1962/10 1962/12 1973/17 1979/9	profession [1] 1982/13
periods [1] 1961/23	platform [1] 1966/23	precision/utility [2] 1926/17 1927/16	professional [1] 1946/24	professional [1] 1946/24
permanent [1] 1990/21	plausible [1] 1899/12	predictive [1] 1929/1	profile [7] 1943/16 1944/6 1944/7 1945/19 1945/21 1951/20 1955/1	profile [7] 1943/16 1944/6 1944/7 1945/19 1945/21 1951/20 1955/1
person [6] 1899/7 1935/1 1935/2 1944/18 1975/8 1989/22	played [1] 1908/1	prefer [2] 1956/4 1976/25	profiling [2] 1941/11 1944/12	profiling [2] 1941/11 1944/12
personal [2] 1954/19 1988/25	player [1] 1900/7	preference [3] 1947/6 1948/20 1949/18	profits [1] 1957/9	profits [1] 1957/9
perspective [2] 1944/7 1976/16	pleasant [1] 1944/24	prepares [1] 1985/24 1989/16	program [1] 1974/20	program [1] 1974/20
phone [4] 1959/2 1984/6 1984/8 1984/15	please [7] 1922/23 1924/12 1936/5 1936/22 1943/8 1949/7 1971/10	prepared [4] 1981/5 1983/1 1985/18 1990/14	programming [3] 1967/3 1967/3 1967/4	programming [3] 1967/3 1967/3 1967/4
phrase [2] 1927/11 1927/11	plus [3] 1913/16 1913/16 1960/21	preparing [1] 1990/5	programs [2] 1951/8 1951/9	programs [2] 1951/8 1951/9
pick [4] 1910/23 1947/8 1947/18 1947/20	point [20] 1904/7 1908/25 1910/19 1910/22 1912/1 1922/9 1926/11 1927/12 1927/23 1933/18 1933/24 1934/2 1947/25 1955/15 1957/6 1960/13 1970/5 1980/18 1992/6 1992/17	present [1] 1986/14	progress [3] 1914/15 1914/21 1978/18	progress [3] 1914/15 1914/21 1978/18
picked [1] 1980/2	Pokémon [2] 1967/5 1967/6	presentation [22] 1903/8 1903/24 1904/17 1905/1 1905/21 1905/25 1906/11 1906/16 1906/18 1907/12 1907/24 1908/21 1912/16 1932/24 1979/5 1981/5 1981/7 1983/1 1983/10 1984/22 1985/17 1990/12	project [3] 1924/19	project [3] 1924/19

<p>P</p> <p>project... [2] 1973/23 1990/16</p> <p>promote [1] 1901/16</p> <p>prompted [1] 1965/9</p> <p>pronounce [1] 1982/24</p> <p>properties [1] 1962/25</p> <p>proposal [4] 1964/8 1984/22 1984/23 1988/10</p> <p>propose [1] 1985/7</p> <p>proposed [2] 1972/17 1984/25</p> <p>proposition [2] 1941/25 1962/11</p> <p>protect [2] 1937/19 1943/11</p> <p>protection [5] 1886/12 1952/11 1952/13 1953/5 1986/24</p> <p>protections [5] 1937/19 1953/23 1954/5 1955/7 1986/21</p> <p>protocol [1] 1981/9</p> <p>provide [2] 1952/5 1952/6</p> <p>provided [1] 1934/22</p> <p>provides [1] 1952/10</p> <p>proxy [4] 1904/8 1908/2 1908/23 1968/17</p> <p>pull [1] 1931/7</p> <p>purchase [1] 1943/20</p> <p>purportedly [1] 1992/4</p> <p>purpose [2] 1951/20 1990/5</p> <p>push [1] 1974/3</p> <p>put [22] 1900/4 1902/21 1903/16 1905/18 1910/6 1921/6 1929/17 1930/20 1938/25 1941/2 1948/10 1953/5 1955/11 1957/3 1969/12 1969/13 1969/15 1976/16 1983/9 1983/16 1985/4 1987/23</p> <p>puts [1] 1945/20</p> <p>putting [1] 1966/16</p>	<p>1898/18 1898/20 1898/23 1898/24 1898/25 1899/17 1902/10 1902/10 1902/13 1902/16 1959/11</p> <p>query [16] 1896/3 1897/19 1898/3 1899/1 1899/6 1904/10 1906/25 1907/1 1907/23 1918/23 1919/23 1919/24 1934/11 1969/21 1969/24 1970/8</p> <p>question [22] 1896/20 1899/22 1900/11 1901/11 1924/14 1924/16 1927/8 1927/14 1930/25 1933/16 1934/20 1935/4 1935/13 1947/3 1947/8 1947/13 1949/13 1953/13 1963/4 1968/21 1968/22 1985/5</p> <p>questions [12] 1895/11 1913/18 1924/3 1933/11 1933/15 1935/6 1935/10 1935/13 1964/21 1964/23 1968/20 1978/4</p> <p>quickly [4] 1900/15 1900/18 1901/20 1924/4</p> <p>quite [4] 1896/18 1907/21 1913/23 1922/2</p> <p>quixotic [1] 1964/18</p> <p>quote [1] 1989/7</p>	<p>1904/9 1904/9 1907/2 1907/11 1907/25 1908/1 1908/6 1908/7 1908/23 1908/23 1912/19 1922/22</p> <p>reading [4] 1915/11 1916/20 1918/9 1920/19</p> <p>reads [2] 1916/11 1917/17</p> <p>ready [7] 1912/3 1912/14 1924/14 1935/20 1949/9 1972/6 1972/9</p> <p>real [4] 1909/16 1952/25 1959/14 1959/15</p> <p>reality [1] 1940/13</p> <p>really [43] 1903/12 1904/13 1905/11 1907/9 1907/25 1908/9 1919/20 1922/3 1924/22 1927/10 1928/25 1939/10 1939/11 1941/25 1942/13 1942/21 1943/13 1944/17 1946/11 1946/13 1950/14 1950/17 1950/20 1950/23 1951/1 1957/5 1957/12 1959/14 1964/5 1964/6 1965/21 1965/23 1966/20 1967/5 1973/8 1974/4 1975/4 1979/7 1980/19 1986/12 1987/21 1988/5 1990/18</p> <p>Realtime [1] 1887/10</p> <p>reason [7] 1903/18 1928/13 1940/15 1950/8 1956/9 1966/11 1980/21</p> <p>reasonable [1] 1898/5</p> <p>reasoning [3] 1918/10 1918/16 1919/11</p> <p>reasons [3] 1950/5 1977/1 1990/7</p> <p>recall [4] 1955/14 1975/1 1975/17 1986/10</p> <p>received [2] 1917/12 1982/4</p> <p>receives [1] 1968/25</p> <p>recent [1] 1901/9</p> <p>recess [4] 1949/3 1949/4 1993/6 1993/7</p> <p>recite [1] 1948/5</p> <p>recognize [5] 1982/16 1983/7 1983/15 1983/22 1991/16</p> <p>recommending [1] 1960/1</p> <p>record [2] 1990/21 1994/3</p> <p>recorded [2] 1887/14 1930/16</p> <p>recording [1] 1943/13</p>	<p>RECCROSS [1] 1888/4</p> <p>redacted [1] 1932/18</p> <p>redirect [5] 1888/4 1924/9 1926/2 1933/14 1935/9</p> <p>reduce [2] 1896/15 1931/2</p> <p>refer [1] 1939/3</p> <p>reference [4] 1918/17 1920/8 1920/20 1953/9</p> <p>referenced [4] 1898/17 1951/4 1951/14 1966/3</p> <p>references [1] 1981/3</p> <p>referencing [1] 1983/25</p> <p>referred [3] 1965/17 1969/25 1970/21</p> <p>referring [7] 1933/19 1934/15 1934/16 1950/6 1971/2 1988/20 1989/10</p> <p>refers [3] 1919/3 1934/8 1935/5</p> <p>reflect [2] 1913/4 1922/1</p> <p>regard [1] 1918/4</p> <p>regarding [1] 1955/7</p> <p>regards [1] 1967/18</p> <p>Registered [1] 1887/10</p> <p>regular [2] 1956/19 1971/1</p> <p>regularly [2] 1948/6 1959/16</p> <p>reinforce [1] 1983/17</p> <p>related [1] 1920/21</p> <p>relating [1] 1944/4</p> <p>relationship [3] 1895/14 1901/8 1924/20</p> <p>relationships [2] 1900/20 1900/22</p> <p>relative [2] 1898/19 1946/1</p> <p>release [3] 1932/16 1980/20 1987/21</p> <p>released [1] 1951/6</p> <p>releasing [1] 1974/17</p> <p>relevance [1] 1923/8</p> <p>relevancy [1] 1969/11</p> <p>relevant [11] 1900/10 1902/3 1907/1 1907/23 1919/23 1919/24 1925/11 1925/12 1935/10 1950/11 1951/9</p> <p>reliance [1] 1925/1</p> <p>rely [1] 1992/2</p> <p>remaining [1] 1946/4</p> <p>remedy [1] 1957/3</p> <p>remember [9] 1895/12 1904/7 1974/12 1975/7 1975/15 1977/22 1979/24 1980/14 1987/8</p> <p>remembers [1] 1896/2</p> <p>remind [1] 1920/17</p> <p>repertoire [1] 1931/2</p> <p>replaced [2] 1923/10</p>	<p>1925/21</p> <p>replacement [1] 1937/17</p> <p>Reporter [4] 1887/9 1887/10 1887/10 1887/11</p> <p>reporting [1] 1960/4</p> <p>represent [1] 1936/19</p> <p>requesting [1] 1951/10</p> <p>require [3] 1896/19 1925/18 1985/7</p> <p>required [1] 1931/3</p> <p>requires [1] 1925/16</p> <p>requiring [1] 1919/4</p> <p>research [7] 1909/12 1916/6 1944/21 1946/12 1947/1 1964/1 1976/8</p> <p>researchers [4] 1915/24 1916/5 1916/9 1951/19</p> <p>reset [4] 1923/3 1960/12 1960/13 1960/15</p> <p>resets [1] 1960/10</p> <p>resetting [1] 1958/7</p> <p>resolution [1] 1925/15</p> <p>resolve [1] 1988/15</p> <p>resources [3] 1907/14 1933/9 1941/21</p> <p>respect [4] 1898/10 1898/18 1931/22 1941/17</p> <p>respond [2] 1896/10 1900/15</p> <p>responding [1] 1926/12</p> <p>responds [1] 1900/17</p> <p>response [3] 1901/20 1912/7 1973/7</p> <p>responses [3] 1930/11 1930/11 1930/16</p> <p>rest [4] 1926/18 1927/17 1947/23 1978/18</p> <p>result [6] 1899/7 1899/8 1904/13 1931/7 1942/5 1969/7</p> <p>results [50] 1899/12 1901/16 1903/20 1903/21 1904/1 1904/1 1904/9 1904/17 1908/6 1908/8 1921/22 1928/2 1928/4 1928/6 1928/6 1928/10 1929/1 1929/5 1929/5 1929/8 1929/9 1929/11 1931/12 1934/18 1935/1 1938/17 1938/25 1940/4 1940/4 1940/8 1942/6 1944/5 1944/6 1944/9 1945/18 1945/21 1945/24 1947/14 1947/17 1947/22 1955/2 1959/7 1959/25 1966/13 1966/17 1968/25 1969/1 1969/3 1970/2</p>
<p>Q</p> <p>QBST [2] 1918/8 1931/23</p> <p>qualify [1] 1992/23</p> <p>qualitative [2] 1913/21 1968/6</p> <p>qualitatively [1] 1902/13</p> <p>quality [10] 1898/11 1908/8 1911/5 1929/5 1929/14 1968/12 1968/24 1968/24 1969/18 1969/20</p> <p>quantities [1] 1896/11</p> <p>quarter [1] 1905/24</p> <p>queries [14] 1897/24 1897/25 1898/13</p>	<p>R</p> <p>Raghavan [1] 1912/17</p> <p>raise [1] 1936/6</p> <p>Ralph [1] 1886/13</p> <p>ramifications [1] 1954/17</p> <p>range [4] 1955/25 1956/1 1960/2 1968/9</p> <p>rank [1] 1916/1</p> <p>ranking [12] 1895/11 1895/15 1903/21 1904/5 1906/5 1926/18 1927/17 1927/24 1928/2 1929/22 1931/22 1934/25</p> <p>rare [2] 1903/11 1970/9</p> <p>rated [1] 1935/5</p> <p>rather [2] 1908/22 1941/19</p> <p>raw [2] 1919/5 1923/11</p> <p>re [1] 1935/9</p> <p>re-redirect [1] 1935/9</p> <p>reach [1] 1956/21</p> <p>reaching [1] 1916/11</p> <p>reactions [3] 1904/11 1908/2 1930/15</p> <p>read [13] 1904/8</p>			

R	Safari's [3] 1972/18 1978/10 1985/20 safe [1] 1935/17 said [9] 1903/6 1927/14 1932/16 1935/2 1953/20 1960/9 1975/24 1979/15 1988/8 salient [1] 1950/7 Sallet [1] 1886/11 same [17] 1895/23 1897/5 1897/6 1916/18 1916/23 1928/25 1937/25 1938/1 1938/2 1939/19 1948/18 1953/13 1977/3 1977/4 1977/8 1983/16 1990/8 satisfied [1] 1934/22 satisfy [1] 1965/7 saw [3] 1920/18 1964/11 1975/15 say [51] 1897/1 1898/2 1901/6 1905/1 1905/7 1909/11 1909/13 1912/10 1925/11 1927/10 1928/7 1933/18 1939/8 1939/24 1942/1 1944/16 1944/19 1946/12 1948/3 1948/10 1948/18 1950/14 1950/24 1952/9 1953/3 1953/25 1958/9 1959/3 1959/9 1960/5 1960/7 1960/19 1962/5 1962/9 1969/10 1969/19 1970/4 1970/7 1970/15 1970/18 1978/12 1978/21 1979/2 1979/7 1980/5 1980/9 1982/23 1984/24 1987/13 1988/1 1991/2 saying [10] 1907/19 1908/25 1915/1 1918/12 1927/7 1934/6 1955/15 1958/12 1965/21 1970/12 says [10] 1913/16 1916/10 1927/3 1928/21 1930/10 1933/3 1933/24 1934/2 1982/20 1984/18 scale [2] 1931/4 1946/15 scaled [1] 1916/8 scenes [1] 1953/1 Schmidtlein [1] 1887/2 school [3] 1900/18 1901/2 1913/15 scientific [1] 1907/10 score [4] 1899/20 1915/1 1916/22 1916/22 scores [3] 1902/15 1902/19 1916/4 scoring [1] 1915/14 scraps [2] 1899/2	1902/17 screen [13] 1902/21 1903/14 1956/24 1957/3 1981/13 1981/18 1982/7 1983/8 1984/6 1984/8 1984/16 1984/18 1991/12 screens [1] 1979/10 scroll [1] 1922/18 SEALED [3] 1885/3 1889/2 1971/12 seamless [2] 1977/3 1977/6 search [186] searcher [1] 1930/10 searches [5] 1938/11 1949/25 1950/3 1955/21 1970/6 searching [1] 1954/22 seat [1] 1936/5 seated [1] 1949/7 second [10] 1912/12 1914/9 1915/2 1932/13 1943/13 1948/1 1960/25 1976/17 1976/23 1977/21 secret [1] 1951/7 secrets [1] 1913/25 section [5] 1886/12 1902/23 1914/1 1926/25 1929/22 secure [1] 1945/13 see [25] 1897/1 1897/25 1899/14 1916/13 1920/19 1920/22 1921/16 1927/2 1928/21 1929/3 1929/23 1930/8 1932/25 1940/16 1952/23 1959/23 1976/25 1979/7 1981/17 1981/18 1982/3 1982/9 1990/22 1991/8 1993/3 seeing [4] 1911/16 1959/19 1968/3 1968/7 seem [4] 1899/12 1905/9 1927/9 1987/8 seemed [1] 1913/10 seems [3] 1921/1 1923/16 1923/25 seen [16] 1898/3 1898/13 1898/14 1898/18 1898/20 1898/24 1898/25 1899/1 1902/14 1913/19 1921/22 1921/23 1922/10 1923/20 1989/4 1989/9 segment [1] 1959/24 segmented [1] 1976/11 selects [1] 1945/12 send [2] 1981/6 1981/9 sends [1] 1970/13 senior [3] 1903/15 1912/18 1975/9 sense [1] 1927/12	sent [4] 1922/1 1926/8 1926/24 1982/21 sentence [1] 1916/10 sentences [1] 1909/3 separate [1] 1956/18 September [10] 1885/5 1974/18 1986/1 1986/3 1986/11 1987/16 1989/15 1989/17 1991/20 1994/7 September 2018 [2] 1987/16 1989/17 serious [2] 1946/13 1980/19 service [1] 1948/8 services [1] 1943/24 serving [1] 1933/7 session [8] 1885/7 1936/1 1936/1 1949/6 1963/20 1964/24 1971/9 1971/12 set [10] 1914/16 1914/17 1915/10 1921/15 1954/7 1954/18 1955/8 1958/1 1965/23 1985/9 setting [6] 1956/18 1961/1 1961/5 1979/20 1984/13 1984/17 settings [2] 1954/3 1957/23 seven [1] 1959/3 several [10] 1914/17 1926/10 1927/19 1934/3 1937/14 1945/17 1948/10 1972/23 1979/6 1979/12 share [1] 1942/22 she's [1] 1900/6 shift [1] 1924/25 shock [3] 1910/1 1918/25 1922/3 shocking [1] 1989/5 short [1] 1910/7 Shortly [1] 1973/3 shot [4] 1919/3 1920/8 1920/10 1920/10 should [8] 1899/10 1901/23 1902/23 1918/15 1931/8 1964/5 1969/13 1982/2 show [8] 1908/2 1908/5 1908/8 1932/18 1934/17 1934/19 1948/14 1992/14 showed [3] 1926/5 1929/19 1951/7 showing [2] 1895/21 1948/19 shown [2] 1895/21 1947/4 shows [1] 1947/5 side [2] 1939/1 1978/1 sides [1] 1907/8 signal [2] 1904/4 1926/14 signed [2] 1945/23	1945/25 signed-in [1] 1945/25 significant [1] 1933/20 significantly [3] 1911/7 1914/7 1916/3 silence [1] 1977/18 silences [1] 1977/19 similar [4] 1933/4 1941/24 1945/25 1962/23 similarly [2] 1923/8 1983/17 simple [2] 1900/14 1912/25 simply [2] 1901/14 1911/20 since [10] 1911/7 1933/13 1935/9 1938/24 1946/13 1948/16 1950/9 1952/1 1963/10 1991/7 single [1] 1900/14 Siri [1] 1975/14 site [3] 1941/9 1968/16 1968/19 sitting [1] 1965/8 situations [3] 1896/7 1896/8 1898/14 six [1] 1909/22 slide [11] 1905/20 1906/15 1906/16 1908/17 1917/15 1917/16 1917/19 1917/23 1920/16 1920/18 1929/20 slowly [1] 1950/21 small [7] 1898/24 1898/25 1899/1 1910/17 1923/7 1959/10 1961/18 smart [1] 1927/10 Smurzynski [2] 1887/2 1887/6 Snowden [4] 1950/15 1950/16 1951/4 1951/6 so [290] so I think [12] 1896/10 1896/14 1897/18 1899/18 1909/13 1910/19 1923/20 1925/14 1927/23 1934/5 1934/8 1958/18 so it's [7] 1912/22 1963/14 1969/22 1971/16 1973/12 1977/5 1990/23 So this case [1] 1977/20 So this document [1] 1933/22 so this is [6] 1900/11 1906/19 1907/20 1912/13 1921/21 1980/21 social [1] 1947/15 software [2] 1990/15 1990/15 some [59] 1895/15
S	Safari [8] 1953/10 1972/23 1975/11 1980/4 1981/2 1984/17 1984/21 1986/15			

S	1986/6 1988/21 sort [43] 1895/19 1897/4 1897/4 1897/7 1897/18 1897/25 1898/7 1899/14 1899/16 1900/18 1901/4 1901/9 1901/19 1902/11 1903/13 1904/8 1904/16 1904/24 1905/6 1905/9 1906/19 1908/14 1910/16 1911/20 1912/8 1912/10 1912/10 1912/12 1912/13 1912/14 1913/4 1913/14 1914/4 1914/25 1915/2 1916/1 1916/5 1917/25 1918/10 1919/8 1922/10 1923/4 1971/3 sorts [2] 1966/24 1967/2 sought [1] 1956/23 sounds [1] 1901/13 source [2] 1908/10 1966/23 speak [2] 1987/13 1993/2 speaking [1] 1903/18 special [2] 1901/4 1903/16 specific [2] 1919/20 1920/3 specifically [6] 1929/19 1948/4 1955/10 1972/16 1976/12 1992/4 speculate [2] 1988/24 1989/2 speculated [1] 1915/15 speed [1] 1910/23 spell [2] 1936/21 1961/13 split [1] 1967/25 spot [1] 1931/12 spouse [1] 1952/22 spring [1] 1974/20 St [1] 1887/3 stacked [1] 1987/11 staggering [1] 1911/24 standard [2] 1990/2 1990/3 stands [3] 1924/5 1949/2 1993/6 start [7] 1897/23 1897/24 1901/19 1907/7 1926/4 1932/3 1933/5 started [17] 1910/19 1912/14 1913/6 1913/9 1921/1 1924/16 1934/6 1938/21 1939/13 1946/11 1948/17 1949/23 1951/2 1952/15 1953/5 1966/11 1973/4 starting [4] 1906/20 1907/4 1908/21	1966/12 startling [2] 1913/23 1923/9 starts [1] 1954/4 startup [3] 1923/1 1923/7 1923/23 state [3] 1886/11 1936/21 1965/2 statement [1] 1992/22 statements [3] 1992/4 1992/7 1992/10 states [9] 1885/1 1885/3 1885/10 1899/10 1913/2 1935/23 1936/19 1964/22 1965/3 steadily [1] 1948/16 stem [1] 1954/22 stenography [1] 1887/14 step [3] 1961/2 1988/12 1988/16 steps [5] 1958/20 1959/17 1959/18 1960/21 1990/1 stickier [1] 1915/13 still [22] 1900/21 1901/2 1902/25 1911/9 1923/6 1923/25 1924/1 1925/4 1925/6 1925/13 1925/14 1931/21 1938/23 1945/24 1954/8 1955/1 1955/3 1957/13 1959/12 1960/3 1971/20 1988/2 stop [1] 1953/6 stopped [1] 1967/9 stopping [2] 1954/13 1954/14 store [1] 1963/4 story [4] 1903/7 1903/8 1923/25 1965/11 straight [1] 1992/21 strange [1] 1913/9 strategy [3] 1966/18 1966/20 1967/10 Stratton [3] 1973/15 1980/5 1980/6 stream [1] 1897/19 Street [2] 1886/3 1886/7 strong [6] 1899/4 1915/6 1942/3 1947/6 1948/19 1949/18 structure [3] 1919/10 1919/17 1919/19 struggled [1] 1901/22 studies [10] 1945/17 1945/22 1946/5 1946/7 1946/17 1946/18 1947/4 1949/13 1955/5 1955/6 study [3] 1945/23 1956/3 1956/9 stuff [6] 1904/23 1905/12 1941/14 1970/8 1987/14 1990/1 subject [1] 1975/23	subjective [1] 1969/21 subscribed [1] 1948/8 substance [2] 1975/17 1986/10 substitute [1] 1959/15 substitution [3] 1958/20 1959/11 1959/14 subtle [2] 1895/24 1941/15 succeeded [1] 1901/25 successful [2] 1961/21 1976/3 such [6] 1922/24 1923/20 1928/5 1928/5 1942/19 1952/22 suggest [1] 1909/15 Suite [2] 1886/14 1886/19 sum [1] 1909/11 summary [2] 1914/4 1982/20 summer [7] 1978/20 1979/25 1980/16 1981/6 1983/2 1985/18 1985/19 Sundar [1] 1932/24 super [1] 1929/6 SuperGLUE [4] 1914/8 1914/10 1915/12 1916/4 sure [25] 1899/13 1916/19 1926/16 1927/5 1927/15 1932/10 1936/23 1937/9 1938/20 1940/5 1943/9 1946/19 1951/17 1953/17 1958/17 1965/20 1967/22 1971/22 1974/1 1982/6 1982/19 1989/10 1990/8 1990/8 1990/9 surprises [1] 1911/8 surveillance [2] 1950/19 1951/8 survey [5] 1946/20 1946/24 1946/25 1959/20 1968/7 surveys [6] 1946/15 1955/12 1959/21 1959/22 1959/24 1968/8 suspect [1] 1989/6 SVP [1] 1974/2 SW [1] 1887/7 Swaminathan [1] 1982/24 Swift [4] 1900/4 1900/6 1900/19 1900/22 Swift's [1] 1901/7 switch [13] 1942/13 1942/20 1947/9 1956/15 1958/14 1958/16 1959/9 1959/15 1960/16 1960/22 1962/20 1962/22 1967/8	switchable [1] 1960/23 switched [2] 1947/10 1961/1 switching [2] 1950/8 1960/3 SWORN [1] 1936/14 symbols [1] 1911/13 synonyms [1] 1901/1 system [37] 1896/2 1896/15 1897/7 1898/12 1900/17 1901/20 1902/12 1912/22 1914/16 1914/20 1914/21 1914/23 1915/18 1916/3 1916/9 1918/1 1922/8 1922/24 1924/5 1925/11 1926/15 1928/3 1928/5 1928/5 1928/9 1928/15 1928/20 1929/8 1929/10 1930/23 1931/10 1931/18 1934/25 1959/6 1960/11 1960/25 1984/13 systems [44] 1895/25 1896/1 1896/6 1896/10 1896/12 1896/13 1896/13 1896/16 1896/17 1896/21 1896/22 1896/22 1896/23 1896/25 1897/9 1900/15 1900/20 1901/1 1901/2 1901/15 1902/2 1907/25 1908/11 1908/15 1910/12 1911/5 1911/10 1911/19 1912/11 1913/4 1913/10 1913/15 1915/19 1915/23 1918/8 1919/8 1923/21 1924/20 1925/2 1925/3 1931/3 1931/19 1931/20 1931/22
			T	
			T-o-r [1] 1961/14 T5 [5] 1915/18 1915/21 1916/3 1916/7 1916/9 tab [5] 1953/18 1981/12 1982/1 1982/2 1982/10 table [1] 1922/17 tablet [1] 1959/2 tail [3] 1897/20 1902/9 1902/17 take [20] 1899/19 1905/20 1911/5 1914/25 1920/3 1931/13 1940/20 1948/25 1961/3 1961/4 1971/14 1971/16 1971/21 1973/8 1974/6 1979/10 1979/20 1984/12 1985/2	

T	1963/6 1968/7 1974/25 1976/12 1982/18 1988/6 telling [1] 1928/25 ten [2] 1924/19 1948/17 tend [2] 1908/7 1928/25 tended [1] 1897/2 tendency [1] 1929/6 tens [1] 1898/20 tenth [1] 1935/2 term [4] 1900/19 1909/16 1912/20 1971/5 terms [6] 1896/10 1912/9 1924/21 1931/6 1968/24 1989/8 terrible [1] 1900/2 test [4] 1967/24 1967/25 1967/25 1968/6 testified [1] 1992/20 testifying [1] 1992/19 testimony [3] 1935/16 1975/21 1993/2 testing [3] 1967/17 1967/21 1968/12 tests [2] 1968/8 1968/18 text [17] 1907/15 1908/2 1911/5 1911/6 1911/10 1911/20 1918/13 1918/21 1919/5 1920/4 1920/5 1920/6 1921/15 1923/11 1926/11 1927/4 1989/7 than [23] 1899/21 1906/8 1908/8 1908/22 1914/8 1918/14 1919/4 1926/15 1926/18 1927/17 1928/3 1928/6 1934/25 1940/13 1941/9 1941/19 1947/13 1957/9 1960/20 1962/19 1969/17 1984/10 1993/2 Thank [26] 1897/11 1902/6 1903/4 1924/2 1924/7 1925/23 1935/16 1935/18 1935/19 1936/8 1936/10 1938/7 1949/7 1949/10 1963/17 1965/15 1968/20 1971/7 1971/11 1971/22 1972/10 1981/23 1983/19 1985/4 1985/15 1993/4 Thank you [23] 1897/11 1902/6 1903/4 1924/2 1924/7 1925/23 1935/18 1935/19 1936/8 1936/10 1938/7 1949/7 1949/10 1963/17 1965/15	1968/20 1971/11 1971/22 1972/10 1983/19 1985/4 1985/15 1993/4 Thank you very much [1] 1935/16 that [435] that'll [1] 1941/12 that's [42] 1899/16 1900/24 1903/23 1905/6 1907/20 1908/14 1910/6 1910/7 1914/1 1919/1 1920/10 1920/13 1921/7 1922/15 1923/25 1929/3 1929/13 1929/16 1930/25 1932/6 1933/20 1934/14 1938/22 1940/22 1944/24 1947/24 1957/12 1959/10 1959/11 1959/16 1959/18 1960/6 1961/5 1961/24 1962/5 1966/7 1970/9 1971/15 1971/15 1978/19 1980/5 1986/5 their [34] 1904/11 1908/2 1913/10 1914/22 1914/23 1916/6 1934/19 1935/10 1935/20 1939/5 1943/19 1954/16 1955/20 1957/3 1958/11 1959/13 1960/3 1962/25 1964/15 1965/25 1972/14 1974/1 1974/2 1974/16 1976/12 1976/20 1977/17 1979/9 1984/2 1984/9 1985/12 1986/13 1988/6 1988/15 theirs [1] 1979/1 them [46] 1899/4 1899/10 1899/15 1901/3 1901/18 1904/15 1904/15 1905/5 1908/3 1916/21 1919/9 1919/14 1919/15 1919/18 1923/19 1929/10 1938/23 1939/3 1939/8 1943/23 1944/21 1946/1 1946/20 1946/21 1946/22 1948/10 1948/11 1954/22 1955/15 1956/15 1959/14 1962/20 1966/4 1966/5 1966/8 1966/16 1967/16 1970/6 1970/25 1976/18 1979/6 1984/1 1984/12 1984/25 1985/2 1986/13 themselves [4]	1896/18 1941/11 1970/14 1973/11 then [61] 1898/2 1900/20 1904/5 1904/10 1904/13 1905/7 1910/15 1910/23 1910/25 1911/1 1913/6 1913/9 1913/17 1913/20 1913/23 1914/19 1915/4 1915/25 1916/6 1919/13 1919/25 1920/5 1921/13 1921/15 1922/8 1922/20 1928/7 1928/10 1928/16 1928/20 1929/10 1932/13 1934/2 1934/20 1939/21 1941/7 1941/13 1942/5 1943/14 1944/3 1944/19 1946/21 1946/24 1947/23 1949/20 1950/20 1950/20 1952/1 1952/21 1955/23 1955/24 1960/19 1962/1 1964/23 1971/8 1974/19 1978/18 1983/13 1983/25 1984/8 1992/14 theory [1] 1922/5 there [84] 1895/24 1896/7 1898/17 1899/6 1901/4 1901/13 1901/15 1902/1 1903/6 1905/22 1906/2 1907/7 1907/19 1908/12 1909/2 1910/10 1910/24 1911/11 1912/10 1912/11 1912/20 1914/9 1914/24 1914/25 1915/2 1917/5 1918/3 1919/1 1919/1 1921/16 1925/4 1925/9 1925/14 1927/19 1928/4 1928/7 1931/14 1938/22 1941/15 1944/3 1945/5 1946/11 1950/10 1950/23 1951/15 1951/23 1952/2 1952/18 1954/17 1955/16 1957/1 1957/2 1957/24 1961/9 1962/13 1963/25 1964/12 1965/8 1965/21 1970/12 1970/16 1970/16 1975/6 1975/7 1975/7 1975/11 1975/13 1975/14 1975/14 1977/21 1977/23 1978/1 1978/24 1979/18 1980/9 1980/10 1980/14 1982/25 1984/13 1987/8 1987/10	1987/10 1989/24 1990/10 there's [42] 1897/18 1898/23 1900/14 1901/19 1902/1 1906/5 1910/7 1911/1 1914/1 1917/7 1918/17 1920/20 1926/10 1927/19 1928/18 1929/6 1931/1 1934/23 1939/6 1939/8 1941/7 1947/12 1956/17 1956/18 1957/24 1958/18 1958/19 1958/23 1959/7 1960/13 1960/14 1960/21 1967/14 1967/23 1968/9 1969/20 1970/8 1977/17 1977/18 1979/13 1980/13 1992/9 these [69] 1896/8 1896/10 1896/13 1897/8 1899/17 1900/9 1901/2 1901/14 1902/13 1905/8 1905/8 1905/13 1907/3 1911/10 1911/19 1912/9 1912/11 1913/3 1913/10 1913/15 1914/7 1916/20 1917/21 1919/5 1919/8 1920/3 1922/16 1923/18 1924/20 1925/1 1925/3 1928/21 1929/9 1929/10 1931/3 1931/20 1934/17 1938/25 1939/2 1939/5 1939/6 1939/11 1939/14 1941/22 1943/20 1944/4 1944/11 1944/23 1947/4 1948/9 1955/13 1957/25 1959/4 1959/21 1959/25 1960/3 1960/17 1966/10 1967/1 1967/11 1967/18 1968/17 1969/8 1976/9 1983/22 1983/24 1986/21 1990/5 1990/14 thesis [1] 1939/14 they [98] 1899/3 1900/22 1908/6 1908/7 1908/7 1911/15 1913/8 1913/11 1914/15 1914/20 1914/21 1914/23 1915/11 1915/13 1915/15 1915/25 1916/5 1916/22 1916/22 1917/1 1919/10 1919/17 1919/22 1920/2 1920/7 1927/9 1928/19 1928/22 1928/22 1932/10
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T	1940/24 1946/2 1948/5	1895/22 1896/16	1973/15 1974/22	train [2] 1896/18
they... [68] 1934/20	1952/16 1954/25	1896/17 1896/22	1975/11 1980/4	1919/9
1945/25 1948/6 1948/6	1957/10 1967/2 1968/5	1896/23 1896/25	1982/22 1984/3	trained [2] 1918/21
1948/6 1948/7 1948/12	1968/6 1974/18 1976/5	1899/9 1900/10	1984/21 1990/25	1918/23
1951/12 1952/11	1977/16 1977/20	1901/20 1903/18	times [13] 1895/20	training [7] 1933/5
1952/15 1953/11	1979/3 1980/12 1981/4	1904/11 1905/4	1898/19 1898/21	1933/7 1933/18 1934/8
1953/17 1954/14	1988/24 1989/12	1905/10 1914/2	1898/24 1899/1 1899/2	1934/10 1934/14
1955/15 1955/16	1990/25	1914/24 1915/7	1902/14 1918/13	1935/5
1955/24 1957/8 1959/1	think [100] 1895/24	1915/23 1916/15	1940/13 1960/1	transcript [3] 1885/9
1959/16 1959/25	1896/10 1896/14	1919/25 1920/6	1961/24 1972/19	1887/14 1994/3
1960/4 1967/25 1970/2	1897/18 1897/22	1925/10 1928/1	1988/18	transcription [1]
1970/14 1970/23	1898/5 1899/18	1928/17 1929/7	titled [2] 1932/23	1887/14
1970/23 1973/8	1900/24 1901/12	1940/24 1942/5	1994/4	translate [1] 1923/2
1973/19 1974/3	1901/23 1901/24	1946/17 1946/18	titles [1] 1974/1	translation [1] 1923/3
1974/16 1974/18	1903/22 1904/18	1948/17 1951/5	TL [1] 1914/2	translator [1] 1923/6
1974/18 1974/19	1904/20 1906/23	1954/25 1955/3	today [10] 1908/12	travels [1] 1935/17
1974/22 1975/15	1907/8 1907/20 1909/7	1957/23 1959/24	1938/9 1939/10	Travis [1] 1900/7
1976/13 1976/14	1909/8 1909/13	1965/18 1966/10	1939/18 1941/24	treasure [1] 1922/7
1979/7 1979/8 1979/10	1910/19 1911/8	1967/16 1968/20	1942/22 1943/10	treat [1] 1898/19
1980/19 1981/3 1984/3	1911/11 1912/17	1970/11 1970/22	1944/17 1961/10	treatments [1] 1941/13
1984/10 1984/11	1912/19 1916/2	1973/17 1973/21	1961/17	TRIAL [1] 1885/9
1984/14 1985/1 1985/2	1916/21 1918/5	1978/4	together [3] 1916/8	triangulate [1] 1948/18
1985/3 1985/11	1923/16 1923/17	though [9] 1896/12	1943/14 1983/10	Tribble [1] 1975/7
1986/12 1986/22	1923/20 1923/21	1901/25 1908/4	toggle [3] 1979/14	tricks [1] 1925/2
1986/23 1986/25	1923/24 1923/25	1909/19 1929/13	1979/20 1984/13	tried [6] 1896/25
1987/19 1987/19	1925/4 1925/5 1925/5	1951/23 1962/21	told [2] 1935/1 1936/3	1939/16 1965/13
1987/20 1987/23	1925/13 1925/14	1968/5 1969/19	too [9] 1899/4 1904/1	1974/3 1974/21 1979/9
1988/1 1988/4 1988/5	1925/18 1925/20	thought [19] 1907/12	1904/5 1922/15 1937/3	tries [3] 1901/5
1988/5 1988/13	1926/10 1927/22	1907/16 1909/20	1958/20 1959/18	1901/20 1912/22
1988/13 1988/16	1927/23 1929/4 1932/6	1911/14 1911/16	1975/16 1990/21	Tripadvisor [1] 1966/4
1989/25 1992/14	1932/7 1932/15	1916/8 1921/13 1922/7	took [5] 1964/6	trivial [1] 1913/14
1992/17	1933/20 1933/24	1922/14 1939/14	1972/23 1974/7 1974/7	true [3] 1927/22
they'd [1] 1914/24	1934/5 1934/8 1934/14	1955/20 1964/1	1974/13	1929/15 1932/6
they'll [3] 1900/23	1934/16 1935/4	1966/19 1973/20	tool [1] 1990/16	trust [1] 1899/10
1929/11 1963/1	1938/22 1938/23	1976/13 1976/17	toothpaste [3] 1925/9	truth [3] 1992/3
they're [26] 1896/13	1943/15 1944/14	1978/25 1984/1	1925/10 1925/17	1992/11 1992/17
1919/12 1919/12	1945/7 1946/3 1949/16	1986/22	top [20] 1908/17	try [11] 1901/23 1902/2
1925/11 1925/12	1951/22 1953/11	thousand [1] 1918/13	1910/6 1921/9 1921/20	1906/20 1908/23
1934/22 1939/1	1953/17 1957/13	thousands [4] 1898/20	1926/13 1927/2	1910/5 1913/3 1943/3
1939/11 1947/13	1958/18 1958/25	1898/21 1904/21	1934/18 1938/25	1948/4 1962/19
1954/11 1955/22	1960/9 1963/8 1964/3	1967/1	1939/1 1940/12	1968/17 1984/9
1958/12 1958/12	1964/4 1964/12	threaded [1] 1990/20	1940/17 1940/22	trying [14] 1903/23
1959/12 1960/5 1960/5	1964/21 1964/22	threats [1] 1952/25	1941/2 1947/9 1960/2	1905/3 1905/9 1914/11
1964/4 1964/5 1965/25	1965/13 1965/16	three [6] 1920/11	1966/16 1969/13	1925/15 1925/16
1968/7 1970/4 1974/19	1967/15 1967/24	1920/13 1940/13	1969/16 1969/17	1931/2 1956/11
1986/21 1987/22	1969/20 1970/6	1959/3 1959/17	1984/3	1962/13 1964/18
1987/23 1992/18	1970/22 1970/22	1964/18	topic [2] 1901/19	1972/22 1985/1
they've [2] 1948/10	1970/23 1970/24	through [6] 1912/19	1906/17	1985/13 1987/23
1948/13	1973/6 1974/18 1975/8	1914/6 1917/21	topline [1] 1969/23	tuning [2] 1919/16
thickest [1] 1930/2	1975/22 1975/23	1927/11 1951/24	Tor [3] 1961/11	1919/22
thing [19] 1899/18	1976/23 1978/14	1968/6	1961/17 1961/25	turn [7] 1902/20
1905/3 1907/20 1916/6	1980/14 1980/21	ticked [1] 1950/21	totally [1] 1978/4	1907/18 1908/16
1925/6 1933/21	1982/24 1985/3	tied [1] 1943/23	TPUs [1] 1933/9	1917/15 1979/15
1940/17 1940/18	1986/19 1989/1	time [41] 1897/24	track [2] 1954/8 1956/5	1983/20 1991/11
1946/4 1947/18	1990/19 1992/25	1901/23 1906/19	tracker [1] 1987/4	turned [2] 1911/18
1951/13 1952/3 1956/2	thinking [5] 1904/25	1907/16 1908/9 1909/8	trackers [2] 1986/17	1911/18
1957/12 1969/15	1916/19 1968/7	1912/17 1916/20	1987/5	TV [2] 1976/22 1977/8
1969/17 1983/11	1974/22 1988/9	1921/3 1922/7 1929/1	tracking [5] 1952/19	two [20] 1895/18
1983/16 1987/6	thinks [1] 1987/4	1931/1 1931/2 1931/5	1953/1 1953/2 1954/13	1899/7 1901/8 1901/8
things [41] 1901/5	third [8] 1912/13	1931/6 1931/13	1955/3	1907/8 1920/11
1903/14 1904/14	1914/1 1915/2 1917/25	1933/14 1935/16	tracks [1] 1954/19	1920/13 1932/9
1905/8 1905/8 1910/23	1918/17 1934/2	1944/14 1944/15	trade [1] 1913/25	1933/15 1940/12
1911/22 1913/2 1913/9	1948/16 1969/13	1944/22 1946/2	traditional [6] 1931/22	1940/21 1940/22
1913/21 1920/3 1925/6	third-generation [1]	1947/21 1950/7	1939/17 1939/19	1942/4 1942/24
1925/18 1927/7 1931/9	1917/25	1950/21 1952/16	1969/8 1970/10	1945/22 1947/22
1939/6 1939/7 1940/10	this [196]	1952/25 1960/5 1960/6	1970/18	1951/1 1960/8 1968/1
1940/12 1940/16	thoroughly [1] 1912/19	1962/3 1964/20	traffic [3] 1927/25	1976/5
1940/18 1940/22	those [44] 1895/16	1966/18 1967/10	1940/25 1957/19	TYLER [1] 1886/18

<p>T</p> <p>type [4] 1929/3 1963/11 1967/23 1975/10</p> <p>types [1] 1965/22</p> <p>typical [2] 1899/16 1958/25</p> <p>typically [4] 1897/1 1919/9 1919/13 1989/21</p>	<p>1989/25 1990/10</p> <p>update [1] 1902/2</p> <p>updates [1] 1960/11</p> <p>upon [3] 1914/16 1925/2 1988/23</p> <p>ups [2] 1990/6 1990/14</p> <p>UPX0666 [1] 1991/12</p> <p>UPX0818 [2] 1981/12 1981/13</p> <p>UPX193 [1] 1932/18</p> <p>UPX197 [2] 1921/7 1926/5</p> <p>UPX203 [3] 1905/19 1929/18 1929/21</p> <p>UPX228 [1] 1902/20</p> <p>UPX818 [2] 1981/22 1982/4</p> <p>us [31] 1904/8 1905/4 1905/7 1905/11 1908/23 1909/5 1913/23 1916/7 1922/23 1933/5 1942/15 1946/16 1948/5 1950/4 1956/11 1957/5 1957/8 1958/2 1958/5 1960/1 1960/4 1962/2 1966/24 1968/7 1970/13 1971/16 1977/9 1980/24 1985/22 1986/13 1988/6</p> <p>usage [2] 1955/13 1959/23</p> <p>usdoj.gov [2] 1886/5 1886/9</p> <p>use [24] 1895/11 1896/5 1901/20 1908/11 1912/15 1914/21 1918/19 1932/1 1933/4 1934/5 1934/7 1943/17 1944/22 1956/11 1959/6 1962/24 1964/5 1968/10 1968/17 1982/12 1982/13 1984/25 1990/15 1990/18</p> <p>used [16] 1908/11 1912/20 1914/3 1919/22 1926/19 1928/13 1931/3 1931/21 1932/10 1935/10 1943/21 1944/1 1952/21 1955/1 1955/15 1987/12</p> <p>useful [3] 1932/11 1938/18 1940/7</p> <p>user [38] 1896/3 1897/17 1898/10 1899/8 1903/13 1904/24 1907/16 1908/10 1911/16 1919/2 1923/10 1924/21 1925/1 1925/4 1925/5 1925/13 1925/14 1925/16 1925/19 1925/20 1930/15 1932/4</p>	<p>1932/11 1934/24 1944/7 1944/13 1945/12 1945/19 1946/23 1951/23 1957/9 1958/25 1959/20 1959/22 1976/25 1980/4 1984/8 1985/8</p> <p>user's [1] 1954/8</p> <p>users [20] 1904/14 1904/19 1930/11 1930/12 1933/8 1942/13 1942/19 1945/14 1957/22 1959/25 1959/25 1964/4 1964/4 1968/11 1973/11 1973/19 1976/12 1976/12 1976/19 1979/4</p> <p>users' [3] 1946/8 1949/14 1959/11</p> <p>uses [2] 1941/18 1953/16</p> <p>using [9] 1920/21 1927/25 1932/3 1932/7 1933/7 1951/19 1959/12 1959/24 1987/4</p> <p>usually [4] 1913/1 1928/13 1934/21 1989/23</p> <p>utility [2] 1926/17 1927/16</p> <p>utilize [1] 1895/15</p>	<p>1957/22 1957/22 1968/15 1975/7 1977/15 1979/7 1987/11 1987/18 1987/25</p> <p>view [3] 1909/21 1923/15 1957/6</p> <p>vision [1] 1937/15</p> <p>visit [1] 1954/15</p> <p>visual [5] 1904/17 1905/1 1941/13 1979/7 1985/2</p> <p>visually [1] 1903/20</p> <p>volume [2] 1895/16 1898/12</p> <p>volumes [1] 1918/21</p> <p>vs [1] 1885/5</p>	<p>1921/24</p> <p>we'll [12] 1899/2 1902/21 1917/21 1926/4 1949/1 1963/19 1966/5 1968/5 1968/7 1971/9 1992/25 1993/3</p> <p>we're [32] 1896/12 1899/13 1902/14 1904/7 1907/4 1908/21 1923/17 1924/1 1937/12 1941/10 1942/24 1948/24 1948/24 1956/9 1959/19 1961/11 1969/6 1969/7 1969/23 1971/20 1972/9 1974/24 1979/13 1980/16 1985/1 1986/3 1987/15 1988/2 1989/14 1990/23 1991/19 1992/11</p> <p>we've [23] 1895/21 1898/14 1898/16 1898/24 1898/25 1899/1 1901/25 1902/13 1906/23 1908/5 1921/23 1929/4 1930/15 1945/17 1946/14 1946/25 1952/4 1957/11 1961/23 1971/2 1971/14 1991/4 1991/6</p> <p>weak [2] 1915/14 1934/21</p> <p>weather [1] 1939/7</p> <p>web [19] 1896/3 1900/21 1906/24 1906/25 1907/23 1908/7 1909/2 1909/3 1910/8 1910/16 1910/18 1921/22 1922/15 1923/19 1925/10 1928/19 1941/17 1941/19 1986/18</p> <p>web-answered [1] 1921/22</p> <p>WebAnswer [2] 1910/7 1934/25</p> <p>WebAnswers [11] 1910/4 1910/15 1915/25 1919/22 1922/11 1932/10 1932/12 1933/23 1933/25 1934/6 1934/9</p> <p>WEBB [1] 1886/18</p> <p>website [3] 1954/16 1961/3 1961/4</p> <p>websites [2] 1953/1 1971/1</p> <p>weeks [1] 1901/8</p> <p>weighting [1] 1902/9</p> <p>Weinberg [17] 1935/24 1936/9 1936/14 1936/18 1936/24 1936/25 1949/12 1952/7 1954/6 1963/19 1965/6 1972/12</p>
<p>U</p> <p>U.S [9] 1886/2 1886/6 1914/13 1923/22 1942/17 1942/23 1942/24 1943/1 1961/16</p> <p>Uh [1] 1933/10</p> <p>Uh-huh [1] 1933/10</p> <p>ultimately [1] 1964/17</p> <p>uncertainty [1] 1899/19</p> <p>under [3] 1906/5 1936/7 1969/13</p> <p>underneath [1] 1984/5</p> <p>understand [19] 1900/3 1904/3 1906/21 1907/10 1909/1 1909/5 1911/14 1914/12 1914/20 1918/15 1918/18 1919/10 1919/17 1981/16 1984/9 1984/9 1988/19 1988/20 1991/25</p> <p>understanding [8] 1907/7 1917/3 1917/17 1918/1 1934/24 1985/11 1989/2 1989/7</p> <p>unfolding [1] 1923/25</p> <p>Unfortunately [1] 1965/11</p> <p>unit [2] 1886/12 1918/13</p> <p>united [7] 1885/1 1885/3 1885/10 1899/10 1913/1 1935/23 1936/19</p> <p>United States [2] 1899/10 1936/19</p> <p>United States of [1] 1935/23</p> <p>unless [2] 1958/1 1984/10</p> <p>unsupervised [1] 1923/11</p> <p>until [1] 1951/1</p> <p>up [30] 1896/16 1897/23 1904/22 1907/20 1909/11 1910/23 1914/16 1916/9 1925/2 1928/20 1931/7 1934/13 1935/6 1947/24 1950/21 1951/1 1951/22 1952/3 1966/15 1966/20 1966/25 1967/7 1976/2 1976/16 1980/2 1983/9 1989/16 1989/21</p>	<p>us [31] 1904/8 1905/4 1905/7 1905/11 1908/23 1909/5 1913/23 1916/7 1922/23 1933/5 1942/15 1946/16 1948/5 1950/4 1956/11 1957/5 1957/8 1958/2 1958/5 1960/1 1960/4 1962/2 1966/24 1968/7 1970/13 1971/16 1977/9 1980/24 1985/22 1986/13 1988/6</p> <p>usage [2] 1955/13 1959/23</p> <p>usdoj.gov [2] 1886/5 1886/9</p> <p>use [24] 1895/11 1896/5 1901/20 1908/11 1912/15 1914/21 1918/19 1932/1 1933/4 1934/5 1934/7 1943/17 1944/22 1956/11 1959/6 1962/24 1964/5 1968/10 1968/17 1982/12 1982/13 1984/25 1990/15 1990/18</p> <p>used [16] 1908/11 1912/20 1914/3 1919/22 1926/19 1928/13 1931/3 1931/21 1932/10 1935/10 1943/21 1944/1 1952/21 1955/1 1955/15 1987/12</p> <p>useful [3] 1932/11 1938/18 1940/7</p> <p>user [38] 1896/3 1897/17 1898/10 1899/8 1903/13 1904/24 1907/16 1908/10 1911/16 1919/2 1923/10 1924/21 1925/1 1925/4 1925/5 1925/13 1925/14 1925/16 1925/19 1925/20 1930/15 1932/4</p>	<p>V</p> <p>value [5] 1897/17 1898/10 1921/2 1934/24 1962/11</p> <p>values [1] 1947/15</p> <p>variables [2] 1901/14 1946/3</p> <p>variants [1] 1915/6</p> <p>varies [1] 1897/6</p> <p>variety [1] 1950/5</p> <p>various [1] 1921/19</p> <p>varying [1] 1945/6</p> <p>vast [1] 1925/16</p> <p>vendors [1] 1934/12</p> <p>verbal [1] 1992/18</p> <p>version [4] 1910/16 1916/1 1916/9 1957/8</p> <p>versions [3] 1896/17 1968/1 1968/3</p> <p>versus [2] 1901/7 1956/19</p> <p>vertical [3] 1942/18 1965/25 1969/22</p> <p>very [32] 1900/15 1900/17 1904/24 1910/6 1911/19 1912/1 1916/4 1919/25 1920/3 1921/2 1927/2 1929/15 1929/16 1932/11 1934/18 1935/16 1941/24 1942/3 1945/25 1948/4 1950/3 1955/14 1957/13</p>	<p>W</p> <p>W-e-i-n-b-e-r-g [1] 1936/24</p> <p>wait [1] 1927/10</p> <p>waiting [1] 1971/20</p> <p>walk [1] 1968/6</p> <p>want [17] 1900/7 1902/8 1918/9 1926/4 1926/7 1926/13 1927/13 1943/7 1963/3 1965/23 1968/4 1969/15 1976/14 1979/7 1979/8 1979/15 1987/24</p> <p>wanted [10] 1905/7 1914/15 1939/15 1941/21 1957/8 1963/17 1965/13 1976/2 1985/3 1988/5</p> <p>was [194]</p> <p>was/is [3] 1926/16 1927/15 1927/20</p> <p>Washington [6] 1885/5 1886/3 1886/8 1887/4 1887/7 1887/12</p> <p>wasn't [7] 1900/25 1902/4 1913/22 1915/8 1946/11 1952/19 1989/2</p> <p>wave [3] 1906/19 1907/24 1908/14</p> <p>way [25] 1895/16 1897/5 1897/22 1903/20 1911/15 1912/23 1914/15 1920/3 1926/18 1929/3 1943/4 1944/14 1952/1 1957/9 1960/19 1961/6 1961/7 1962/5 1962/23 1967/7 1969/16 1979/3 1984/2 1984/21 1985/6</p> <p>ways [4] 1904/2 1910/15 1913/11 1931/14</p> <p>wc.com [2] 1887/5 1887/8</p> <p>we [287]</p> <p>we believe [1] 1962/10</p> <p>We will [1] 1967/24</p> <p>we'd [3] 1908/8 1909/1</p>	<p>we've [23] 1895/21 1898/14 1898/16 1898/24 1898/25 1899/1 1901/25 1902/13 1906/23 1908/5 1921/23 1929/4 1930/15 1945/17 1946/14 1946/25 1952/4 1957/11 1961/23 1971/2 1971/14 1991/4 1991/6</p> <p>weak [2] 1915/14 1934/21</p> <p>weather [1] 1939/7</p> <p>web [19] 1896/3 1900/21 1906/24 1906/25 1907/23 1908/7 1909/2 1909/3 1910/8 1910/16 1910/18 1921/22 1922/15 1923/19 1925/10 1928/19 1941/17 1941/19 1986/18</p> <p>web-answered [1] 1921/22</p> <p>WebAnswer [2] 1910/7 1934/25</p> <p>WebAnswers [11] 1910/4 1910/15 1915/25 1919/22 1922/11 1932/10 1932/12 1933/23 1933/25 1934/6 1934/9</p> <p>WEBB [1] 1886/18</p> <p>website [3] 1954/16 1961/3 1961/4</p> <p>websites [2] 1953/1 1971/1</p> <p>weeks [1] 1901/8</p> <p>weighting [1] 1902/9</p> <p>Weinberg [17] 1935/24 1936/9 1936/14 1936/18 1936/24 1936/25 1949/12 1952/7 1954/6 1963/19 1965/6 1972/12</p>

W	1923/15 1929/7 1937/23 whatever [3] 1900/20 1901/2 1968/4 when [46] 1898/3 1900/24 1906/19 1908/5 1910/5 1911/22 1918/5 1931/3 1931/9 1931/21 1933/18 1938/21 1939/13 1939/24 1940/8 1940/20 1942/7 1943/10 1945/18 1946/11 1946/13 1949/12 1949/24 1952/15 1952/18 1953/25 1954/2 1954/12 1955/21 1961/23 1964/8 1970/18 1970/23 1972/6 1972/12 1972/20 1974/22 1977/2 1978/21 1979/2 1979/16 1980/5 1982/23 1986/19 1986/19 1991/2 whenever [3] 1914/19 1924/14 1949/9 where [40] 1896/7 1896/8 1896/9 1899/7 1902/17 1905/23 1909/1 1910/7 1913/16 1919/16 1922/12 1927/3 1931/12 1932/10 1932/14 1933/3 1934/11 1934/17 1936/25 1937/6 1950/23 1955/20 1957/25 1957/25 1961/9 1963/11 1964/2 1965/18 1966/23 1968/1 1969/12 1970/2 1974/6 1979/14 1984/1 1984/8 1984/13 1984/18 1984/19 1987/20 whether [5] 1906/25 1907/23 1944/17 1949/13 1956/3 which [52] 1895/19 1897/3 1899/17 1899/19 1901/3 1902/14 1902/20 1903/11 1905/19 1907/16 1908/12 1912/6 1912/14 1915/11 1915/18 1916/1 1916/19 1921/7 1925/17 1927/12 1927/13 1928/21 1929/18 1929/19 1931/10 1932/18 1933/23 1934/9 1937/17 1939/21 1941/22 1942/4 1942/6 1942/25 1944/8 1945/19 1948/11	1951/9 1954/15 1957/3 1957/24 1960/12 1961/12 1968/3 1968/16 1968/22 1970/24 1983/14 1983/21 1987/24 1988/5 1990/16 while [1] 1900/16 whistleblower [1] 1951/6 white [1] 1955/11 who [27] 1903/13 1903/15 1904/16 1904/22 1904/25 1913/12 1921/19 1930/16 1942/11 1945/23 1946/21 1946/24 1951/6 1954/18 1956/13 1959/25 1973/16 1973/17 1975/1 1975/13 1975/15 1980/4 1981/8 1982/21 1987/11 1987/11 1990/9 who's [6] 1900/7 1904/22 1912/3 1915/1 1915/2 1989/22 whole [8] 1903/11 1908/6 1908/22 1926/15 1931/1 1966/11 1966/23 1990/17 whom [1] 1903/12 why [16] 1901/3 1903/7 1905/6 1929/3 1941/18 1945/16 1950/8 1952/12 1956/9 1958/15 1960/6 1968/16 1970/24 1971/8 1985/6 1985/6 wide [3] 1955/16 1964/7 1968/9 widely [1] 1903/22 wider [3] 1951/22 1952/1 1989/11 widget [1] 1959/10 Wikipedia [4] 1966/7 1966/14 1966/15 1966/16 will [24] 1900/2 1900/21 1901/5 1902/19 1905/22 1910/5 1913/17 1916/16 1917/11 1924/9 1924/25 1925/4 1925/5 1925/14 1925/18 1925/21 1929/11 1929/12 1930/16 1940/18 1967/24 1968/5 1977/10 1981/22 William [4] 1886/17 1887/9 1994/2 1994/8 WILLIAMS [2] 1887/3 1887/6 window [2] 1952/21 1953/18	windows [1] 1953/23 wins' [1] 1926/21 wiped [2] 1923/4 1952/22 wiping [1] 1952/20 within [5] 1900/12 1910/22 1914/3 1915/17 1940/1 without [4] 1902/11 1920/19 1944/8 1963/19 witness [10] 1888/2 1905/16 1933/15 1935/21 1935/24 1936/3 1936/7 1936/14 1971/25 1988/24 WITNESSES [1] 1888/4 wonder [1] 1907/4 wonk [1] 1904/22 word [3] 1900/25 1900/25 1943/6 words [1] 1909/6 work [20] 1900/23 1901/3 1904/16 1905/10 1905/11 1910/17 1914/22 1918/8 1922/17 1936/25 1937/1 1939/23 1959/2 1961/6 1961/7 1977/9 1983/10 1985/14 1985/24 1988/6 workarounds [1] 1907/3 worked [4] 1914/23 1935/3 1978/5 1980/3 working [7] 1902/3 1915/25 1916/7 1918/5 1930/17 1939/22 1946/14 works [1] 1986/20 worksheets [1] 1913/15 world [10] 1899/23 1900/1 1900/16 1904/24 1909/21 1911/25 1914/14 1918/6 1925/16 1991/7 worth [2] 1935/1 1960/8 would [78] 1895/18 1896/1 1901/14 1907/16 1909/11 1909/12 1910/20 1910/24 1911/15 1911/17 1913/3 1914/23 1914/24 1915/15 1919/13 1919/16 1919/22 1919/24 1919/25 1920/4 1922/16 1924/19 1925/7 1927/10 1928/4 1928/4 1928/7 1934/10 1935/8 1940/24 1943/15 1943/16 1944/11 1944/19 1945/19	1947/9 1947/17 1948/1 1948/1 1952/9 1952/22 1955/21 1956/4 1959/3 1962/9 1965/14 1967/8 1967/25 1969/19 1969/25 1970/1 1970/2 1970/4 1970/10 1970/14 1971/4 1976/25 1978/12 1979/7 1979/11 1979/19 1982/1 1984/4 1984/4 1984/12 1984/13 1984/19 1984/24 1985/7 1985/14 1987/13 1988/6 1989/5 1989/21 1989/25 1990/19 1990/19 1992/22 would do [1] 1979/11 Would it be [1] 1982/1 wouldn't [5] 1902/4 1909/4 1954/14 1981/8 1985/11 wow [1] 1910/25 wrapped [1] 1911/9 write [10] 1914/7 1921/10 1921/13 1921/18 1989/16 1989/21 1989/25 1990/6 1990/14 1990/24 write-up [2] 1989/16 1989/21 write-ups [2] 1990/6 1990/14 writing [1] 1966/15 written [2] 1920/4 1926/25 wrong [1] 1966/22 wrote [5] 1923/13 1926/14 1926/22 1929/21 1930/14
			Y	
			Yahoo [2] 1939/18 1942/16 Yandex [1] 1923/1 yeah [41] 1900/11 1912/10 1920/15 1920/15 1922/16 1923/24 1931/5 1933/20 1938/3 1943/5 1946/10 1950/2 1950/12 1952/9 1952/14 1958/8 1962/15 1963/8 1963/16 1967/13 1968/14 1969/5 1970/3 1970/20 1971/4 1971/5 1973/14 1974/14 1975/3 1976/1 1978/1 1978/11 1978/23 1980/6 1982/3 1982/15 1982/17 1983/8 1983/24 1988/11 1989/20 year [9] 1905/25 1910/25 1915/18	

<p>Y</p> <p>year... [6] 1937/4 1949/23 1950/17 1974/15 1980/22 1986/1</p> <p>year's [1] 1980/20</p> <p>yearly [1] 1974/16</p> <p>years [19] 1896/6 1901/8 1909/12 1909/22 1910/22 1910/25 1922/5 1924/19 1924/19 1925/2 1934/14 1937/14 1945/17 1948/17 1951/1 1953/3 1964/18 1972/23 1977/17</p> <p>Yep [3] 1899/24 1983/6 1983/16</p> <p>yes [51] 1895/13 1896/24 1896/24 1897/15 1901/17 1902/23 1906/4 1906/7 1906/9 1906/13 1908/19 1916/14 1920/10 1920/23 1921/8 1921/12 1921/17 1926/6 1926/9 1929/15 1930/9 1930/13 1930/18 1931/8 1931/20 1931/24 1932/2 1932/21 1933/1 1935/22 1938/15 1954/9 1954/20 1955/9 1956/7 1956/25 1957/18 1962/8 1963/23 1964/10 1967/19 1972/19 1982/2 1983/3 1984/8 1984/17 1985/21 1989/19 1990/3 1991/18 1991/21</p> <p>yesterday [5] 1895/10 1895/24 1902/10 1903/6 1911/7</p> <p>yet [3] 1908/9 1976/3 1988/2</p> <p>York [1] 1886/19</p> <p>you [379]</p> <p>you know [1] 1906/23</p> <p>you'd [1] 1959/15</p> <p>you'll [1] 1930/14</p> <p>you're [14] 1906/17 1906/24 1908/12 1908/17 1924/14 1949/9 1955/20 1958/1 1960/17 1963/1 1964/3 1968/2 1976/24 1977/7</p> <p>you've [4] 1896/21 1900/5 1947/10 1969/25</p> <p>younger [1] 1912/3</p> <p>your [96] 1897/23 1902/21 1905/15 1906/16 1906/17 1909/17 1909/20 1909/21 1910/6 1912/7</p>	<p>1915/21 1916/24 1917/3 1917/10 1920/5 1920/5 1920/24 1921/9 1923/15 1924/9 1924/10 1924/12 1924/15 1926/5 1929/18 1929/25 1930/16 1930/21 1932/20 1933/2 1933/12 1933/13 1935/4 1935/8 1935/12 1935/16 1935/16 1935/22 1935/25 1936/4 1936/6 1936/11 1936/21 1936/21 1937/2 1937/19 1943/17 1943/18 1944/2 1944/6 1944/6 1944/7 1944/8 1944/9 1944/15 1945/19 1945/21 1949/10 1949/15 1952/7 1952/20 1952/22 1952/23 1952/23 1955/1 1955/2 1961/7 1964/4 1964/4 1964/20 1965/1 1971/22 1971/24 1972/3 1972/10 1975/20 1977/13 1980/17 1981/11 1981/12 1981/14 1981/23 1981/24 1982/13 1983/4 1984/22 1984/22 1987/17 1988/10 1991/11 1991/23 1992/1 1992/8 1992/16 1993/2 1993/3</p> <p>Your Honor [29] 1905/15 1909/17 1916/24 1917/3 1917/10 1924/9 1924/12 1932/20 1933/12 1933/13 1935/8 1935/12 1935/22 1935/25 1936/4 1936/11 1949/10 1964/20 1965/1 1971/22 1971/24 1972/3 1972/10 1975/20 1981/14 1991/23 1992/1 1992/8 1992/16</p> <p>Your Honor's [1] 1924/15</p> <p>yourself [1] 1943/11</p> <p>YouTube [1] 1962/25</p> <hr/> <p>Z</p> <p>Z-i-p-f [1] 1897/20</p> <p>Zaremba [3] 1887/9 1994/2 1994/8</p> <p>Zipfian [1] 1897/20</p> <p>zones [1] 1990/25</p>			
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