

LEAGUE OF WOMEN VOTERS OF UTAH

VS

UTAH STATE LEGISLATURE

EVIDENTIARY HEARING DAY 2

October 24, 2025



IN THE THIRD JUDICIAL DISTRICT COURT
IN AND FOR SALT LAKE COUNTY, STATE OF UTAH

LEAGUE OF WOMEN VOTERS OF
UTAH; MORMON WOMEN FOR
ETHICAL GOVERNMENT;
STEFANIE CONDIE; MALCOLM
REID; VICTORIA REID; WENDY
MARTIN; ELEANOR SUNDWALL;
and JACK MARKMAN,

Plaintiffs,

vs.

UTAH STATE LEGISLATURE;
UTAH LEGISLATIVE
REDISTRICTING COMMITTEE;
SENATOR SCOTT SANDALL, in
his official capacity;
REPRESENTATIVE BRAD
WILSON, in his official
capacity; SENATOR J.
STUART ADAMS, in his
official capacity; and
LIEUTENANT GOVERNOR DEIDRE
HENDERSON, in her official
capacity,

Defendants.

EVIDENTIARY HEARING
DAY 2

Case No. 220901712

Judge Dianna Gibson

COPY

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OFFICIAL TRANSCRIPT OF ELECTRONIC RECORDING

Reporter: Lindsay Payeur, RPR, CSR, CCR

A P P E A R A N C E S

FOR THE PLAINTIFFS:

David C. Reymann
Cheylynn Hayman
PARR BROWN GEE & LOVELESS
Attorneys at Law
101 South 200 East
Suite 700
Salt Lake City, Utah 84111
Tel: 801-532-7840
Email: dreymann@parrbrown.com
Email: chayman@parrbrown.com

Mark P. Gaber - pro hac vice
Aseem Mulji - pro hac vice
Benjamin Phillips - pro hac vice
Isaac DeSanto - pro hac vice
CAMPAIGN LEGAL CENTER
Attorneys at Law
1101 14th Street NW
Suite 400
Washington, DC 20005
Tel: 202-736-2200
Email: mgaber@campaignlegalcenter.org
Email: amulji@campaignlegalcenter.org
Email: bphillips@campaignlegalcenter.org
Email: idesanto@campaignlegalcenter.org

FOR DEFENDANTS UTAH STATE LEGISLATURE; UTAH
LEGISLATIVE REDISTRICTING COMMITTEE; SENATOR SCOTT
SANDALL; REPRESENTATIVE BRAD WILSON; AND SENATOR J.
STUART ADAMS:

Tyler R. Green
CONSOVOY MCCARTHY, PLLC
Attorney at Law
222 South Main Street
Fifth Floor
Salt Lake City, Utah 84101
Tel: 703-243-9423
Email: tyler@consovoymccarthy.com

A P P E A R A N C E S (continued)

FOR DEFENDANTS UTAH STATE LEGISLATURE; UTAH
LEGISLATIVE REDISTRICTING COMMITTEE; SENATOR SCOTT
SANDALL; REPRESENTATIVE BRAD WILSON; AND SENATOR J.
STUART ADAMS:

Soren Geiger
Olivia Rogers
CONSOVOY MCCARTHY, PLLC
Attorneys at Law
1600 Wilson Boulevard
Suite 700
Arlington, Virginia 22201
Tel: 703-243-9423
Email: soren@consovoymccarthy.com
Email: orogers@consovoymccarthy.com

FOR DEFENDANT DEIDRE HENDERSON:

David N. Wolf
UTAH ATTORNEY GENERAL'S OFFICE
Attorney at Law
160 East 300 South
Fifth Floor
Salt Lake City, Utah 84114
Tel: 385-441-5084
Email: dnwolf@agutah.gov

I N D E X

JONATHAN KATZ, Ph.D.	PAGE
Direct examination by Ms. Rogers	10
Cross-examination by Mr. Mulji	32
Redirect examination by Ms. Rogers	71
SEAN TRENDE, Ph.D.	PAGE
Direct examination by Mr. Green	74
Cross-examination by Mr. Gaber	164
MICHAEL BARBER, Ph.D.	PAGE
Direct examination by Mr. Geiger	261
Cross-examination by Mr. Gaber	340

E X H I B I T S

NUMBER	PAGE
P-8	73
P-9	73
P-10	73
P-12	406
P-13	406
P-16	409
P-17	409
P-19	409
P-20	409
P-21	409
P-22	409
P-23	409
D-1	398
D-2	399
D-3	401
D-4	404
D-5	404
D-6	404
D-7	402
D-8	401
D-9	401
D-10	401
D-12	8

E X H I B I T S (continued)

NUMBER	PAGE
D-13	8
D-14	8
D-15	8
D-16	8
D-17	163
D-18	405

1 P R O C E E D I N G S

2

3 THE BAILIFF: All rise. Third District
4 Court is now in session. The Honorable Judge Dianna
5 Gibson is presiding.

6 You may be seated.

7 THE COURT: Good morning. Just give me
8 one second to get set up, and then we'll get
9 started.

10 Alright. Are you all ready to get
11 started?

12 MR. GABER: Yes, Your Honor.

13 THE COURT: Okay. League of Women Voters,
14 et al., versus Utah State Legislature, et al.,
15 case 220901712.

16 Counsel, please make your appearances.

17 MR. REYMANN: Good morning, Your Honor.
18 David Reymann and Cheylynn Hayman from Parr Brown.
19 And from the Campaign Legal Center, Mark Gaber,
20 Aseem Mulji, Ben Phillips, and Isaac DeSanto.

21 Thank you again for starting a little
22 early this morning.

23 THE COURT: Of course.

24 MR. GREEN: Good morning, Your Honor.
25 Tyler Green for the legislative defendants.

1 MR. GEIGER: Soren Geiger for the
2 legislative defendants.

3 MS. ROGERS: Olivia Rogers for the
4 legislative defendants.

5 THE COURT: All right. Well, good
6 morning.

7 Before we get started today, any issues we
8 need to address?

9 MR. GREEN: One quick housekeeping item --
10 evidentiary matter, Your Honor. We have provided
11 our exhibits for today, all of our expert reports --

12 THE COURT: Okay.

13 MR. GREEN: -- which I believe we have a
14 stipulation with the plaintiffs to be admitted into
15 evidence, so I would move the admission of
16 Defendants' Exhibits 12 through 16, which are the
17 expert reports of Drs. Katz, Trende, and Barber, and
18 all their appendices.

19 THE COURT: Okay.

20 MR. MULJI: No objection, Your Honor.

21 THE COURT: Great. Then Defendants'
22 Exhibits 12 through 16 are admitted.

23 (Defendants' Exhibits 12, 13, 14, 15,
24 and 16 received.)

25 THE COURT: All right. Are you all ready

1 to call your first witness?

2 MS. ROGERS: Yes, Your Honor.

3 THE COURT: Okay.

4 MS. ROGERS: Legislative defendants call
5 Dr. Jonathan Katz.

6 THE COURT: All right. Dr. Katz, if you
7 wouldn't mind, come forward. We're going to ask you
8 to provide some testimony under oath.

9 (Witness sworn.)

10 THE COURT: All right. I believe you've
11 heard me repeat this a few times, but just in case,
12 a reminder, everything we do is recorded, audio
13 only. So when you respond, just make sure you speak
14 into the microphone, and when you respond, use
15 words, "yes" and "no."

16 THE WITNESS: Yes, Your Honor.

17 THE COURT: All right. Thank you.

18 All right. Whenever you're ready.

19 MS. ROGERS: Thanks, Your Honor.

20

21 JONATHAN KATZ, Ph.D.,
22 called as a witness, being first duly sworn,
23 was examined and testified as follows:

24 ***

25 ***

DIRECT EXAMINATION

BY MS. ROGERS:

Q. Good morning, Dr. Katz. Appreciate you being here today.

A. Good morning.

Q. Could you first just start out by stating your name for the record, please?

A. Jonathan Neil Katz.

Q. Thanks.

Could you tell us what you do for a living, Dr. Katz?

A. I am the Kay Sugahara Professor of Social Sciences and Statistics at the California Institute of Technology, more colloquially known as Caltech.

Q. And how long have you been there?

A. Too long. Thirty years with a two-and-a-half year hiatus trying to solve joint career issues with my spouse.

Q. And could you briefly describe your educational background?

A. Sure. I did my undergraduate degree at MIT. I then did my master's and Ph.D. in political science at UC San Diego. I was a postdoctoral fellow at Harvard, then joined the Caltech faculty in July of '95.

1 Q. And have you served as an expert in
2 redistricting cases before?

3 A. Yes, many, going back to 1998.

4 Q. Okay. And has that been for both
5 Republicans, Democrats, across the board?

6 A. Yeah, I've worked for Democrats,
7 Republicans, independent agencies; I've been a
8 consultant to independent redistricting commissions.

9 Q. And were there partisan gerrymandering
10 claims in any of those cases?

11 A. Sure. The most recent ones, both -- I
12 never remember the case names, I refer to them by
13 their states -- Oregon and New York. So New York
14 was a full trial.

15 Oregon had -- when they amended their
16 constitution for how they do redistricting, the
17 state supreme court hears it as a sort of special --
18 not as a judicial matter, but as a sort of
19 administrative matter to make sure the plans meet
20 the terms of the statute.

21 Q. Got it.

22 You've been retained by legislative
23 defendants in this case; is that right?

24 A. That is correct.

25 Q. And what were you asked to do?

1 A. I was asked to basically give opinions
2 about how political scientists and statisticians
3 measure partisan fairness in electoral maps.

4 Q. And did you arrive at any conclusions?

5 A. Yes. Based on work I've done for a long
6 time but most recently with Gary King and Elizabeth
7 Rosenblatt, the accepted standard for how we measure
8 fairness of maps is partisan symmetry, and that --
9 although -- which basically just means that the
10 party should get -- for the same expected vote
11 share, for the same average vote share, they should
12 get roughly the same seat share.

13 In addition, there were -- in recent
14 academic literature in response to some conditions,
15 there were alternative measures of partisan fairness
16 put forward, and we show in this paper that appeared
17 in the American Political Science Review that
18 that -- unfortunately, these measures do -- while
19 some of them measure some aspects of the electoral
20 system, none of them fully measure partisan
21 symmetry.

22 Q. Got it.

23 So you mentioned this paper that you've
24 published. Could you read the title, or could you
25 remind us of the title?

1 A. Oh, you want me to remember the title of
2 the paper I wrote? I'd have to look at my vitae.

3 MS. ROGERS: Your Honor, it's Defense
4 Exhibit -- let's see -- Defense Exhibit 10, for your
5 reference.

6 THE WITNESS: Oh, sorry.

7 Q. (By Ms. Rogers) That's okay. We can --
8 don't worry about the title.

9 A. Yeah. Oh, here it is. "How to Evaluate
10 Measures of Partisan Fairness for Legislative
11 Redistricting."

12 We changed the title several times during
13 the writing process, so...

14 Q. Sure. Sure.

15 Could you just briefly describe your
16 findings in this article?

17 A. Again, the paper has a few components.
18 It's quite technical. It tries to lay out the
19 mathematical or statistical assumptions that
20 underlie partisan symmetry. It then talks about how
21 do we measure partisan symmetry using the
22 seats-votes curve and how we estimate that.

23 In particular, it then goes on to evaluate
24 the estimation strategy, because in order to
25 calculate partisan symmetry, or more typically

1 called partisan bias, we need to do a counterfactual
2 estimation, we need to know -- so if the Democrats
3 got 55 percent of the vote in some election, we need
4 to know what would have happened in that map if the
5 Republicans had. The way we do so is with an
6 assumption -- the basic assumption is called uniform
7 partisan swing. Actually, in practice, we use a
8 generalization of that called stochastic uniform
9 partisan swing. The technical details don't
10 particularly matter. We show that that assumption
11 actually -- and how to sample forecasts of next
12 elections, in fact, although very simple, in fact,
13 leads to very robust and accurate forecasts of
14 district-level vote shares.

15 We then -- the final section goes on to
16 evaluate these other proposed measures that had
17 recently appeared in the literature.

18 Q. Got it.

19 MS. ROGERS: Well, we'll talk about all
20 that a little bit more in detail, but first, Your
21 Honor, legislative defendants offer Dr. Jonathan
22 N. Katz as an expert in statistical methods and
23 redistricting, as we've already stipulated to his
24 qualifications.

25 THE COURT: And there's no objection?

1 MR. MULJI: No objection, Your Honor.

2 THE COURT: All right. Please proceed.

3 MS. ROGERS: Thank you.

4 Q. (By Ms. Rogers) So just to start out and
5 just get an overview, could you describe what is
6 partisan symmetry?

7 A. So partisan symmetry, as I kind of alluded
8 to already, is the idea that -- let me go back.

9 Political scientists, when they talk about
10 how votes are turned into seats, we talk about a
11 seats-votes curve. And that's a fancy word, but it
12 really just means it's a -- it's a table that says,
13 for a given vote share, what expected seat share do
14 we think a given party should win.

15 So what partisan symmetry requires in a
16 two-party system, like in the U.S., is that the
17 seats-votes curve for the Democrats and the
18 Republicans be the same. Deviations from that is
19 referred to as partisan bias.

20 Now, partisan bias is a little bit -- so
21 we talked about symmetry across the entire curve.
22 Partisan bias is a summary that is measured either
23 at a given vote share or a given -- or averaged over
24 a given range of vote share.

25 The other component that comes into play,

1 not with regard to fairness, is the responsiveness
2 of the curve, which basically just says if the
3 Republicans get 1 percent more vote share, on
4 average, how many more seats they get.

5 Given that we have a single-member
6 district system in the U.S. and in Utah, typically
7 they get more than one seat. It's not proportional.

8 Q. Is there a difference between this idea of
9 proportionality and symmetry?

10 A. Yeah. As I've already alluded to,
11 single -- first-past-the-post single-member district
12 systems, which is the formal political science name
13 for the system we use in the United States for
14 electing members of Congress, typically are not
15 proportional. There are separate proportional
16 representation systems that try to, as best as
17 possible, given constraints, allocate 1 percent of
18 seat leads to roughly 1 percent of -- 1 percent of
19 vote leads to roughly 1 percent of seat.

20 Of course, the problem is always the sort
21 of integer problem. We can't -- if you get 55.7
22 percent of the vote, we can't give you seven-tenths
23 of a seat. So there's some technical details you
24 have to worry about, and that's how the methods vary
25 about how they resolve that.

1 But there's -- but in general, we've known
2 for a long time, going back to Edward Tufte in the
3 1970s, that first-past-the-post single-member
4 district systems will typically award much more
5 seats to the majority -- the winning majority party.

6 Q. Sure. So could you just describe --
7 you've talked about it a little bit, but what is
8 partisan bias measuring?

9 A. So, recall -- we'll say the system is fair
10 if the seats-votes curve is the same.
11 Mathematically, that means that they're symmetric.
12 That's all "symmetric" means. Because that's a hard
13 thing to -- that's a whole function, and we -- most
14 people, except nerds like me, don't think about
15 entire functions, it's easier to think about
16 deviations from symmetry at given points. So that's
17 partisan bias. It's just saying how many more seats
18 do you get. So partisan bias.

19 So if the Republicans get 55 percent of
20 the vote and get 60 percent of the seats, that's
21 fair. So if -- it would have zero partisan bias.
22 If it had 55 percent of the votes, the Democrats get
23 roughly 60 percent of the seats.

24 Suppose they only got 55 percent of the
25 seats. Then we would say the bias is 2.5 percentage

1 points, because that's the swing to move it back to
2 zero, or symmetry.

3 Q. Got it.

4 Have there been any scholarly criticisms
5 of your work on partisan bias?

6 A. Yeah, I would say it's a more general one,
7 but DeFord, et al., which is referenced in my
8 report, raised some concerns.

9 We have some very deep mathematical
10 differences with them, but what probably is of most
11 interest to this Court is they give -- because it's
12 related to redistricting in Utah, they give some
13 simple examples of four-district legislatures, which
14 has an average vote share of 25 percent for the
15 Democrats, in one of those hypothetical district
16 maps.

17 So a district map is just what we expect
18 the vote should be in each district on average. Of
19 course, in an actual election, it will vary, right?
20 There's good years for Democrats, there's bad years
21 for Democrats, but on average.

22 And in one of those maps, the Democrat
23 wins the seat, and they are surprised by the fact
24 that the map in which the Democrats win one seat
25 shows partisan bias at a half, whereas a map where

1 the Republicans win all four seats -- so the
2 Democrats win zero seats -- shows no bias at 50
3 percent.

4 And there's lots of problems with their
5 reasoning, but for -- the most important one for
6 this Court is what they're doing is they're sneaking
7 in to a notion of fairness proportionality, right?
8 So it sounds like it should be fair. The Democrats
9 got 25 percent of the vote, one seat is worth 25
10 percent of the seats, so they should win that. That
11 would be true if the U.S. had a proportional
12 representation system. We don't. So typically, the
13 majority party will get more seats.

14 So in order for you to sneak in at this
15 low average vote share for the Democrats to win one
16 seat, you need to pay for it, and you pay for it
17 because you're distorting the seats-votes curve at
18 other points along the voting curve. In particular,
19 at one -- at a half. So it shows partisan bias at a
20 half even though they've won one seat.

21 Q. So would you -- when we look at this
22 three-to-one seat, this outcome that's described in
23 DeFord, et al., is that -- would you call that a
24 fair outcome under the symmetry test? Or how do we
25 know whether it's fair?

1 A. No, it's not fair, because under the
2 symmetry standard, they're inducing at least a
3 partisan bias, a non-zero partisan bias, at some
4 point along the seats-votes curve. So there's
5 asymmetry at least at one point. There are actually
6 asymmetries along multiple points, but one is
7 sufficient to show that it's not fair.

8 Q. Sure.

9 And what does it mean to say that it's not
10 fair along the symmetry curve? How does -- does it
11 treat the parties differently? Or what does that
12 look like?

13 A. Good question. So that literally means as
14 it sounds. We're not treating the two parties the
15 same. So if they were to receive the same vote
16 share -- so in the hypothetical world where the
17 Democrats and Republicans in this four-person
18 delegation (inaudible) with the votes, under the map
19 where they won one seat, when the average vote share
20 was 25 percent, the map would actually be biased in
21 favor of Democrats.

22 Q. Got it.

23 You mentioned that some other measures of
24 partisan symmetry have been proposed. Could you
25 just describe, what are those other measures?

1 A. Sure. There have been lots, because --
2 recall that estimating symmetry is hard. We need to
3 think about this counterfactual estimation, which,
4 unless you're, again, a stats person like me, is not
5 something you probably think about.

6 So a bunch of people in the literature
7 have proposed various measures which look like
8 simple calculations and don't seem to require this
9 counterfactual estimation. We've heard some of
10 those yesterday in court. The mean-median test,
11 lopsided outcomes test, declination, and the
12 efficiency gap are the most prominent ones that have
13 been used.

14 Q. And what do you think of those other
15 measures?

16 A. Some of them have interesting things to
17 say about the electoral system, but as we've shown
18 mathematically, formally, none of them completely
19 characterize partisan symmetry. And, actually, some
20 of them fail completely.

21 Q. Sure.

22 So which ones fail completely?

23 A. Well, let's start with the one that does
24 something reasonable. So -- I like to start with
25 the positive.

1 The mean-median test is a -- in
2 statistics, we would call it -- it's a great test
3 statistic for the hypothesis, the null hypothesis
4 formally, that the bias at 50 percent is zero.
5 So if we calculate the mean-median, recall, which is
6 we take the mean vote share across all the
7 districts, say, for the Democrats, and we take the
8 median of that, and we compare those two numbers, if
9 they're different, that's just asymmetry in vote
10 share, which Dr. Warshaw mentioned yesterday in his
11 testimony.

12 But really all that matters, if that's
13 zero -- or close to zero in a statistical sense,
14 because we have uncertainty, then we know that
15 partisan bias at a half needs to be zero. We didn't
16 have to do this whole counterfactual estimation, we
17 can just know if it's non-zero -- that is, if it's
18 positive or negative -- the plan shows partisan bias
19 at a half.

20 The problem is, that's all it does. So
21 suppose I get a very large positive mean-median
22 test. That doesn't tell me anything about how
23 far -- how far the deviation is from symmetry, it
24 just says there's at least at partisan vote shares
25 of half, we don't know what it is.

1 Q. Sure. Sure.

2 What about some of the other measures? I
3 think you mentioned declination, lopsided outcomes,
4 efficiency gap.

5 A. Yeah, lopsided outcome, as the name
6 suggests, you compare sort of the average outcome
7 and the sort of big wins for the Dems -- Democratic
8 districts versus Republicans. Again, it has the
9 same notion of thinking about packing voters --
10 right -- because that's a common partisan
11 gerrymandering strategy -- and it -- so it sounds --
12 has this nice intuition.

13 Unfortunately, as we show formally, we can
14 show that it doesn't imply a coherent -- that is, a
15 mathematically well-defined seats-votes curve -- so
16 it can't measure partisan symmetry; and, therefore,
17 derive measures of partisan symmetry like partisan
18 bias.

19 The same issues with declination.
20 Declination is the most difficult, and, actually,
21 I've actually never seen it really used much in
22 practice. I've seen it used in academic articles.
23 It's based on the geometry of the vote share, and,
24 again, much like the lopsided outcome, we show that
25 it implies an incoherent seats-votes share. So,

1 again, it doesn't measure anything regarding
2 partisan symmetry.

3 And the last one, the one that's received
4 probably the most use in practice and in the
5 academic literature, is the efficiency gap.

6 Q. Can you tell us just a little bit about
7 what the efficiency gap tests for?

8 A. Yes. Again, the efficiency gap -- again,
9 Dr. Warshaw went through this somewhat in his
10 testimony -- has a nice intuition, right?

11 So, again, think about the strategy of
12 pack-- of -- common strategy for making a plan
13 biased in favor of a party is you win as many
14 districts as you can with just enough, so 50-plus,
15 some safety margin, whatever you -- whatever the
16 re-drawer thinks is -- the future swings might look
17 like, and if you can't get all the districts, you
18 then pack your opponents into a small number of
19 districts.

20 So what does that mean in practice? Well,
21 what McGhee and Stephanopoulos define it as is
22 there's wasted votes. Right? That is, there's some
23 inefficiency.

24 So the inefficiency happens. Well, in the
25 pack districts, every vote over a half is sort of

1 wasted. That party who's winning that district
2 would rather have moved some of those votes to
3 another district, which might have allowed them to
4 win it.

5 The other wasted vote is if I lose a
6 district. Right? So every vote I lose.

7 So the nice thing is -- this measure has
8 really nice sort of common sense intuition, that it
9 measures this asymmetric distribution of votes
10 across districts. Unfortunately, it doesn't --
11 unlike the claim made by the authors who proposed
12 it, it doesn't, in fact, measure partisan symmetry.

13 There's a technical problem, which, again,
14 was alluded to yesterday, which is, in the original
15 formulation, it requires that turnout be constant
16 across districts, which is demonstrably false in
17 American politics. You can actually -- we show and
18 others have showed you can actually weaken that
19 assumption to basically uncorrelatedness, so the
20 turnout in a given district has to be uncorrelated
21 with how that district votes. That's also a dubious
22 claim, but is less onerous than the blatantly false
23 assumption of turnout being constant across
24 districts.

25 So that's one problem. That was

1 corrected, and, again, we talked about this
2 corrected seats-vote share. But the problem is even
3 in this corrected seats-vote share, the implied
4 seats-votes curve has three terms. It has the ones
5 we care about, which is partisan bias and
6 responsiveness, but it also has the C term, which is
7 basically this -- this term which is zero if there's
8 no correlation between turnout and vote share.

9 The other thing that's odd about the
10 seats-votes curve, which is not talked about enough,
11 is that it requires the responsiveness -- that is,
12 how vote share should change -- how an increase in
13 vote share should increase seat share -- has to be
14 exactly two.

15 So what does this mean in practice?
16 In practice, the vote -- the efficiency gap could be
17 nonzero, either because the C term is nonzero, the
18 responsiveness in the actual plan is not equal to
19 two, or partisan bias is not equal to zero, or any
20 combination.

21 Right? And worse -- right? -- we could
22 get zero partisan -- the efficiency gap could be
23 zero, even though there's positive partisan bias, if
24 either the responsiveness moves in the right
25 direction or the C term moves in the right direction

1 to just offset this bias. Right? Because it's a
2 combination.

3 So basically, the efficiency gap is
4 testing these three conditions simultaneously, which
5 have their own values.

6 Q. So in other words, if we have a positive
7 efficiency gap value or a large efficiency gap, what
8 do we really know?

9 A. Nothing.

10 Q. And does the efficiency gap test partisan
11 symmetry or measure partisan symmetry?

12 A. No, it doesn't. And if you want some
13 practical evidence of this, in the paper that we
14 alluded to at the start of my testimony, the Katz,
15 King, and Rosenblatt 2020, we actually have a data
16 set, a very large data set, from 1968 to 2016 of
17 every state legislative election in the United
18 States. And so what we did is we restricted that to
19 states looking at legislative elections where the --
20 there was at least half the -- half the districts
21 were contested for some statistical reasons.

22 So we ended up with a set of 963
23 legislative elections, and what we did is, for each
24 of those 963 legislative elections, we calculated
25 the efficicent -- the corrected efficiency gap, or

1 turnout corrected efficiency gap, and we calculated
2 partisan bias around a half.

3 Perhaps most interestingly for this Court,
4 if you look at that graph, which is Figure 1 of my
5 report, at -- corrected efficiency gap is zero,
6 suggesting that the plan is fair. In fact, the
7 range of partisan bias ranges from 20 percent in the
8 Democratic direction to minus 20 percent in the --
9 in the (inaudible), which would be -- which are huge
10 gerrymanders. This is, like, bigger than we
11 typically see in court cases.

12 Q. Would you -- would you like to pull up
13 that --

14 A. Sure, it would be great.

15 Q. -- that graphic?

16 MS. ROGERS: Your Honor, we just have --
17 this is from page 11 of Dr. Katz's report.

18 If we can get that on the screen.

19 THE WITNESS: Yeah, so this is the graph.
20 So just how you read it, the corrected efficiency
21 gap is along the horizontal axis, so we just
22 estimated that number from the data -- right? --
23 and then the partisan bias, which is this fancy
24 Greek letter beta, that's the functional name we use
25 for it in our paper, at a half tells us -- is the

1 vertical axis. So a dot is just a combination of,
2 in that legislative election, what was the corrected
3 efficiency gap versus what was the bias.

4 So you can see there's a positive
5 correlation, which you like. That means that
6 there's -- there's some underlying relationship.
7 But for it to be a true measure of partisan bias, we
8 -- all those points should be along the 45-degree
9 line, and you can see they're pretty far from that.

10 Q. (By Ms. Rogers) Right. Right.

11 One more question for you. You've
12 mentioned some of these measures kind of tried to
13 estimate some counterfactual or look at a
14 counterfactual situation. Is this standard within,
15 you know, statistical measures of symmetry?

16 A. It's standard within measures of symmetry,
17 it's standard within statistics in general.
18 Almost -- a large part of modern statistics involves
19 counterfactual estimation. Which we don't need to
20 go into details here, I don't want to put everyone
21 to sleep, but, yes. And what was really interesting
22 that I mentioned at the beginning, this -- how we do
23 this counterfactual estimation is this idea of a
24 uniform partisan swing.

25 So how you should think about it, if we

1 observed the vote share at 30 percent Democratic
2 vote share or 70 percent Democratic -- or Republican
3 vote share in Utah in an election and we wanted to
4 know what it would be at 40 percent Democratic vote
5 share, we would literally just move, on average,
6 every district by 10 percentage points, and that
7 would change the overall average so then we could
8 count up the number of districts in which the Dems
9 win a seat, and we could look -- and we could -- we
10 now know the vote share, so that's another point
11 along this district curve.

12 So, again, this sounds like a really
13 simplistic estimation idea. Why would just -- why
14 would all the districts move together? There's
15 some -- in the paper, we talk about some theory
16 about it, but that's not important. What we show
17 is, out of sample, that this is a really good
18 predictor, that -- how we do that is, again, in this
19 set of -- very large set of state legislative
20 elections, we -- we observe the vote share in a --
21 in one election -- right? -- we observe the average
22 vote share in Utah, in Kansas, in New York, and we
23 observe the seat share they got.

24 Then what we do is, in the next
25 election -- we don't care about the seat share in

1 this case -- we say, suppose that in the next
2 election, the Dems did 5 percent points better than
3 they did in the previous election.

4 So now what we want to do is, with the
5 information about where the districts started in
6 this earlier election and that we know there was a
7 five-point swing, we want to say, How bad is our
8 estimate at the district level? If we just add five
9 percentage points to each district, how off are we?
10 And the answer is not very far off. I think the
11 error is like less than a tenth of a percentage
12 point.

13 And what's more interesting is that, at
14 least over the range of data we have, it doesn't
15 seem to be correlated with how far that swing was.
16 You might think our estimate would get worse if
17 there was a very large swing between the election in
18 2012 and the election in 2014. That's actually not
19 so. It's uncorrelated. Roughly uncorrelated.

20 Q. Got it.

21 Thank you very much, Dr. Katz.

22 MS. ROGERS: No further questions.

23 THE COURT: Alright. Mr. Mulji, cross?

24 THE WITNESS: Your Honor, is it possible
25 for my counsel to hand me another glass of --

1 another bottle of water?

2 THE COURT: Oh, of course. There should
3 be some water there, unless --

4 THE WITNESS: Oh, whichever is -- oh.

5 THE COURT: -- you'd prefer a bottle.

6 THE WITNESS: Whichever is easiest. Thank
7 you.

8 THE COURT: Of course.

9 Whenever you're ready.

10

11 CROSS-EXAMINATION

12 BY MR. MULJI:

13 Q. Good morning, Dr. Katz. My name is Aseem
14 Mulji. I am counsel for the plaintiffs.

15 I think you said you're from Caltech?

16 A. I am.

17 Q. Okay. I live in L.A., so we have a lot in
18 common. We have the same haircut. You're just a
19 smarter version of me; otherwise, the same person.

20 I want to start with the first line of
21 your report, just to clarify the scope of your
22 analysis in this case.

23 You said in your testimony today and it
24 says in the first line of your report that you were
25 asked by counsel in this case to opine on how

1 political scientists measure the partisan --
2 symmetry or partisan fairness of a proposed
3 redistricting map; is that -- is that correct?

4 A. That is correct.

5 Q. Okay. Now, to be clear, in your report,
6 you disclosed no opinion about any of the remedial
7 proposals in this case; is that right?

8 A. Excuse me. That's correct.

9 Q. Okay. And you're not here to offer any
10 opinions on the remedial maps at issue in this
11 hearing?

12 A. I am not.

13 Q. Okay. And just out of curiosity, are
14 you -- you're aware of Proposition 4?

15 A. Vaguely. I haven't read the -- I mean,
16 I've read enough and been in court enough to know
17 roughly what it is, but I haven't studied it
18 carefully.

19 Q. Okay. Have you -- have you been here
20 enough to know that it prohibits dividing districts
21 in a manner that purposefully or unduly favors or
22 disfavors a political party? Does that sound right
23 to you?

24 A. That -- given the testimony and other
25 things I've heard here, that sounds correct.

1 Q. Okay. Fair to say, though, you weren't
2 called here today to opine at all on Proposition 4?

3 A. No, I'm not a lawyer. That's not my area
4 of expertise.

5 Q. Right.

6 For the sake of my questioning today, when
7 I refer to the term "partisan favoritism," can you
8 just understand that what I'm referring to is what
9 Proposition 4 prohibits? So undue -- purposefully
10 or unduly favoring or disfavoring a political party.
11 Does that make sense?

12 A. It makes sense. That's not what I --
13 partisan fairness, in my world, is very clear, it
14 means partisan symmetry.

15 Q. Understood. You have a definition of
16 partisan fairness that you use in your academic
17 work. I just want to make clear that when I say
18 "partisan favoritism," I'm not referring to that,
19 I'm referring to what Proposition 4 specifically
20 prohibits.

21 A. Yeah.

22 Q. Okay.

23 A. I'm not in a position to tell you what
24 Proposition 4 says.

25 Q. Great.

1 Now, you haven't applied any measures of
2 partisan favoritism here to the maps at issue in
3 this case, correct?

4 A. No, I did not estimate partisan symmetry
5 or any other alleged measures of partisan symmetry
6 to maps, remedial or enacted, in Utah.

7 Q. Now, is this -- is this unusual? Is this
8 the first expert report you've written where you've
9 opined on -- where you haven't opined on the
10 redistricting plans at issue in the case?

11 A. Yes. Typically when I've been involved in
12 the four or five cases that have involved partisan
13 gerrymandering, yes, most of -- most of my testimony
14 is about the evaluation of proposed plans.

15 Q. And you would apply the test that you're
16 discussing in whatever report you're writing to the
17 plans at issue?

18 A. That's correct.

19 Q. You didn't apply the partisan bias test in
20 this case to any of the plans?

21 A. That's correct.

22 Q. Okay. And I will just represent to you --
23 and maybe you're aware of this -- that Proposition 4
24 also requires applying the best available data and
25 scientific and statistical methods, including

1 measures of partisan symmetry. Does that sound
2 right to you?

3 A. Again, I'm not a lawyer, and I have not
4 read the text, but given what I've said in here,
5 that seems to be consistent with -- with what at
6 least the lay understanding of the proposition is.

7 Q. Okay. And just to be completely clear,
8 your report doesn't express an opinion about what's
9 included in the best available data and methods that
10 Proposition 4 requires, correct?

11 A. I don't know if I agree with that. I
12 mean, I'm telling you how political scientists, the
13 people who actually study this, do this in the best
14 possible way, given advances in knowledge. So I
15 don't know --

16 Q. You told me you're not a lawyer.

17 A. Correct.

18 Q. You're not expressing an opinion about
19 what methods Proposition 4 contemplates as a matter
20 of law.

21 A. But your statement to me said, "What is
22 the best scientific measures?" And I -- what -- my
23 opinion about it is, what are the best scientific
24 measures for measuring --

25 Q. Dr. Katz, I'm just trying to clarify

1 something very clear here, that -- you've said
2 you're not a lawyer. Proposition 4, as a matter of
3 its terms, defines -- you know, uses the terms "best
4 available data and methods." You're not opining on
5 what Proposition 4, as a legal matter, identifies as
6 the best available data and methods, are you?

7 A. Of course not.

8 Q. Okay. In your opinion -- well, I guess
9 that doesn't disclose an opinion on Proposition 4 at
10 all.

11 A. Correct.

12 Q. Are you aware of SB 1011?

13 A. Again, only through reading -- skimming
14 the reports and listening to testimony.

15 Q. Okay. And from that -- from that -- from
16 listening to the testimony over the last day or so,
17 are you aware that it requires the use of something
18 called the partisan bias test to assess a map's
19 undue partisan favoritism?

20 A. Yes, I've heard that in this court.

21 Q. Okay. And are you aware that it also
22 requires the use of the mean-median difference test?

23 A. Again, I've heard that in this courtroom,
24 yes.

25 Q. Okay. But you haven't reviewed the

1 statutory language?

2 A. Again, I'm not a lawyer, so no way for me
3 to review the statutory language in an expert way.

4 Q. You haven't looked at the statutory
5 language?

6 A. I have not.

7 Q. Okay. You weren't asked to opine on the
8 statutory language when it was being developed in
9 Utah?

10 A. Nope. I -- the first I learned about this
11 was when I was contacted about this case a few weeks
12 ago.

13 Q. When were you first retained in this case?

14 A. I actually don't remember. It was a month
15 ago, maybe.

16 Q. A month ago? So would that have been
17 before October 6th?

18 A. I believe so, but I'd have to go back and
19 check my notes about when Counsel Tyler Green
20 contacted me.

21 Q. Okay. And -- but you -- so just to be
22 clear, you weren't consulted by anyone at the
23 legislature or counsel for legislative defendants on
24 how these tests should be codified and how they were
25 codified ultimately in SB 1011?

1 A. That's correct. I had no involvement.

2 Q. Would you think of yourself as one of the
3 foremost proponents of the partisan fairness -- or,
4 I'm sorry, the partisan bias standard?

5 A. I'm not a proponent. I'm an academic.
6 I'm probably one of the foremost experts on
7 measuring partisan symmetry.

8 Q. But you weren't consulted at all on how
9 the partisan bias test was codified in SB 1011?

10 A. I was not.

11 Q. Now, in your report, you disclose opinions
12 about various measures of partisan fairness in the
13 abstract, but, again, you didn't disclose any
14 opinion about whether or how those measures might
15 apply in Utah?

16 A. I disagree with that.

17 Q. Okay.

18 A. So, yes, I did not estimate anything --

19 Q. Well, let me ask you this: You haven't
20 expressed any opinion as to the partisan bias
21 metrics' applicability in Utah specifically, have
22 you?

23 A. No.

24 Q. Okay.

25 A. In general, I have.

1 Q. You haven't expressed any opinion as to
2 the mean-median difference metrics' applicability in
3 Utah specifically?

4 A. Again, I attest to its general purposes,
5 but not particularly in Utah.

6 Q. You haven't expressed any opinion as to
7 the efficiency gap's applicability in Utah
8 specifically?

9 A. Actually, I have, because I've told you
10 that under no circumstances does the efficiency gap
11 measure partisan symmetry.

12 Q. You haven't opined on the applicability
13 of -- well, let me -- let me ask you this: I took a
14 look at your report, and I "control F"d the word
15 "Utah." I didn't find it.

16 So isn't it true that your report doesn't
17 use the word "Utah" even once?

18 A. Correct.

19 Q. Okay. And is this the only report you've
20 written in a case where you don't opine on -- or you
21 don't even mention the state at issue in the case?

22 A. I've been involved in a lot of cases.
23 Probably, but I haven't checked every one of my
24 cases. Again, typically, I'm retained, as we
25 already discussed, where I'm both opining on the

1 methods and then am asked to implement them in
2 the -- in the given state under the proposed set of
3 maps.

4 Q. In this case, you weren't asked to opine
5 on whether any of these metrics, in fact, would
6 apply in a state like Utah, given Utah's political
7 geography?

8 MS. ROGERS: Objection. Asked and
9 answered.

10 THE COURT: Overruled.

11 THE WITNESS: Again, I talk about their
12 applicability in general, and many of these measures
13 have -- are invalid, so they don't apply anywhere,
14 including Utah.

15 Q. (By Mr. Mulji) I'll take that as a no.

16 Now, I want to turn to the partisan --
17 well, actually, before I do that, I will represent
18 to you that SB 1011 defines a congressional map to
19 fail the partisan bias test, as it's defined, if the
20 party's seat share after a uniform swing at 50/50 is
21 not exactly 50 percent or two congressional seats.

22 Are you aware of that?

23 A. Again, from what testimony I've heard
24 here, that sounds correct.

25 Q. Okay. But -- and you understand what I've

1 said --

2 A. Am I --

3 Q. -- about how that test works?

4 A. Yes, I do.

5 Q. Okay. And similarly, are you aware that
6 SB 1011 also deems a congressional map to fail the
7 mean-median difference test if it falls outside of 2
8 percent in either direction?

9 A. Again, I've heard testimony to that fact,
10 so, yes.

11 Q. Okay. Do you agree that quantitative,
12 bright-line rules like this are not how political
13 scientists generally draw conclusions about partisan
14 fairness of a redistricting plan?

15 A. Again, yes, in general, we would include
16 measures of statistical uncertainty because we don't
17 know what partisan bias is in some future election
18 or what the mean-median test would be in some future
19 election, so we would want to quantify our
20 uncertainty.

21 Q. But you wouldn't rely on one or two
22 knife-edge, bright-line rules about where it falls
23 in a particular metric and use that sole -- only to
24 conclude that the plan includes a partisan
25 gerrymander, would you?

1 A. Again, in my research, no. What a
2 policymaker, a court, or a legislature would want to
3 do, that's theirs, but that's not what I would do in
4 my research.

5 Q. And is that what political scientists
6 would do if they were asked to evaluate a plan
7 for -- as a partisan gerrymander? You wouldn't rely
8 on one metric or two metrics and whether they fall
9 in a particular spot or threshold, right?

10 A. Again, I don't think that's an accurate
11 characterization. What I would do is I would fit
12 the best possible -- I'd take the data, fit the best
13 possible model, I would present those measures and
14 their statistical uncertainty, I would use measures
15 that I know to be valid.

16 So in this case, what I would estimate if
17 I were doing a complete analysis of the Utah maps is
18 I would present analysis of partisan bias evaluated
19 at various points along the seats-votes curve.

20 Q. I want to turn your attention to an
21 article that you wrote. You discussed the Katz, et
22 al., 2020 article -- correct? -- and you cited that
23 frequently in your report.

24 I think you also cited an article from
25 2023, Katz, King, and Rosenblatt. Do you recall

1 that article?

2 A. Yes. That was the response to the DeFord,
3 et al., critique.

4 Q. Okay. Great.

5 I want to -- I want to pull that article
6 up.

7 MR. MULJI: And I don't recall, actually,
8 if defendants have entered that as an exhibit.

9 MS. ROGERS: We have not.

10 MR. MULJI: You have not? Okay. So let
11 me go ahead and do that.

12 This has been marked as Exhibit 9.

13 THE COURT: Thank you.

14 MR. MULJI: Plaintiffs' Exhibit 9.

15 May I approach the witness?

16 THE COURT: Yes.

17 THE WITNESS: Thank you, Counsel.

18 Q. (By Mr. Mulji) Dr. Katz, I want to draw
19 your attention to page 330 of this article.

20 And before I turn to anything specific, do
21 you recognize this to be the article that you wrote
22 in response to the DeFord article?

23 A. I do.

24 Q. And that's "The Essential Role of
25 Statistical Inference in Evaluating Electoral

1 Systems, a response to DeFord, et al."?

2 A. That's correct.

3 Q. Great.

4 Now, I want to turn your attention to the
5 third full paragraph of this article -- or of this
6 page. I'm going to read the first line to you. It
7 says: "Finally, many of the issues in DeFord, et
8 al., result from its goal of a single quantitative
9 bright-line rule for detecting gerrymandering, which
10 is unusual in academia or the courts"; is that
11 right?

12 A. Correct.

13 Q. You go on to say: "In the literature on
14 electoral systems, as in most academic fields,
15 scholars avoid drawing conclusions from a single
16 source" -- "from single sources of evidence or
17 knife-edged quantitative thresholds, and instead
18 seek broader understanding from all available
19 observable implications of a theory," correct?

20 A. Correct.

21 Q. Do you stand by that?

22 A. Yes, I do.

23 Q. "Similarly, few legal tests adopted by the
24 courts employ bright-line rules based on
25 quantitative measures alone. Instead, quantitative

1 tests are typically employed as part of a
2 multi-pronged factor test"; is that correct?

3 A. That's what it says, and I agree with
4 that.

5 Q. You agree with that.

6 I read this to you because I noticed that
7 it was not included in the report that you submitted
8 to the Court. My understanding is that the -- that
9 the report you submitted to the Court is about how
10 political scientists evaluate the partisan fairness
11 of redistricting plans. Correct?

12 A. Correct.

13 Q. Now, were you -- have you read the reports
14 of Dr. Barber and Dr. Warshaw?

15 A. I've skimmed Dr. Warshaw's. I have not
16 read Dr. Barber's.

17 Q. Well, Dr. Barber included, you know, some
18 acknowledgment here that depending on a single
19 measure is not typically what political scientists
20 do and not typically what courts ought to do. Are
21 you aware of that?

22 A. I am not, since I didn't read his report.

23 Q. Okay. Well, you didn't do that here in
24 your report, did you?

25 A. I don't know what "that" is. Could you be

1 a little more specific, please?

2 Q. Yes. An acknowledgment that relying on a
3 single measure is not how political scientists
4 generally conceive of whether a plan includes a
5 partisan -- whether a plan is a partisan
6 gerrymander.

7 A. I agree with that, with one caveat,
8 though. I wouldn't use "one measure," I would use
9 "one bit of evidence."

10 Q. Okay. Now I want to keep reading. I want
11 to draw to your attention -- you said at the end of
12 this paragraph: "In each of these legal fields,
13 quantitative measures are employed as one element of
14 a holistic evaluation. In the many situations where
15 partisan symmetry has been employed by courts, it is
16 one substantive prong in evaluating the fairness of
17 redistricting plans alongside an evaluation of
18 procedural fairness and other concerns"; is that
19 correct?

20 A. Correct.

21 Q. Okay. Let's talk a little more
22 specifically about partisan bias.

23 A. I'm sorry, Counsel, I don't mean to cut
24 you off. Are we done with this? Should I put this
25 away, or do you want me to use it?

1 Q. I think we're done for now. I may come
2 back to it.

3 A. Great. Thank you very much.

4 Q. Now, like I said, the partisan bias metric
5 is a metric that's been codified in SB 1011. You
6 know that, correct?

7 A. Yes, we've discussed that.

8 Q. Right.

9 And am I correct in saying that Gary King
10 is one of the original authors of this partisan bias
11 test or the concept of partisan bias? Is that -- am
12 I getting the academic history right?

13 A. Not quite. So the idea of partisan bias
14 goes back almost 75 years. Actually, longer than --
15 Gary's a little older than I am. Neither of us are
16 young, but he's not 75.

17 What Gary King and his coauthor, Andrew
18 Gelman, who has also been a frequent coauthor of
19 mine, did in the early '90s was to generate what is
20 now the sort of canonical statistical model we use
21 to evaluate legislative elections, and then they use
22 that legislative -- that statistical model to
23 evaluate various points of interest that scholars or
24 others would be interested in. One of them happens
25 to be partisan bias.

1 Q. Okay. So partisan bias, at least in the
2 sort of more recent scholarly literature, sort of
3 originated -- at least the version where you look at
4 the 50/50 hypothetical and use a uniform swing, is
5 that -- that sort of originated -- or at least Gary
6 King is one of the proponents of it, yes?

7 A. Again, I like to be very clear. So, yes,
8 he developed -- Andrew -- Gary King and Andrew
9 Gelman developed the models. There's nothing --
10 50/50 is used because it's an easy point, because
11 it's the only point of the seats-votes curve where I
12 basically don't have to do two counterfactual
13 estimations, because at 50/50, we observe both
14 parties getting the same vote, so the only fair
15 outcome under partisan symmetry says they have to
16 be -- they both have to get roughly 50 percent of
17 the seats. So they don't --

18 Q. I'm sorry to interrupt.

19 A. -- require --

20 Q. So the -- that test, this partisan bias
21 test where you look at the 50/50 hypothetical and
22 you do a uniform swing, that was eventually sort of
23 proposed to courts, correct?

24 A. I'm --

25 Q. Are you aware of --

1 A. -- unaware of what -- I've -- I've not
2 proposed that to courts. I don't know who --

3 Q. Fair enough.

4 A. I proposed looking at partisan symmetry
5 and looking at seats-votes curves --

6 Q. Okay.

7 A. -- and 50/50 is one point. We should look
8 at multiple points, typically.

9 Q. And you're now aware that that 50/50 is
10 where -- the SB 1011 test, where it tells you to
11 look, as the --

12 A. Again, I assume --

13 Q. -- counterfactual 50/50?

14 A. Yes, I -- given our discussion.

15 Q. Okay. Well, are you aware of an
16 article -- isn't it true that in -- well, are you
17 aware of the article in Election Law Journal titled
18 "The Future of Partisan Symmetry as a Judicial Test
19 for Partisan Gerrymandering after LULAC versus
20 Perry"?

21 A. Is that the one by King and Grofman?

22 Q. Exactly. Yeah, it's the -- it's -- I
23 think it was 2007. Does that sound right?

24 A. Sounds roughly right.

25 Q. Okay.

1 A. I haven't read it in a long time, but yes.

2 Q. Isn't it true that in that article,
3 Dr. King clarified that he only proposed this
4 test -- at least he did -- as a test to find
5 jurisdictions where it's reasonable to assume that
6 elections can be competitive?

7 A. Yes, but to be fair, that's -- that was
8 in 2007. The two -- our 2020 article revisits this
9 when we have more knowledge.

10 So we codify that in this assumption too,
11 which we call "rotation in office," and the central
12 concern that Gary King did and that we're concerned
13 about is as we fit a model to the data, if we're
14 going to then forecast what's going to happen very
15 far -- so let's put this in concrete terms in Utah.
16 We observe Democratic vote shares around 35 percent,
17 and we want to know what would happen if the
18 Democrats were to get 50 percent.

19 We rely very heavily on the modeling
20 assumptions. That's the -- that's a general rule we
21 can surmount. What we did and what caused Gary
22 to -- or me, at least. I can't speak for Gary,
23 that's hearsay -- is that we actually tested the
24 uniform partisan swing and why we show, at least in
25 the range we have, about -- about 10 percentage

1 points that, in fact, partisan swing is a very
2 accurate measure, even in that case.

3 So the world has changed since Gary King
4 and Bernie Grofman wrote their article in 2007.

5 Q. Fair to say, in 2020, you formalized this
6 assumption in some way of competitive elections?

7 A. We both formalized the assumption and
8 tested the estimation assumption.

9 Q. "The estimation assumption" just being
10 uniform swing?

11 A. Yes.

12 Q. Okay.

13 A. Uniform partisan swing.

14 Q. But my question is: You formalized the
15 assumption and you acknowledge there is an
16 assumption that this -- that -- that there are --
17 that there are competitive elections in the
18 jurisdiction where you're applying this partisan
19 bias test.

20 A. Yeah, but we should also be clear that --

21 Q. Well, that was a yes-or-no question.

22 MS. ROGERS: Objection. Interrupting the
23 witness.

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

1 MS. ROGERS: Counsel's interrupting the
2 witness answering the question.

3 THE COURT: Counsel, I'll just caution
4 you, let the witness finish before you begin the
5 next questions.

6 MR. MULJI: Sure thing, Your Honor.

7 THE WITNESS: Just briefly, it's -- the
8 concern -- the assumption, which is a very technical
9 one, is that eventually, in some election, it is
10 feasible that we would observe a vote share, say,
11 above a half. That's -- that's a very weak
12 assumption.

13 Q. (By Mr. Mulji) Now, in that 2020 article,
14 you included -- or there's an online appendix
15 associated with that 2020 article, correct?

16 A. That is correct.

17 Q. And you discuss another version of --
18 another model of partisan symmetry that would apply
19 in jurisdictions where -- that you say have
20 noncompetitive electoral systems; is that correct?

21 A. Yes. It's very brief because of -- that
22 wasn't the main point of the article, but, yes, we
23 did mention that.

24 Q. Okay. Thank you.

25 Now -- and that was online Appendix B,

1 correct?

2 A. I don't -- I don't remember the --
3 which -- there are, I think -- there are -- I think
4 there are seven appendices, so I don't remember
5 which one that is.

6 Q. Okay. Do you recall citing that one in
7 your -- in your report to this Court?

8 A. Yeah, probably.

9 Q. Okay. I will -- I will represent to you
10 that I did not see it, but --

11 A. Oh.

12 Q. Well, why don't we take a look at it now.
13 I'm going to --

14 A. Thank you.

15 Q. Dr. King [sic], I've provided you --

16 A. Dr. Katz.

17 Q. Oh, I'm so sorry. Dr. Katz.

18 Dr. Katz, I've provided you what we have
19 marked as Plaintiffs' Exhibit 8. Do you recognize
20 it to be the online appendix associated with your
21 2020 article?

22 A. I do.

23 Q. Okay. And it's titled "Theoretical
24 Foundations and Empirical Evaluations of Partisan
25 Fairness in District-Based Democracies and Online

1 Premises."

2 A. Correct.

3 Q. I want to turn your attention to page 3 of
4 this exhibit. You explain the purpose of this
5 Appendix B that's titled "Noncompetitive Party
6 System Fairness Standards"; is that right?

7 A. Correct.

8 Q. And in the first sentence, you say: "We
9 address here standards of fairness for electoral
10 systems when one party has an overwhelming majority
11 of votes and is likely to keep it," correct?

12 A. Correct.

13 Q. And you say, going on: "In this
14 situation, the partisan symmetry promise to a
15 minority party of eventually receiving a controlling
16 seat proportion when in a future election the party
17 has more voter support seems empty"; is that
18 correct?

19 A. Correct.

20 Q. And to this problem, you describe another
21 model of fairness called "symmetric democracy with
22 minority party protection"; is that correct?

23 A. Correct.

24 Q. And in this model, you propose that
25 partisan symmetry, as you define it, should be

1 paired with legal rules for protecting minority
2 parties from being locked out altogether from
3 representation; is that right?

4 A. No. We go -- the formal definition was
5 given in one. It's not -- it says that you
6 basically want to have the seats-votes curve still
7 remain to be symmetric, it's the same, but what you
8 might want to do is tamp down -- we don't talk about
9 this usually in terms of partisan fairness, but the
10 responsiveness of the -- of the -- designing the
11 district so the responsiveness of the seats-votes
12 curve is lower.

13 Q. And that's to protect minority parties --

14 A. It could be, yes.

15 Q. -- in certain circumstances?

16 A. That is one use of that.

17 Q. Okay. But would you agree that minority
18 protection is a component of partisan fairness and
19 redistricting in noncompetitive states?

20 A. Again, we have to be very clear about what
21 we mean to be noncompetitive states. So the
22 theorem -- the assumption that we make is that there
23 is some eventuality in which a party could win
24 votes. So we actually more met this for cases where
25 there was legal -- there were legally or

1 nondemocratic systems.

2 So -- but, yes, if it's truly the case
3 that the party is blocked by some -- for some legal
4 structural reason from doing this, then, yes, we'd
5 want to include that in fairness.

6 Q. Okay. Let's take a look at -- actually,
7 let's go back to what we've -- well, the -- what we
8 marked as Plaintiffs' Exhibit 8, the -- your
9 response to the DeFord --

10 A. That's 9, for the record.

11 Q. -- that I said we might come back to.

12 Oh, 9? Oh, is that 9? Oh, I've gone in
13 the reverse order. Apologies. Let's go back to
14 Plaintiffs' Exhibit 9. Thank you.

15 I want to turn your attention to page 329.
16 And I actually want to turn your attention to
17 footnote 3 of this.

18 Now, do you see footnote 3?

19 A. I do.

20 Q. Okay. I'm going to read to you what the
21 first sentence is. "As a reminder, our article
22 formalizes two definitions of electoral system
23 fairness widely used" -- "widely accepted by
24 scholars on all sides of most" -- "adversaries on
25 all sides of most redistricting litigation and those

1 who write legislation and constitutions."

2 Do you see that?

3 A. Correct.

4 Q. You describe competitive electoral systems
5 as one where "each party has a reasonable chance of
6 winning a majority of votes statewide in future
7 elections," correct?

8 A. Correct.

9 Q. And then you define noncompetitive
10 electoral systems as one where "one party is
11 confident of a statewide majority"; is that right?

12 A. Yes.

13 Q. And in those circumstances, you offer the
14 symmetric democracy with a minority party
15 protection, correct?

16 A. Correct.

17 Q. Okay. And you've said just now that
18 that's a component -- that it includes a component
19 of fairness?

20 A. It includes -- it requires a symmetric
21 seats-votes curve and a tamping down of
22 responsiveness, if possible.

23 Q. Now, you've stated at one point somewhere
24 that -- that this model -- well, these two models,
25 this -- there's one that applies to competitive

1 electoral systems, which is symmetric democracy, you
2 said, and one that applies to noncompetitive
3 electoral systems that you called symmetric
4 democracy with minority party protection, correct?

5 A. Correct.

6 Q. Okay. I think you said somewhere that the
7 partisan bias test or -- you know, that one model
8 would be preferred to Republican lawmakers in Utah.
9 Do you recall that?

10 A. Yes. It's -- it was actually mentioned
11 in --

12 Q. Is it on this page?

13 A. It's mentioned in this response to DeFord
14 and --

15 Q. Let's --

16 A. -- DeFord, et al.

17 Q. Apologies. Let's take a look at that.
18 Now, you say in the first paragraph of
19 this page that: "Republican decision-makers in
20 Utah, one of the most Republican states in the
21 nation, favors our symmetric democracy model of
22 electoral systems rather than the symmetric
23 democracy with minority party protection model"; is
24 that right?

25 A. Yes. Although I forget what page that's

1 on.

2 Q. That would be on page 329 of Plaintiffs'
3 Exhibit 9.

4 A. Yes.

5 Q. Okay.

6 THE COURT: Counsel, where were you
7 reading?

8 MR. MULJI: I was reading, Your Honor, on
9 the first paragraph of page 329 in Plaintiffs'
10 Exhibit 9.

11 THE COURT: Okay. Thank you.

12 Q. (By Mr. Mulji) I want to ask you a few
13 questions about the uniform swing assumption. And
14 when I say "uniform swing assumption," am I -- do
15 you understand what I'm asking about or what I'm
16 referring to?

17 A. Yeah, we make a -- the paper you -- we've
18 been discussing at length is -- makes a very clear
19 mathematical definition of what that is.

20 Q. Okay. I am certainly not going to be able
21 to articulate the precise mathematical definition of
22 uniform swing, so I'll have some general questions.

23 First, just to clarify, the partisan bias
24 test, as you understand it to be codified in
25 SB 1011, utilizes this uniform swing in its

1 operation, correct? It relies on the uniform swing
2 assumption?

3 A. Again, to estimate partisan bias requires
4 counterfactual estimation, which we typically use
5 uniform partisan swing, or, more generally, we would
6 actually use stochastic uniform partisan swing.

7 Q. But in SB 1011, is it your understanding
8 that in order to construct the 50/50 hypothetical or
9 counterfactual under whatever map is being
10 evaluated, you shift the party's statewide vote
11 share in every district by the difference between
12 its statewide vote sharing, 50 percent, just the --
13 just the basic uniform swing; is that right?

14 A. Again, I don't know what the text of the
15 law says, but I have no reason to doubt your
16 characterization.

17 Q. Okay. Thank you.

18 Now, this assumes that basically
19 throughout the state -- that basically each precinct
20 uniformly throughout the state would swing toward --
21 would swing in the same way -- right? -- that it
22 would swing sort of uniformly; is that right?

23 A. Again, it's not precinct. The level is at
24 the district. But, yes.

25 Q. Okay. That each district would swing

1 uniformly; is that -- that's correct?

2 A. Correct.

3 Q. Okay. I see.

4 Have you -- you haven't examined whether
5 the uniform swing assumption actually holds in Utah
6 specifically, have you?

7 A. No.

8 Q. Okay. I have another sort of question
9 that you might just need to correct my understanding
10 of because I might not have asked the question
11 exactly right, but is it right that you define
12 partisan bias in terms of the seats-votes curve that
13 you just explained on direct? Is that right?

14 A. Well, we -- so let's be -- I like to be
15 crystal clear. Partisan symmetry requires the
16 seats-votes curve to be symmetric, which means
17 they're the same for both parties. Partisan bias is
18 just a derived measure which tries to quantify
19 deviations from this partisan symmetry.

20 Q. Okay. So in some sense, the partisan bias
21 depends on understanding what the vote-seats curve
22 is, right?

23 A. Right. It actually mathematically
24 requires the estimation of the seats-votes curve.

25 Q. I see. Okay.

1 And one instantiation of that partisan
2 bias is you look at the 50/50 part of the --

3 A. That is one --

4 Q. -- vote-seats curve as --

5 A. Correct.

6 Q. Okay. Now, is it appropriate to try to
7 estimate the vote-seats curve for congressional
8 districts in a single state?

9 A. I don't understand your question. I'm
10 sorry.

11 Q. Well, perhaps I should just point to where
12 I'm asking here -- what I'm asking about here. I --
13 well, maybe a more general question. Is partisan
14 bias appropriate -- an appropriate metric to apply
15 to state and congressional maps?

16 A. Yes.

17 Q. Okay. I want to take you back to
18 Plaintiffs' Exhibit 9, the -- your response to
19 DeFord again, and I want to go to page 329, which
20 is, I think, where we were before.

21 A. Okay.

22 Q. In the last paragraph on page 329 of
23 Plaintiffs' Exhibit 9, you state that: "The
24 seats-votes curve is defined coherently only for all
25 districts in an entire legislature"; is that right?

1 A. Correct.

2 Q. And you say: "For example, Katz, et al.,
3 studied the redistricting conducted by each state of
4 all districts within its state House or Senate,"
5 correct?

6 A. Correct.

7 Q. And you say: "Proper computation or
8 estimation of the seats-votes curve for the U.S.
9 House, as attempted in DeFord at the state level,
10 should instead be performed nationally, even if
11 their goal is to estimate the effects of
12 congressional redistricting conducted in any one
13 state on Congress as a whole"; is that right?

14 A. Yeah, you'd want to use a bunch of
15 information, yes.

16 Q. Okay. And you -- the last thing you say
17 about this is that: "Conducting analyses under the
18 implied assumption that House districts within one
19 state somehow constitute a legislature is not
20 reasonable."

21 A. Correct.

22 Q. Okay. I want to turn to the mean-median
23 difference test. Do you believe that the
24 mean-median difference test is appropriate to apply
25 in a state like Utah, where a single party is

1 dominant and statewide vote shares are pretty far
2 from 50 percent?

3 A. That's irrelevant. The point is it is a
4 test statistic for the -- for a partisan bias at 50
5 percent regardless of the size or the underlying
6 vote distribution.

7 Q. I'm not sure I understand your answer. Do
8 you think it would -- if you were asked to sort of
9 apply the mean-median -- if you were asked
10 whether -- let's say -- let's assume you were asked
11 to evaluate Utah's congressional districts. Would
12 you -- would you -- for the existence of partisan
13 favoritism. Would you think it's appropriate to
14 apply the mean-median difference test to draw any
15 conclusions about that?

16 A. Again, I -- it is a quick test statistic
17 of partisan bias around a half. What I would have
18 done is estimate the entire seats-votes curve.

19 Q. You wouldn't rely just on the mean-median
20 difference test?

21 A. I would do both.

22 Q. Okay. You mentioned that you served as an
23 expert in the New York case?

24 A. Correct.

25 Q. Do you recall writing an expert report in

1 that case?

2 A. I do.

3 Q. Okay. And you served as an expert for the
4 defense in that case, correct?

5 A. Complicated.

6 Q. Okay.

7 A. I was technically the expert witness to
8 state Senate interveners.

9 Q. Okay. So part of the legislature. You
10 were defending New York's -- New York's con- -- or
11 New York's -- the districts at issue in New York. I
12 can't remember which ones they were.

13 A. It was -- yes, it was -- correct. It was
14 the -- yes.

15 Q. Okay. And it was alleged that New York
16 had enacted a partisan gerrymander?

17 A. Correct.

18 Q. Okay. And that was the Harkenrider versus
19 Hochul case? Does that sound right? I know you
20 said you couldn't remember the case names.

21 A. I never remember case names.

22 Q. All right. We won't worry about it.

23 Okay. So I want to actually pull up the
24 report that you submitted in that case.

25 A. Thank you.

1 Q. Dr. Katz -- well...

2 MR. MULJI: Apologies, Your Honor. I'm
3 just trying to find the page where --

4 THE COURT: No problem.

5 MR. MULJI: -- I want to direct our
6 attention.

7 Q. (By Mr. Mulji) Apologies, the page
8 numbers are a little different from the version I
9 had before. But I would direct your attention to
10 page 15 of this exhibit.

11 A. Fifteen of my report? Or the 15th page?

12 Q. Well -- oh, yeah, good question.

13 So, actually, let me just establish for
14 the record that this is Plaintiffs' Exhibit 10.

15 Do you recognize this to be the expert
16 report you submitted --

17 A. Yes --

18 Q. -- in --

19 A. -- although the pagination seems quite
20 different than my original report.

21 Q. I -- I noticed that as well, and I think
22 that was --

23 MR. REYMANN: Your Honor, we had some
24 issues printing this particular document. It had
25 some -- something inside of it, and I -- that may be

1 the reason the page numbers are different. We also
2 have an electronic version that we can share that
3 may fix it.

4 THE COURT: Okay.

5 MR. REYMANN: So I don't think it changed
6 any of the substance, but I didn't have time this
7 morning to go through and compare everything.

8 THE COURT: Okay. I'll just defer to our
9 witness.

10 Q. (By Mr. Mulji) Do you have -- do you have
11 any reason to doubt, Dr. Katz, that this is the
12 expert report you submitted?

13 A. It looks very similar to it, but like I
14 said, the pagination looks just odd to me.

15 Q. Okay. Well, I want to ask you about one
16 line --

17 A. Great.

18 Q. -- and you can tell me if that line comes
19 from your report or not.

20 So I want to turn your attention to what
21 is paginated here as 15.

22 A. Is that the page that starts with an
23 incomplete sentence "discussed before"?

24 Q. Yes.

25 Okay. And I want to turn your attention

1 to the first full paragraph on this page.

2 It starts "As mentioned above." And if you could
3 read the last sentence of that paragraph.

4 A. Sure. "The mean-median test, as noted by
5 Wang, 2016, is not appropriate in a state like New
6 York where a single party's dominant statewide vote
7 shares are far from 50 percent."

8 Q. And do you recall applying the mean-median
9 test -- difference test in this case?

10 A. I do not.

11 Q. Okay. On -- I want to turn back to your
12 report now. I'm sorry, I'm going from document to
13 document very rapidly.

14 Now, on page 9 of your report, you state
15 that: "One way to produce a partisan gerrymander is
16 to pack the other party's voters into a few
17 districts"; is that --

18 A. Where -- I talk about it in several
19 places. Where on page 9? I just don't see the
20 reference you're alluding to.

21 Q. If you look to the third full paragraph --

22 A. Oh, the -- in a discussion of the lopsided
23 outcome test, yes.

24 Q. Exactly. Yes.

25 And I think it's the third sentence of the

1 third full paragraph on page 9 in your report, you
2 say: "This measure seems to have intuitive
3 appeal," and you're talking about the lopsided
4 outcomes test, and you say that that's because one
5 way to produce a partisan gerrymander is to pack the
6 other party's voters into a few districts; is that
7 right?

8 A. That's correct.

9 Q. There's another way to produce a partisan
10 gerrymander known as cracking, correct?

11 A. Correct.

12 Q. You don't mention a cracking gerrymander
13 in this report, do you?

14 A. No.

15 Q. You've offered no opinion in this case on
16 how to assess a cracking gerrymander in a
17 congressional plan in Utah?

18 A. I disagree.

19 Q. Like I said, you haven't expressed any
20 opinions about how to apply any of these tests in
21 Utah specifically, correct?

22 A. Correct.

23 Q. And you don't mention -- you don't discuss
24 cracking gerrymanders in Utah at all?

25 A. I do not discuss cracking gerrymanders in

1 particular, no.

2 Q. Okay. Those are all the questions I have
3 for you, Dr. Katz. Thank you so much.

4 A. Thank you.

5 THE COURT: And redirect, Ms. Rogers.

6 Ms. ROGERS: Thank you, Your Honor.

7

8 REDIRECT EXAMINATION

9 BY MS. ROGERS:

10 Q. Hi again, Dr. Katz.

11 A. Good morning again.

12 Q. First, are you here offering an opinion on
13 the best available statistical methods to measure
14 partisan symmetry?

15 A. Yes.

16 Q. Counsel asked you about a minority
17 protection model. Are you offering a legal opinion
18 on whether the, quote, minority protection model
19 would comply with Proposition 4?

20 A. I'm not. I'm not a lawyer.

21 Q. Counsel also mentioned the New York test.
22 Did you apply the partisan bias test there?

23 A. I estimated partisan symmetry and partisan
24 bias, as well as responsiveness, among other
25 measures.

1 Q. Thank you.

2 MS. ROGERS: That's all.

3 THE COURT: Anything else --

4 MR. MULJI: Nothing further, Your Honor.

5 THE COURT: -- for this witness? All
6 right.

7 Ms. ROGERS: May he be excused?

8 THE COURT: Yes.

9 Dr. Katz, thank you very much for your
10 time and testimony. You are excused.

11 THE WITNESS: You're welcome, Your Honor.

12 THE COURT: Counsel, go ahead and call
13 your next witness.

14 MR. GREEN: Oh, I was just going to ask,
15 any chance we could take a quick ten-minute restroom
16 break?

17 THE COURT: Absolutely.

18 All right. Court will be in recess for
19 ten minutes. And you may remain seated. Thanks.

20 Thank you.

21 (Recess taken.)

22 THE COURT: All right. We are back on the
23 record.

24 MR. REYMANN: Yes. Thank you, Your Honor.
25 Plaintiffs move for admission of their Exhibits 8,

1 9, and 10.

2 THE COURT: Any objection?

3 MS. ROGERS: No objection.

4 THE COURT: All right. Plaintiffs'
5 Exhibits 8, 9, and 10 are admitted.

6 (Plaintiffs' Exhibits 8, 9, and 10
7 received.)

8 THE COURT: All right. Counsel, ready for
9 your next witness?

10 MR. GREEN: Yes, Your Honor. Defendants
11 call Dr. Sean Trende.

12 THE COURT: All right. Dr. Trende, right?
13 Is that correct?

14 DR. TRENDE: Correct, Your Honor.

15 THE COURT: All right. We're going to ask
16 you to provide some testimony under oath.

17 (Witness sworn.)

18 THE CLERK: Thank you. You may take a
19 seat.

20 THE COURT: All right, Dr. Trende.
21 Everything we do is recorded. It's audio only. So
22 my request for you, when you speak, just make sure
23 you're speaking into the microphone. And then when
24 you respond, use words, "yes" and "no." "Uh-huh"
25 and "huh-huh" don't really translate accurately on

1 the record.

2 THE WITNESS: Yes, Your Honor.

3 THE COURT: All right. Thank you.

4 Whenever you're ready.

5 MR. GREEN: Thank you, Your Honor.

6
7 SEAN TRENDE, Ph.D.,
8 called as a witness, being first duly sworn,
9 was examined and testified as follows:

10
11 DIRECT EXAMINATION

12 BY MR. GREEN:

13 Q. Good morning, Dr. Trende.

14 A. Morning.

15 Q. Would you please state your name and spell
16 it for the record?

17 A. Yeah. Sean, S-E-A-N, Trende, T-R-E-N-D-E.

18 Q. Dr. Trende, what is your educational
19 background?

20 A. I got a bachelor's degree in history and
21 political science from Yale. I got a JD from Duke
22 in 2001. And then -- I do have to say it this
23 way -- I got a master's in applied statistics from
24 The Ohio State University in 2019 and a Ph.D. in
25 political science in -- a couple years later.

1 Q. And what is your current occupation?

2 A. I'm the senior elections analyst for
3 RealClearPolitics.

4 Q. How long have you had that job?

5 A. Full-time, since 2010.

6 Q. What do you do there?

7 A. So a lot of what I do is assess the
8 competitiveness of races, particularly for House. I
9 help with our ratings. And then I -- most of what I
10 do is write about the political firmament and
11 articles that try to explain difficult statistical
12 concepts to our general readership.

13 Q. What is RealClearPolitics?

14 A. So RealClearPolitics is a company that
15 puts on a website. We're a company of about 50
16 people. We have our physical offices in D.C., but
17 some of us are spread across the country. I'm in
18 Columbus, Ohio.

19 Q. At RealClearPolitics, do you draw a salary
20 and get benefits?

21 A. Salary and benefits. It's a real company.

22 Q. Have you written any books?

23 A. Yes. I have a book that's about half done
24 that's due on Saturday -- a week from Saturday. So
25 this timing has been less than ideal. But the -- I

1 wrote a book in 2012 called "The Lost Majority"
2 about political coalitions and how they change over
3 time.

4 I've written chapters. Larry Sabato from
5 the Crystal Ball and University of Virginia does
6 retrospective books on elections every two years,
7 and I've written chapters for that every year since,
8 I think, 2014.

9 And then I was a co-author of the 2014
10 Almanac of American Politics.

11 Q. And do you remember what you wrote about
12 in that 2014 book?

13 A. So in 2014, we divide -- that was the --
14 so the 2014 Almanac actually covers the 2012
15 elections, for weird historical reasons. And so
16 that was the redistricting year. We kind of divvied
17 up the states among us, and one of my states was
18 Utah.

19 Q. Have you ever lived in Utah?

20 A. No.

21 Q. Did you have to look into Utah history as
22 part of writing that chapter in the Almanac?

23 A. I did.

24 Q. Have you ever been to Utah before today?

25 A. So I've never, you know, spent months

1 here. I've never, like, worked here, but I've been
2 through it, skied here. I have -- on my honeymoon,
3 we drove back from the West Coast to Virginia, just
4 kind of like stopped at places along the way. Saw
5 the "no services for 100 miles" sign and thought it
6 was going to be a very short marriage because I was
7 afraid we were going to have to do some walking, but
8 thankfully not.

9 Q. So you've visited the state before?

10 A. Yeah, I've driven through it probably four
11 or five times.

12 Q. And you're generally familiar with the
13 state's topography as a result of your visits here?

14 A. Yeah. Yeah.

15 Q. Have you taught any college classes?

16 A. I have.

17 Q. Which ones?

18 A. So I teach -- I'm a lecturer at Ohio
19 State. I teach a variety of classes.

20 The one that's probably the most relevant
21 is a voter participation and turnout class. That
22 class, the first half of it focuses on kind of the
23 political science literature, on the decision, why
24 people choose to turn out, what encourages them, how
25 they make their vote decisions, what causes someone

1 to decide for a vote for a Republican versus a
2 Democrat, especially when people generally have low
3 levels of political knowledge.

4 The second half then ties that in and
5 turns it into a more practical class, turns it --
6 ties it in with kind of the legal framework around
7 voting, and so -- teach the Voting Rights Act, teach
8 partisan gerrymandering.

9 I have the students get on Dave's
10 Redistricting and draw their own maps. That's their
11 final project is they have to -- they get in groups,
12 and they have to do a poster presentation of their
13 favorite map, talk about 14th Amendment cases, and
14 then photo ID and the like.

15 Q. Have you ever been an expert before in any
16 redistricting cases?

17 A. A lot of them.

18 Q. There were a rough number?

19 A. Fifteen to twenty, I would guess, at this
20 point.

21 Q. Those are all listed in your CV?

22 A. Yes.

23 Q. Which is part of your expert report here?

24 A. They should be.

25 Q. Did any of those prior cases involve

1 partisan gerrymandering claims?

2 A. Quite a few of them.

3 Q. Do you remember any in particular?

4 A. So the first ones I was involved in were
5 the Gill v. Whitford and Rucho case that went up to
6 the Supreme Court, revolving around the efficiency
7 gap. I was the witness in the Harkenrider v. Hochul
8 and the Maryland case -- I think it's Szeliga,
9 S-C-E-L-I-G-A [sic]-- that struck down those states'
10 lines as partisan gerrymanders. I've been in quite
11 a few others.

12 Q. Which state was the Harkenrider case?

13 A. Harkenrider was the New York case.

14 Q. And have you ever been appointed to draw
15 districts in other states?

16 A. Yeah, so weird trick of history. I was
17 actually appointed as -- for the Supreme Court of
18 Belize as their court expert in their country's
19 version of Baker v. Carr. I was asked to, you know,
20 evaluate their divisions for malapportionment and
21 see if it complied with international standards of
22 fairness and then draw potential remedial maps.

23 The more domestic one is I was appointed
24 with Dr. Bernie Grofman, who sort of started the
25 entire redistricting litigation. He was the expert

1 witness in Gingles. And we were appointed by the
2 Supreme Court of Virginia to draw that state's
3 congressional State Senate and State House of
4 delegates lines after their independent
5 redistrict -- or I guess it's not really
6 independent. Their redistricting commission
7 deadlocked.

8 Q. Were there any challenges to those
9 Virginia maps?

10 A. No. We're actually pretty proud. It's
11 the only southern state that, at least so far,
12 hasn't been challenged as a political or racial
13 gerrymander or violating the Voting Rights Act.

14 Q. Dr. Trende, your expert report here has
15 been marked as Defendants Exhibit Number 13. That's
16 in that white binder in front of you. Before we
17 talk about the specifics of your report, I just want
18 to ask you, you were retained by the legislative
19 defendants as an expert in this case.

20 A. Yes.

21 Q. What were you retained to do?

22 A. Well, the initial retention was to
23 evaluate the maps as they came in, as they were
24 submitted. Somewhere along the way, one of my
25 suggestions became the map. So it kind of grew over

1 time.

2 Q. So did you end up drawing maps as well?

3 A. I did. I drew or took computer
4 simulations and massaged them, the five maps that
5 were kind of the finalists for consideration.

6 Q. And did you also end up evaluating other
7 maps that were submitted to the legislature?

8 A. Yeah, all of the Independent Redistricting
9 Commission maps and then all of the outside maps
10 that were submitted.

11 Q. Thank you.

12 MR. GREEN: And, Your Honor, I believe we
13 have a stipulation with plaintiffs for this, but
14 defendants would offer Dr. Trende as an exhibit --
15 as an expert, rather. Not as an exhibit.

16 You get to go home, Dr. Trende.

17 THE COURT: I don't think so. We have to
18 keep all of the exhibits.

19 UNIDENTIFIED MALE: Cancel that flight.

20 MR. GREEN: Then I would like to
21 restate -- I would like to restate my offer. We
22 would offer Dr. Trende as an expert in map drawing,
23 statistical and quantitative analysis, and partisan
24 symmetry analysis.

25 THE COURT: Any objection?

1 MR. REYMANN: No objection.

2 THE COURT: All right. Thank you.

3 You may proceed.

4 MR. GREEN: Thank you.

5 Q. (By Mr. Green) And, Dr. Trende, to make
6 sure we're on the same page for the rest of our
7 discussion today, can we have an understanding that
8 we'll call the plan that you drew, that was adopted
9 by the legislature, we'll call that the enacted map?

10 A. Yes.

11 Q. Great. So let's start at the beginning.
12 Before you drew the enacted map, did you review
13 Proposition 4?

14 A. I did.

15 Q. And based on your review of Proposition 4,
16 does that -- what does that require the legislature
17 to follow when it's preparing a redistricting plan?
18 What standards?

19 A. So broadly speaking, I thought it had two
20 sets of provisions. There were the sort of
21 structural standards that governed compactness, city
22 splits, things of that nature. And then there were
23 the partisanship requirements, which, you know, the
24 structural provisions are labeled in little
25 subheadings, and then there's a couple sentences

1 about partisan fairness and intent.

2 Q. Great. Let's -- we'll talk about both of
3 those over the course of the next little bit.

4 Let's start with the structural
5 provisions. Did you list those in your report?

6 A. Yes.

7 Q. Could you turn to page 14 of your report,
8 please? Again, this is Defendants' Exhibit 13.

9 What were those structural -- what you
10 call structural requirements of Prop 4?

11 A. Yeah, so the first one is adherence to the
12 Constitution and federal law. And so that, to me,
13 was the Voting Rights Act, and I didn't see, at
14 least for the congressional district, any Voting
15 Rights Act potential demonstrative districts,
16 minority-majority districts.

17 The second was the equal population
18 requirements.

19 Q. What's the second requirement of Prop 4?

20 A. So the second-slash-second-third
21 requirement is municipal and county splits, with
22 municipal splits prioritized over county splits.

23 Q. Are there any situations in which a county
24 needs to be split?

25 A. Yeah, there's four cities where the

1 boundary of the city overlaps a county boundary,
2 Park City, Draper, Bluffdale, and then one at the
3 southern tip of Utah, which name escapes me. But,
4 yeah, there's four where, if you keep a municipality
5 intact, you're going to split a county.

6 Q. Any other situations where you would need
7 to split a county?

8 A. Those are the ones that I was aware of.
9 Well -- oh, well, so Salt Lake -- yeah, Salt Lake
10 County has more -- has a higher population than an
11 equally populated congressional district. So no
12 matter what you do, Salt Lake County is going to be
13 split once.

14 Q. Did you read Proposition 4 to require the
15 redistricting plan to have zero municipal splits?

16 A. So there's a very literalist
17 interpretation that you can take that says, yeah,
18 all the splits have to be done in unincorporated
19 areas. In my experience, courts don't force that.

20 I was in a case in Missouri where that was
21 the question. The plaintiffs had found -- and this
22 is just my state of mind. You know, obviously, I
23 don't want to intrude on the Court's powers. But
24 when I was drawing this, I was thinking of the
25 Missouri case where someone had come up with a --

1 with a map that had one fewer county split and was a
2 little bit less compact.

3 And the ruling was, well, in this world of
4 computer simulations and generated maps, you're
5 almost always going to find someone that's a little
6 better.

7 I also knew some of the IRC maps had as
8 many as 14 municipal splits, so I didn't interpret
9 this as being a hard minimalization. I tried to
10 keep the maps so that there was one split per
11 district split.

12 Q. I'm sorry. Could I just make sure I
13 understand? One split per district split, meaning?

14 A. So there's four districts, which means
15 there's going to be three lines that split the
16 districts. And so I tried to make it so that there
17 were no more than three municipal splits when I was
18 drawing.

19 I knew, again, that IRC maps had had more.
20 They had more county splits, so you could probably
21 go higher. But I tried to keep it at that three.

22 Q. What was the -- back to the structural
23 requirements. What's the third structural
24 requirement, I guess, in sub C of Prop 4?

25 A. That's the compactness requirement, that

1 the districts be geographically compact.

2 Q. How does a map draw a measure of
3 compactness?

4 A. So this is an ongoing bone of contention
5 in the redistricting committee because there's
6 dozens of measures of compactness that have been
7 proposed over the years. I've typically used four.

8 And the thing about these compactness
9 measures is each one measures a different aspect of
10 compactness. None of them is like a canonical "this
11 is compact." So I used four, the Reock,
12 Polsby-Popper, Convex Hull, and then the
13 I-know-it-when-I-see-it score.

14 Q. And could you just give the Court a brief
15 description of how each of those differ?

16 A. So the Reock score, what it does is you
17 have a district, and the idea is it draws a circle
18 around the district that just touches the corners
19 but doesn't cut the district. It's the minimum
20 bounding circle. And the Reock score is what
21 percentage of that circle that district will fill.

22 And the idea is, as the district gets
23 longer, as it gets more distended, that circle is
24 going to grow and the district is going to fill less
25 of it. So what a Reock score of 0.23 means is that

1 the district fills 23 percent of that minimum
2 bounding circle. But kind of a rough idea of what
3 it is, it's how elongated a district is.

4 The Polsby-Popper says, well, yeah, you
5 could have a perfectly circular district, at least
6 theoretically, that has a Reock score of 1. But if
7 I just go in and start removing census blocks and
8 have this kind of serpentine thing going into it, no
9 human being is going to think that's a compact
10 district, but it'll still have a Reock score of
11 pretty close to 1.

12 So what the Polsby-Popper measure says is,
13 okay. Let's take that district and kind of stretch
14 it out without breaking it until it becomes a
15 circle. What's the -- so you have a circle with the
16 same perimeter as the district. What percentage of
17 that circle with the same perimeter as the district
18 does the district fill?

19 The common-sense interpretation of that
20 is, as the district gets more kind of arms and
21 inlets to it, it's going to expand the perimeter.
22 And that will expand the circle, and the district
23 will fill less of it.

24 So districts with weird arms and inlets to
25 kind of reach out and grab things have worse

1 Polsby-Popper scores. That's what the Polsby-Popper
2 score measures.

3 The Convex Hull score says, what's so
4 great about circles? What if we snapped a rubber
5 band around the district? How much of that polygon
6 would the district fill? It's kind of a mash-up of
7 Reock and Polsby-Popper.

8 And then the final one -- and you can tell
9 that the authors are not lawyers because they never
10 would have named it the I-know-it-when-I-see-it
11 score. It's the worst name for a legal map. It's
12 Aaron Kaufman, Gary King, and Mayya Komisarchik.

13 They developed this measure where they
14 went to practitioners and -- so judges, lawyers,
15 redistricting experts -- and then normal people on
16 the street, and they showed them maps and said, "Do
17 you think this is compact?"

18 And after they get this universe of
19 people -- real people who had looked at maps and
20 said, "Yeah, I think it's compact" or "It's not,"
21 they ran some statistical modeling on it and came up
22 with a number that's supposed to reflect how normal
23 people interpret compactness. And I like it, so I
24 use it as well.

25 Q. Is there something else called the eyeball

1 test?

2 A. So after all is said and done, the Supreme
3 Court, in cases has signed off on just an eyeball
4 test, you look at the map and say, "Is it weird?"

5 And so -- and when most people are
6 drawing, they have some version of the eyeball test
7 in mind as well.

8 Q. Is there any principled cut-off --
9 numerical cut-off for any of these compactness
10 measures?

11 A. So that's one of the problems with them is
12 that there isn't. Like, if you tell me a
13 Polsby-Popper score is 0.3 on one map and 0.26 on
14 another map, all I can say is that the Polsby -- you
15 know, the second map has more arms and inlets, has
16 little weirder boundary.

17 But I can't say, you know, above point --
18 no one can say, "Above 0.2, it's fine. Below 0.2,
19 it's bad." It's unfortunate.

20 Q. So in your experience, then, does this
21 compactness question leave some discretion with the
22 map drawer?

23 A. It really does.

24 Q. Were you here yesterday when Dr. Chen was
25 testifying about compactness and the Polsby-Popper

1 scores?

2 A. Yes.

3 Q. Are those two things the same thing?

4 A. So they're really not. The Polsby-Popper
5 score is not, quote/unquote, compactness as such.
6 It's an aspect of compactness that could be
7 measured, how -- basically what the perimeter -- the
8 relationship between the perimeter of the district
9 and the area of the district is. But there's more
10 to compactness than just that.

11 Q. So did you hear Dr. Chen testify yesterday
12 that some of your maps had really bad Polsby-Popper
13 scores?

14 A. Really bad compactness, yeah, I did.

15 Q. Would you have any response to that?

16 A. Again, I don't really know what that means
17 because the Polsby-Popper scores of the maps range
18 from 0.2 to 0.4. That's a big range, but the maps
19 that I submitted to the legislature range from 0.24
20 to 0.4. The IRC maps have a similar range to them.
21 So this range is kind of in the universe of what
22 real people drawing maps were drawing in, not this
23 narrow 0.42 to 0.46 range.

24 Q. So, then, just to clarify, could you
25 please give me some examples of things that can

1 influence the Polsby-Popper score in particular?

2 A. So that's another -- that's -- there's
3 something really nice about the Polsby-Popper score
4 because I think people do intuit lots of arms and
5 elbows to be a non-compact -- or arms and inlets to
6 be a non-compact district, and when we think about
7 gerrymandering, sometimes we think about arms that
8 go out and they grab a specific area.

9 At the same time, rivers create irregular
10 boundaries. So if you follow that county boundary
11 of San Juan and Grand, which goes along the Colorado
12 River and the Green River, has lots of meanders,
13 that's going to increase the perimeter of your
14 district. It's going to make the Polsby-Popper
15 score worse.

16 Mountain ranges don't go in a straight
17 line. So if your -- if you follow that boundary,
18 one of the county boundaries that's split along the
19 Oquirrh or the Wasatch Mountains, it's going to
20 increase your Polsby-Popper score, even though
21 there's nothing untoward about what you're doing.

22 So, again, I'm not saying these are
23 terrible measures by any respect. You just have to
24 take them in context.

25 Q. Did you have a specific Polsby-Popper

1 score target in mind when you were drawing these
2 districts?

3 A. I didn't. I wanted -- I knew if I made
4 them -- if they looked reasonable, they would come
5 up reasonable on Polsby-Popper scores. If somebody
6 had come up with like a .05 average, that's pretty
7 bad. But no, no hard target.

8 Q. What about the fourth structural criteria
9 in Proposition 4?

10 A. So I was kind of surprised this was as low
11 as it was. Usually this is higher, but contiguity
12 falls below all these other things, and then ease of
13 transportation.

14 Q. Is this a traditional redistricting
15 criteria?

16 A. Contiguity is, which is, again, why I'm
17 surprised it's this low. But ease of
18 transportation, I think people would debate that,
19 but it's in the statute. So...

20 Q. What about the fifth requirement?

21 A. That's the keeping neighborhoods and
22 communities of interest together prong.

23 Q. How did you go about trying to achieve
24 this when you drew your maps?

25 A. So there were -- you know, I've been to

1 Utah. I don't live here. I don't know it as well
2 as a lot of people. What I do know is that
3 political science kind of takes three approaches to
4 communities of interest. My dissertation was on
5 communities of interest and redistricting
6 simulations.

7 The first says, you know, the best way is
8 through counties and municipalities. People tend to
9 live together in their municipality or their county,
10 and so if you're doing a good job with those, you're
11 going to collect a lot of the communities of
12 interest. I think Dr. Chen said something to that
13 effect in his direct.

14 You can do the -- kind of ask people what
15 they think a community is. That's good as long as,
16 you know, people aren't smuggling in partisan goals
17 to their description. You don't want to be that
18 cynical, but sometimes you have to be.

19 And then there's another one, which is
20 using, kind of, factor analysis to find economic and
21 demographic commonalities among census blocks. And
22 the most straightforward one here was the
23 municipalities.

24 There are some other ones that the
25 legislature suggested through you that I think would

1 be good. You know, keeping the Native American
2 reservations intact, I mean, that's straightforward.
3 They have nice, clear, distinct boundaries. Trying
4 to keep military installations and colleges
5 together, again, nice, clear, well-defined
6 boundaries that aren't going to be manipulated by
7 intent.

8 So I did that. Oquirrh and Duchesne
9 Counties were described as kind of an
10 energy-producing region. And I was actually a
11 little skeptical of that one because that could have
12 a partisan impact, but as it turns out, one of the
13 reservations covers most of Duchesne and Uintah
14 Counties, and so it kept them together anyway.

15 Q. And then the sixth structural requirement
16 in Prop 4.

17 A. Following natural and geographic
18 boundaries.

19 Q. In your experience, is this a traditional
20 criteria as well?

21 A. You know, this is usually not defined as
22 part of it, but it's something that we see referred
23 to. It's certainly something I've -- we relied upon
24 in Virginia, trying to keep the Shenandoah Valley
25 together. So it's a reasonable one.

1 Q. Can this one affect the compactness
2 scores?

3 A. Yeah, again, river boundaries, mountain
4 ranges don't go in straight lines.

5 Q. And then what's the final structural
6 requirement?

7 A. That's maximizing boundary agreement.

8 Q. And what does that mean?

9 A. So as I understood that, that's, you know,
10 trying to make sure that the boundaries of the State
11 House districts and the State Senate districts look
12 like the congressional boundaries.

13 Q. So based on your review of those
14 structural criteria, did you understand that the
15 legislature must follow those standards to the
16 greatest extent practicable and in the order they
17 were listed?

18 A. Yes.

19 Q. Did you understand the phrase "greatest
20 extent practicable" to mean the greatest extent
21 possible?

22 A. So I didn't. My understanding pract- --
23 and, again, this is -- I'm looking at the statute.
24 I have to evaluate maps. I can't get an advisory
25 opinion, so I have to use my judgment.

1 "Practicable" is a little bit looser than
2 "possible," because again, "possible" means that you
3 absolutely do not draw maps with any municipal
4 splits. You're forcing unincorporated areas to be
5 split. No more than three counties, which I knew
6 the IRC had done more.

7 You know, technically, if you take a
8 hyper-literalist interpretation, there's only three
9 requirements, because once you've drawn the most --
10 you know, fewest county splits, municipal splits,
11 and the most compact district, anything else should
12 either already be included because of its
13 compactness, or if you have to deviate from
14 compactness, you wouldn't be allowed -- to keep a
15 community of interest together, you wouldn't be
16 allowed to do it.

17 That's what, like, a literalist
18 interpretation of "possible" forces you in. Now,
19 maybe the Court will adopt that. That's the Court's
20 discretion, but when I was interpreting it, that's
21 not how I interpreted it. I thought there was some
22 discretion built in.

23 Q. So, in your opinion, did you follow the
24 structural criteria to the greatest extent
25 practicable when you drew the enacted map?

1 A. Yes.

2 Q. And why did you do that?

3 A. Because I was, you know, trying to make
4 sure that -- I didn't want to be here. I was trying
5 to draw maps that would easily comply with at least
6 the structural requirements of Utah law.

7 Q. And I want to make sure I heard your
8 earlier testimony correctly. You testified you'd
9 been an expert in about 15 or so cases? 15 to 20
10 cases?

11 A. I think that's right.

12 Q. In your experience in those cases, have
13 you seen a lot of different legal interpretations
14 and arguments related to those criteria?

15 A. Yeah. You want to say these things are
16 cut and dried, and you quickly learn they are not.

17 Q. Was that your same opinion about
18 Proposition 4 as well?

19 A. Yeah. So, for example, one thing I
20 learned to my displeasure in Florida is that there's
21 a ruling from the Supreme Court of Florida from
22 their gerrymandering -- their big gerrymandering
23 case that if you split a county but you split it
24 with unpopulated precincts, that that doesn't count
25 as a county split.

1 Okay. I mean, that's Florida law, and so
2 there's a reasonable court that's come up with that
3 interpretation. So those are the types of judgment
4 calls you then find yourself having to make in this
5 situation.

6 Q. And you didn't see -- well, let me ask it
7 this way: Did you see any Utah-specific law
8 governing those kinds of judgment calls?

9 A. No. And there were things -- like I said,
10 the -- there are cities that cross county
11 boundaries. What do you do about that? And so my
12 interpretation was -- there's two ways you can do
13 it. You can say, "Well, if a city crosses a county
14 boundary, you count that as a county split."

15 That kind of forces the map, then, to have
16 at least a split of Utah and Salt Lake County, and
17 it forces one of your splits to be of Utah and, I
18 guess, Juab County.

19 And maybe that's what the law does, but I
20 thought, because municipal splits were expressly
21 prioritized above county splits, that in the
22 instances where you're splitting one of those
23 cities, as long as you don't then go further into
24 the district, you didn't count it as a county split,
25 just because of how it was prioritized. I may be

1 wrong, but that's how I looked at it.

2 Q. So after you looked at all those criteria,
3 you had them in mind, walk us through how you drew
4 the map, the enacted map.

5 A. So, again, there were a couple of
6 different looks that I submitted. The way that I
7 approached the map that ended up becoming the
8 enacted map was I looked at the map the legislature
9 had enacted, and I noted that, you know, the
10 problems with it in the decision I read were
11 process-based.

12 And so I asked myself, "Well, if I fix all
13 these -- the legislature knows things on the ground
14 that I don't know. If I can fix the structural
15 problems with this map, and as I do it, it ends up
16 fixing the partisan fairness and any intent
17 problems, that seems like a good idea."

18 Because I'm -- to the extent the
19 legislature has legitimate goals in keeping things
20 together, keeping school districts or things I don't
21 know about, that seems good. So let's see if I can
22 do it.

23 Q. And did you try to do that, then?

24 A. I did. So I started in Salt Lake County
25 because I saw that four-way split and I figured that

1 is probably the first thing that jumps off the page
2 is, you know, "I don't like this."

3 So there were kind of two things I could
4 do. I could join them together on an east-west
5 axis, the four quadrants -- or I knew Salt Lake City
6 had to be split, so there were going to be two
7 districts -- or join them together on the
8 north-south axis.

9 And so I melted together the portions of
10 Salt Lake County that were in District 2 with
11 District 4, and the portions of Salt Lake County
12 that were in District 1 with District 3. For
13 compactness reasons, it made sense to put the
14 western half -- more sense to put the western half
15 in with District 4, the -- District 2 than
16 District 4.

17 And for the same reason, it made more
18 sense to put the eastern half in with District 3
19 than it did with District 1. If you didn't do it
20 that way, you got weird-looking appendages that made
21 the compactness measures bad.

22 At that point, Salt Lake City was badly
23 split. I figured people probably wouldn't like
24 that. So I put Salt Lake City in with District 1,
25 which was the one that had the least population

1 problem -- it needed population. 2 needed to shed
2 population at that point -- and then moved on.

3 Q. Are you looking at a specific page in your
4 report?

5 A. Yeah. So page 33 shows the way that the
6 legislature divided it, Figure 8.

7 Q. This is Defendants' Exhibit 13?

8 A. Yeah. And then on the next page, 34,
9 that's how the map divides it, and so you can see
10 that the basics of the north -- east-west divide are
11 kept together. And then Salt Lake City is made
12 whole. To keep that -- you know, it has that --
13 Salt Lake City has that really irregular boundary
14 that's going to inflate a Polsby-Popper score.

15 And so to smooth that out, there were some
16 precincts to the north that had really nice regular
17 boundaries, and so -- low populations, weren't in
18 cities. So I went ahead and split it -- or I
19 included those in the district.

20 Then I evened out the -- I think the way
21 that I did it -- yeah, so Sandy and then Draper were
22 mostly in the eastern district, so I put them wholly
23 within it. And then that left Millcreek, I believe,
24 as the jurisdiction to be -- that was split. I
25 fixed most of the splits of Millcreek, so I left it

1 as the district that was split.

2 It went out to 215, which the city -- the
3 statute requires transportation boundaries, and so
4 the district extends out to 215, and then the rest
5 of that is just trying to make the population even,
6 which is a nightmare, frankly, because you have to
7 find the exact combination of census blocks that
8 will add up to the perfect population. And that's
9 what it ended up looking like.

10 Q. And then after you made those changes in
11 Salt Lake County, did you make other changes to the
12 legislature's 2021 map that -- in the map that
13 became Map C?

14 A. Yeah. So District 2 was overpopulated by
15 about 350,000 residents. So I took Davis County and
16 put it into District 1. It was now overpopulated,
17 so I took the portion of District 1 that was in
18 Summit County and put it, along with Morgan County,
19 in District 3.

20 And District 1 was about 328 -- that's
21 actually a really nice combination. I think most of
22 us have a version of District 1 that looks like
23 that, because now District 1 is only 328 residents
24 from perfect population. It's just a matter of how
25 you choose to zero it out.

1 So now District 4 -- District 4 is now a
2 half million people under. I mean, it's basically
3 no longer District 4. It's something completely
4 different. So Juab County was split, so I saw that
5 needed to be resolved.

6 And one nice thing about the way this map
7 was shaping up was that it went nicely along the, I
8 guess, I-80 corridor that comes through Salt Lake
9 City. District 2 kind of follows it, and then it
10 goes to District 3 out. And on the north-south, you
11 have I-15, which is going up through District 1.

12 So I took a lot of the more rural counties
13 that were still in District 2 and I put them into
14 District 4, and you end up with a district that's
15 based along the southern end of the I-15 corridor.
16 Makes sense.

17 And so at that point, the district was
18 actually pretty close, and it was just a matter of
19 fixing municipal splits and zeroing districts out.
20 So that's how I drew the map.

21 Q. So let's talk, then, about each of the
22 criterion as applied to the enacted map. Do each of
23 the four districts have equal population?

24 A. They do.

25 Q. Did all the Independent Redistricting

1 Commission maps have equal population?

2 A. They actually didn't. And there's
3 actually some conflicting Supreme Court language on
4 how zeroed out a map has to be, but there was -- one
5 of the redistricting map -- commission maps had two
6 people over and then two districts with one people
7 under -- person under.

8 Q. The next one, municipal and county splits,
9 how many of each of those are in the enacted map?

10 A. Three of each.

11 Q. And which municipalities are split?

12 A. It's Millcreek; North Salt Lake; and I
13 believe, Pleasant Grove.

14 Q. And what's the reason for splitting those
15 municipalities?

16 A. Because that was what you needed to do to
17 zero out population. I mean, I guess I could have
18 contorted the map to try to make all the splits in
19 unincorporated areas, but these made for pretty
20 straightforward splits.

21 Q. Did you calculate the enacted map's
22 compactness scores?

23 A. Yeah. So the enacted map's compactness
24 scores are presented -- oh, where is it?

25 Q. Are those on page 17 --

1 A. They're in the report.

2 Q. Page 17 of your report?

3 A. Yeah. Page 17, Table 2.

4 Q. Could you talk a little bit about those
5 scores?

6 A. Yeah. So Table 2 shows the enacted map,
7 each of the four scores compared to the previous
8 map. And for Districts 1 and 3, some scores it
9 performs a little worse than the 2021 version. But
10 then when you look at Districts 2 and 4, you know,
11 the -- especially on things like Polsby-Popper, the
12 I-know-it-when-I-see-it measure, the compactness
13 improves substantially.

14 Again, without -- it would be nice at some
15 point to get a, like, numeric, like, this is what
16 the maps have to be drawn to. But without that, you
17 know, in my experience, these scores for the enacted
18 map are good. But, again, I don't know exactly what
19 that means.

20 Q. Does the enacted map allow for ease of
21 transportation throughout the districts?

22 A. Yeah. So, again, it's drawn mostly along
23 interstate corridors. There's the problem of
24 southeastern Utah, which is notoriously difficult to
25 get to, but it keeps transportation corridors to get

1 to that portion of the state in line. You can cross
2 over the bridge in Green River, and then in Moab to
3 get down to San Juan County. So it does its best on
4 those measures.

5 Q. Is the enacted map -- are the districts in
6 the enacted map contiguous?

7 A. Yes.

8 Q. Does the enacted map respect neighborhoods
9 and communities of interest?

10 A. Yes, by keeping the counties' municipal
11 splits minimized.

12 Q. And does it follow natural and geographic
13 boundaries?

14 A. It does.

15 Q. Does it maximize boundary agreement?

16 A. So that one, I didn't do. And, again,
17 this is one of those judgment calls. The State
18 legislative maps have been drawn under the old, now
19 unconstitutional, version of the law.

20 And I looked at it, and one of the
21 districts, you know, it has San Juan and then I
22 guess Kane County in the same district. So it jumps
23 across the Colorado River without a bridge. I guess
24 you can maybe get a ride from nice partygoers on the
25 lake.

1 But, you know, I wasn't going to do that
2 with the district. So I just decided that this is
3 so low down in the priority list, and those
4 districts are probably -- I guess I won't be back
5 for the legislative phase, but those districts are
6 probably illegal, that it didn't make sense to
7 follow them.

8 Q. Overall, Dr. Trende, in your opinion, does
9 the map comply with the structural requirements of
10 Proposition 4?

11 A. Yes.

12 Q. I believe you testified earlier that the
13 starting point for the enacted map was the
14 legislature's 2021 map.

15 A. Right.

16 Q. Does that mean the enacted map is just the
17 2021 map in disguise?

18 A. So, no. You know, you can look at that
19 with the -- you can evaluate that with the core
20 retention numbers.

21 Q. What are core retention numbers?

22 A. So this is something that was discussed
23 earlier, but it's the number of people who are kept
24 together in a district in the base map that are also
25 kept together in a district in the subsequent map.

1 And so you can think of it -- if a
2 district isn't changed at all from the base map to
3 the subsequent map, it will have 100 percent core
4 retention, right? All the people in this district
5 in the base map are also kept together in the
6 enacted map.

7 If you fragment that district, if you blow
8 it up so that you have a chunk of 25 percent that go
9 into a different district, a chunk of 30 percent
10 that go into a different district, that's going to
11 be really low core retention numbers.

12 Q. And did you report the core retention
13 numbers on page 7 of your report?

14 A. Right. So on page 7, I showed that the
15 core retention numbers for the districts -- for
16 District 1, it's 84 percent. That's reasonably
17 high. That's not surprising because I think there's
18 only a few ways you can draw that northern district.

19 But then when you get into the other
20 districts, it's a 62 percent core retention.
21 District 4 has a 62 percent core retention. And
22 then District 2 just doesn't exist anymore. It has
23 a 30 -- the highest core retention for District 2 is
24 36 percent. I end up moving around, I think, almost
25 40 percent of the population of Utah.

1 Q. In numerical terms, do you have a rough
2 idea how many people that is?

3 A. I thought it was like 1.2 million or
4 something to that effect. Over a million people.

5 Q. Thank you.

6 A. Yeah, 1.271 million.

7 Q. So let's talk for just a minute then --
8 move on from the structural provisions. You
9 testified earlier, I think, that Proposition 4
10 imposes also some constraints related to partisan
11 politics while drawing a plan?

12 A. Yes.

13 Q. What are those constraints?

14 A. So there's kind of two portions of the
15 partisan constraints. The -- and they're familiar
16 from redistricting cases. It's a purpose test and
17 an effect test. You can't draw it with the purpose
18 of aiding a party. You can't draw it with the --
19 basically an effect of unduly aiding a party.

20 So even if you don't want to help the
21 party, if you end up drawing something that
22 inadvertently helps one party or the other, gives
23 them an undue edge, then it would be illegal.

24 Q. So I think this is such an important
25 point. I want to be crystal clear on this. While

1 you were drawing the enacted map, did you consider
2 partisanship in any way?

3 A. Not at all.

4 Q. While you were drawing the enacted map,
5 did you consider the partisan makeup of any of the
6 four districts?

7 A. No.

8 Q. While you were drawing the enacted map,
9 did you consider the likely partisan outcome of any
10 election in any of the four districts?

11 A. No.

12 Q. While drawing the map, did you design any
13 of the districts to purposefully favor an incumbent
14 or a political party?

15 A. No.

16 Q. While drawing the map, did you design any
17 of the districts so they would unduly favor an
18 incumbent or a political party?

19 A. No.

20 Q. Dr. Trende, when did you learn about the
21 partisanship of these districts?

22 A. It was kind of funny. Right when the
23 legislature was about to vote on it, Twitter kind of
24 erupted with -- first -- the first wave was "There
25 are four districts that Trump carried." The second

1 wave was, "Oh, my gosh. Democrats could win two of
2 these four maps."

3 That's when I learned about the
4 partisanship, was when the map was about to be voted
5 on.

6 Q. So after you drew the enacted maps, did
7 you at some point consider partisan data as it
8 relates to the four new districts?

9 A. So the way that I did that was I
10 actually -- I program -- I had a program that, you
11 know, evaluated the districts, and you could just
12 kind of highlight a chunk of it, hit control-enter
13 in the programming language, and it would then spit
14 out at the end of it whether the maps passed or
15 failed, what their compactness was, those various
16 things.

17 Q. Why did you only consider those data after
18 you were drawing the map?

19 A. Because there's no need for it when you're
20 drawing politics blind.

21 Q. I want to direct your attention also to
22 page 20 of your report. Is there a requirement in
23 Proposition 4 that would have required you to
24 consider some aspect of partisanship to these maps?

25 A. So you are required to create some type of

1 measure in Partisan [sic] 4 of the partisanship.
2 It's the only way you can ultimately measure effect.
3 So in that extent -- at the end, yeah, there is some
4 requirement.

5 Q. And what did you understand that
6 requirement to be?

7 A. So the statute says you have to use the
8 best available data and science -- statistical
9 methods, and then there is this, in my view, tragic
10 addendum, "including measures of partisan symmetry."

11 Q. And did you, in fact, apply scientific and
12 statistical methods, as the statute requires?

13 A. Yes.

14 Q. And after you applied those methods, did
15 you reach any conclusions about whether the enacted
16 map purposefully or unduly favors an incumbent or
17 political party?

18 A. It does not -- I knew it didn't
19 purposefully beforehand because I didn't look at
20 politics when I drew it, but on the statistical
21 test, it doesn't show evidence of it either.
22 And then the effects test, it does not show an
23 effect of unduly favoring or disfavoring another
24 party.

25 Q. All right. So let's talk about that

1 effects test a little bit more. How did you measure
2 district partisanship?

3 A. So we had -- so the way I started out --
4 and, again, this is going at breakneck speed. We
5 had to get a lot of stuff done in a month. That's
6 just the timetable we had. I got COVID in the
7 middle of it. My wife got COVID in the middle of
8 it. So it was kind of a nightmare.

9 But I started out just with the
10 presidential data. That was the initial way that I
11 evaluated partisan fairness. Then there was
12 guidance that it should be done with an index of
13 certain races, and then there was another race
14 ended -- added to the index of certain races, and
15 that's all within range of -- all those different
16 approaches are within range of how people measure
17 partisanship.

18 So at the end of the day, we ended up with
19 the index of statewides in '24, '20, and '16,
20 provided there have been major party opposition.

21 Q. Do the specific races that go into the
22 index matter?

23 A. So with the efficiency gap, they do,
24 because the efficiency gap is sensitive to whether a
25 party is -- whether a district is characterized as

1 Republican or Democrat. With partisan bias and
2 mean-median, it really doesn't because those
3 measures are pegged to the statewide average.

4 So if you put in a bunch more races where
5 Republicans do worse, the statewide average will
6 fall, the partisanship of the districts will fall.
7 So the mean-median gap will actually remain stable
8 for the -- so for the measures we had, it didn't
9 really matter to me what went into the index.

10 Q. Can you use these measures as a stand-in
11 for whether Republicans or Democrats are going to
12 win a district?

13 A. So I think that's one of the things that's
14 been under discussed so far, is that this is just an
15 average of how statewide candidates have fared.
16 It's not necessarily predictive of how the district
17 is going to perform in the real world.

18 We call it a Republican district or a
19 Democratic district, but, I mean, just common sense,
20 going from Democratic by one vote to Republican by
21 one vote isn't going to shift the partisanship or
22 the performance of the district by more than one or
23 two votes.

24 You also have this history in Utah of
25 Democrats over-performing district-based

1 partisanship. You have Matheson and McAdams winning
2 in districts that nominally are heavily Republican.
3 So I don't -- there isn't a one-to-one
4 correspondence.

5 Q. So I think you testified earlier that
6 you'd read Proposition 4 to prohibit both
7 intent-based and effects-based gerrymandering.

8 A. That's right.

9 Q. Do you use the same statistical or
10 scientific methods to test for intent-based
11 gerrymandering and to test for effects-based
12 gerrymandering?

13 A. No. There are different
14 conceptualizations at a base level of what a
15 gerrymander is.

16 You know, the purpose test, you're looking
17 at the political geography of the state and saying,
18 "Is this something -- if you had no partisan data,
19 is this a map that -- whose partisanship is
20 something you might come up with if you were truly
21 drawing blind to partisanship."

22 The effects is, "Okay. We have this map
23 that's been put into effect. Is this something
24 that's going to tend to produce a bad outcome?"
25 however you want to define "bad."

1 You can draw completely blind to politics
2 and end up with a map that fails the effects test.
3 You can draw a map that passes the effects test, but
4 it turns out, you know, you were trying to get that
5 district so democratic that you ended up
6 purposefully aiding that party.

7 So it's not uncommon to pair the two, but
8 it's different visions of what a gerrymander is.

9 Q. Okay. Great. Well, let's talk -- excuse
10 me -- let's talk, then, first about intent-based
11 tests.

12 But before we do that, just to confirm,
13 did you draw the map with the intent of helping one
14 party or another?

15 A. No.

16 Q. All right. So on to the test. In your
17 opinion, what's the best statistical method for
18 assessing whether a plan was drawn with intent to
19 favor a party?

20 A. So I think, aside from asking the map
21 drawer -- and you have to make a determination
22 then -- simulations are kind of the statistical test
23 that most people use.

24 Q. We've -- we heard a fair amount about
25 simulations yesterday. Were you here for some of

1 that testimony?

2 A. Yes.

3 Q. So if we could just refresh for the Court,
4 what is the simulation test? How does it work? How
5 does it operate?

6 A. So the idea is you can make it so --
7 really easy so a computer knows absolutely nothing
8 about the partisanship of the state. And there's a
9 couple of different approaches that are detailed in
10 the report, but you have the computer produce a
11 range of maps that are drawn blind to partisanship.
12 You put in some constraints on the computer so it's
13 acting like people drawing maps would.

14 But the real point is not to draw maps
15 that would be enacted or to have a beauty contest on
16 maps. It's to ask: Okay, people who are drawing
17 maps with these constraints, what is -- what is
18 available to them? What could they have come up
19 with? If we put 100,000 people in a room and said,
20 "Draw maps," what's the range of the partisanship
21 that they would come up with?

22 So...

23 Q. Is the purpose of the simulation analysis
24 to draw perfect plans that can be implemented as the
25 computer spits them out?

1 A. No, you want them to follow guidelines.
2 But at the end of the day, the point of the exercise
3 is to get a range of partisanship. What do
4 party-blind maps in Utah really look like?
5 Somewhere -- you know, is it somewhere between 48
6 percent Republican and 60 percent Republican? Is it
7 40 percent Republican and 52 percent Republican?
8 That's what you're really testing.

9 Q. So is the -- those simulated maps that you
10 generate in your ensembles, are they a means to an
11 end?

12 A. That's right. It's to find -- you're
13 saying, "If someone was drawing blind to
14 partisanship, what would they likely come up with
15 for the partisanship of their map?"

16 And so you have the computer draw a bunch
17 of them. You get the range of partisanship. And if
18 what the map drawer did was way above that range or
19 way below that range, you say, "Well, come on.
20 That's not what a politics-blind map drawer is going
21 to come up with."

22 Q. How long have experts in this field been
23 using simulations to test for partisan intent?

24 A. So the whole simulation actually goes back
25 to the '60s. I could give a fun speech on that, but

1 for our purposes, I think probably in around the
2 mid-2010s is when they started coming into the
3 courts.

4 Q. Have other Courts around the country
5 accepted simulations as a reliable way to measure
6 partisan intent?

7 A. Yes.

8 Q. The Utah law now specifies a particular
9 kind of ensemble analysis, one created using a
10 Sequential Monte Carlo analysis. Can you specify
11 why that kind of -- or can you -- do you have an
12 opinion on why that kind of Sequential Monte Carlo
13 analysis was required?

14 A. So there's a section in my report -- I
15 won't rehash it -- that kind of goes over the
16 different approaches to simulation techniques, but
17 the main competitor to Sequential Monte Carlo, which
18 is this Markov Chain Monte Carlo, has this tendency
19 sometimes to get stuck in drawing maps in a circle.
20 That's the best way I can think of it.

21 The nice thing about Sequential Monte
22 Carlo is that you're drawing maps more or less from
23 scratch, and so it tends not to get stuck in those
24 holes.

25 Q. Was -- to clarify one point, was adding

1 the ensemble analysis to SB 1011 your idea?

2 A. The ensemble analysis? Oh, you mean
3 specifying it? No.

4 Q. No. The -- I'm sorry. Let me make sure
5 I'm clear. Yes, the ensemble analysis, this
6 requirement of doing ensembles, was that your idea,
7 to add that to the legislation?

8 A. I don't know whose idea it was to add it
9 to the legislation. You know, I knew, once I saw
10 purpose, it was going to be an ensemble analysis,
11 but I don't know. If I had written that, it surely
12 would have been more than 4,000 sims and had a
13 better definition of SMC, but...

14 Q. So did you perform this ensemble analysis?

15 A. Yes.

16 Q. Did you use the Redist package when you
17 did that?

18 A. I did.

19 Q. Can you explain for the Court what the
20 Redist package is and why you used it?

21 A. So you've heard people talk about the
22 ALARM database. There is a group of political
23 scientists out of Harvard; Kosuke Imai is the kind
24 of lead of that project. He's one of the big names
25 in political methodology, and he and his research

1 assistants, now professors in their own right,
2 developed this technique of doing gerrymander
3 analysis through ensembles.

4 And so they've created this downloadable
5 package in R that I would say anyone can use, but
6 any R user could use, to test -- to generate
7 ensembles.

8 Q. And what is -- when you say downloaded R,
9 what does that mean?

10 A. So R -- it's just the letter R -- is a
11 computer programming language that's typically used
12 in the social sciences. It's what all my statistics
13 classes and political science classes used for doing
14 analysis.

15 Q. Have any other experts besides -- besides
16 you used that Redist package?

17 A. Yeah, and I should say -- I said every
18 class. There were a couple classes I took in the
19 public health department that used Stata instead,
20 but for the most part, it was R.

21 Yeah, other political scientists have used
22 it. Dr. Barber has used it as an expert. Dr. Imai
23 has used it in cases I was in. Dr. McCartan has
24 used it in cases.

25 Q. Did you hear Dr. Chen's testimony

1 yesterday about his algorithm?

2 A. I did.

3 Q. Have you ever encountered anyone other
4 than Dr. Chen using his algorithm?

5 A. Only Dr. Chen.

6 Q. To your knowledge, has Dr. Chen sought to
7 restrict the use of his algorithm?

8 A. So this has changed over time. It's
9 welcome, but there are versions of his algorithm I
10 can't discuss because they're under a protective
11 order.

12 Q. Is the Redist package publicly available?

13 A. Yes.

14 Q. Does it have any quality control
15 diagnostics built into it?

16 A. Yeah. So after you create your simulation
17 set, let's just say it's called "output," you type
18 "summary, parentheses, output" into R, and it gives
19 you a list of diagnostics and whether your
20 simulations have met the criteria for being a good
21 simulation set.

22 Q. Are those reproducible?

23 A. Yeah. If anyone puts my -- takes my
24 simulation set and types "summary output," they'll
25 get the exact diagnostics that I get.

1 Q. Should the person running the Sequential
2 Monte Carlo simulations give any instructions to the
3 computer to govern the way the computer draws the
4 maps?

5 A. Yeah, so you input different constraints
6 on the maps that the computer will then follow.

7 Q. Do those constraints have to be exact?

8 A. They're never exact because the end -- the
9 goal is not to say, you know, whatever the
10 parameters of the enacted map are specifically, what
11 would you get?

12 Because if you're specific to the
13 parameters that we're drawing guiding the enacted
14 map, you're only going to draw the enacted map.
15 There has to be some wiggle room around what the
16 enacted map was drawn under, and different people
17 interpret these differently.

18 Again, I had -- the IRC was drawing maps
19 with Polsby-Popper scores ranging from like 0.25 to
20 0.4. Reasonable people can look at these criteria,
21 look at the map, and come up with a different, you
22 know, range of potential outcomes. The IRC was
23 drawing maps with 14 municipal splits and 6 county
24 splits.

25 So the more you crank it down on these

1 criteria, the more you limit it to a specific vision
2 of what these criteria are supposed to look like,
3 and you end up excluding things, like IRC maps.

4 Q. Well, let's talk about maybe a different
5 one. Proposition 4 says the districts have to be --
6 have to have equal population, which is, of course,
7 a federal constitutional requirement. Did you code
8 your simulations to produce maps only with equal
9 population?

10 A. No, because these are run at the precinct
11 level and the code doesn't split precincts, usually
12 the way this is done is you allow a little bit of
13 wiggle room on the population, with the idea that
14 with a 1 percent deviation -- if I were to go into a
15 map and manually fix it, it can't -- it literally
16 can't change the partisan outcome that much, because
17 in a district of 800,000 people, moving around 2 or
18 3,000 people isn't going to affect that top-line
19 partisanship, which is what we're ultimately
20 interested in.

21 Even in the worst-case scenario where
22 you're moving 1 percent of the population and if I
23 were to somehow have a perfect score of moving all
24 Republicans in and all Democrats out, it's not going
25 to change the partisanship of that map enough to

1 appreciably impact the analysis, especially over
2 100,000 districts.

3 And this is something that's been fought
4 about. Every court that I know of has said that
5 1 percent is allowable. So, again, if it's going to
6 be zero percent, it's going to be zero percent in
7 Utah, but that's how I approached it.

8 Q. If you could, please turn to page 37 of
9 your report. Do you discuss -- page -- oh, sorry.
10 I'll wait for you to get there.

11 Do you discuss there other political
12 scientists who have encountered this issue?

13 A. Yes.

14 Q. Who are some of the other political
15 scientists that have talked about it?

16 A. So in the first citation, it's to the
17 foundational Chen and Rodden article that we've
18 talked about that had 5 percent population
19 deviations on the districts.

20 There's an expert report from Dr. Imai,
21 who developed the Redist software; expert reports
22 from the Pennsylvania case that had a 2 percent
23 threshold.

24 So, again, this -- I understand the
25 objection, but this really is a commonplace way to

1 approach this issue.

2 Q. And when did you submit your report in
3 this case?

4 A. Last Friday.

5 Q. That would have been October 17th?

6 A. Yes.

7 Q. And when did you learn Dr. Chen was one of
8 the plaintiffs' experts in this case?

9 A. After I'd submitted my report.

10 Q. So you submitted it without knowing -- and
11 wrote this without knowing he was going to be
12 involved here?

13 A. Yeah, I like Dr. Chen. I'm not picking on
14 him here.

15 Q. Okay. Did you produce more than one
16 ensemble set?

17 A. Yes.

18 Q. How many did you produce?

19 A. So this is another one where -- again,
20 this was just fire drill after fire drill. The
21 legislature needed to get moving, and so there
22 was -- there was actually a snarky comment on
23 Twitter, because the legislature wanted more time,
24 and Christopher Kenny, one of the guys from the
25 ALARM Project, had a snarky, "Well, I can get the

1 legislature 10,000 maps in a couple hours if they
2 want it."

3 And I thought to myself, actually, that's
4 a really great idea, because I knew they had this
5 ALARM set. I knew that some of the parameters were
6 different, but as a general matter, it was following
7 the top -- high line Prop 8 [sic]-- or Proposition
8 criteria.

9 And so just to get started, I used the
10 ALARM data set to measure maps. As we got further
11 along, I was able to get my own simulation set coded
12 that more strictly followed Prop 8 [sic], at least
13 the top three requirements, which, again, are the
14 most important ones.

15 And then, finally, at the end, you know, I
16 had to go in and -- to get it to conform to rivers
17 and mountain boundaries, had to go in and manually
18 remove the adjacencies. And it's real easy to make
19 a mistake there, and so this took dozens of hours to
20 get that fixed. But that's when I had the final --
21 what I call the restricted set.

22 Q. So just to make sure the record is clear,
23 then, were there three sets of ensembles you used as
24 part of your analysis?

25 A. Right. The ALARM set; the base set, which

1 is kind of the top three priority; and then the
2 restricted set, which is kind of the final
3 production.

4 Q. Now, the Harvard ensemble was based on a
5 different set of constraints.

6 A. Yeah, so at the top line, they were
7 similar, the most important ones, but they were
8 different. And it was kind of a -- if I suddenly
9 dropped -- if I had been using the Harvard set and
10 then just suddenly dropped them, I mean, that looks
11 suspicious. So I just kept using all of them and
12 wanted the maps to conform to all of them.

13 As it turned out, again, as I was adding
14 these constraints, I checked to see if the
15 partisanship of the -- of the ensemble changed much,
16 because, again, if I'm doing something that really
17 jerks it one way or another, that's something
18 someone's going to point a finger at.

19 I recorded all this in my code. And
20 surprisingly, the partisanship really doesn't change
21 that much from the ALARM set to the base set to the
22 restricted set.

23 Q. Which of those sets was the least
24 favorable to Republicans?

25 A. The final restricted set.

1 Q. So after you wrote -- excuse me. After
2 you wrote the code and drew those maps that were
3 drawn under those constraints and ran the
4 simulations, what's the statistical measurement by
5 which you compared the proposed redistricting plan
6 to the ensemble plans?

7 A. Well, I used what I guess has been called
8 the "least Republican vote share" approach, where
9 you just look at the least Republican -- you just
10 look at the least Republican district and see if the
11 map falls within the range of that district.

12 Shortly before it was kind of go time, the
13 legislature passed -- or put this bill up that had
14 ranked marginal deviation in it, which was a bit of
15 a panic moment for me.

16 I've used ranked marginal deviation
17 before. I knew how to calculate it. I didn't know
18 if the maps passed it or not. And so I coded up the
19 ranked marginal deviation test, and it passed that
20 test as well.

21 Q. So let's talk -- I think we might have
22 heard some of this yesterday, but just to refresh
23 the Court's recollection, could you give a short
24 couple-of-sentence summary of what ranked marginal
25 deviation means and what it tests? And then the

1 same thing for the Republican vote share.

2 A. Yeah. So I learned about ranked marginal
3 deviation through an article that was attached to
4 the original Sequential Monte Carlo paper. It's
5 what they had suggested originally. And that
6 article called it the gerrymandering index. So if
7 you go back in my old reports, you won't find ranked
8 marginal deviation. You'll find the gerrymandering
9 index. They're the same thing.

10 And the idea is you look at the
11 deviation -- at each rank, the most Republican
12 district, the second most Republican, third, and
13 fourth, you look and see how far the enacted -- the
14 corresponding enacted district is from the average
15 of the ensembles. Okay?

16 So the idea is, if you make that Repbu- --
17 that least Republican district way more Republican
18 than the average of the ensembles, your
19 gerrymandering index is going to get bigger. And
20 punishing it further, you actually square that
21 distance.

22 So a -- you know, if the distance is one
23 point, that squared term is one. If it's two
24 points, it's four. If it's 10 points, it's 100. So
25 the gerrymandering index really punishes large

1 deviations from that.

2 You add up all those deviations, you take
3 the average of them, take the square root, and so
4 you end up with a -- all those manipulations give a
5 nice translation, which is it's the average
6 deviation from what you'd expect from the ensemble
7 in terms of partisanship with a kind of special
8 penalty on large deviations.

9 Q. Now, Utah law, this SB 1011, specifies a
10 95 percent confidence interval for the ranked
11 marginal deviation test.

12 A. Yeah.

13 Q. Can you explain what that means?

14 A. So one of the really nice things about
15 ranked marginal deviation is that unlike -- you
16 know, compactness doesn't really fall into any
17 traditional statistical test that social scientists
18 use.

19 Ranked marginal deviation, though, you can
20 say, "Well, in social science, we use the 95 percent
21 confidence interval all the time, 95 percent
22 statistical significance, p-value of 0.05, all
23 different things that say the same thing."

24 And so you can apply that to the ensemble
25 and say, "Okay" -- there's a chance that you are

1 drawing blind to race and you just happened to draw
2 something that falls outside of the range of the
3 ranked marginal deviation outcomes. I mean, things
4 with a 1 in 100 chance -- things with a 1 in a
5 hundred chance of happening happen 1 times out of
6 100.

7 But 95 percent -- 1 in 20 is kind of the
8 cutoff that social science uses for what's
9 acceptable. And so you can apply that to ranked
10 marginal deviation and say, as long as the map is
11 within that 95 percent confidence, we can't really
12 rule out -- we wouldn't normally rule out the
13 possibility that it was drawn without partisan
14 intent.

15 It's the same way if you had a -- and I
16 can testify to this. If you have a family of three
17 and they're all boys, there is a one in eight
18 chance, about 12 and a half percent of that
19 happening randomly. And yet, if you see a family of
20 three boys, you don't say, "Well, something's really
21 weird there."

22 If you see a family of six where they're
23 all boys, something that has like a 1 percent chance
24 of happening, you think, "Wow, that was really
25 unlikely."

1 And so that 95 percent confidence kind of
2 encapsulates a common sense approach. If you toss a
3 coin three times in a row and get all heads, not
4 that weird. Toss it 10 times in a row and get all
5 heads, well, that's really weird.

6 And so that's what we're getting at with
7 this test.

8 Q. The Utah law, this SB 1011, also uses the
9 term "culling" when it's talk --

10 A. Yeah.

11 Q. -- when it talks about the ensemble and
12 simulations analysis. What does that term "culling"
13 mean?

14 A. So this was another one where I wasn't
15 sure, and -- but the culling -- the idea of culling
16 the maps is, after you have your simulation set
17 drawn, there's this initial test of effect. And so
18 if a mapmaker were to draw his map or her map and
19 then find that it was perfectly fine except that the
20 partisan bias ended up being off, they would have to
21 discard that map -- well, I guess I should say
22 partisan symmetry since there's some fight about
23 that. They would have to discard the map.

24 And so my idea was you should also look at
25 the simulation set restricted to maps that passed

1 the partisan effect test.

2 This is something that's been somewhat
3 controversial. I knew it was. Dr. Magleby, at his
4 Senate testimony, came out full bore, the Democrats'
5 witness, said you shouldn't cull. Plaintiffs here
6 are saying you absolutely need to cull, but using a
7 different test.

8 So, again, just to be careful, I do it
9 both ways. I look at the unculted data set, it
10 passes. Look at the culled data set, and it passes.

11 Q. So I guess maybe that answers what would
12 have been my next question. Did you perform this
13 ensemble analysis or this ranked marginal deviation
14 test on the enacted map?

15 A. I did.

16 Q. And what was your conclusion there?

17 A. It passed.

18 Q. Which set?

19 A. All of them.

20 Q. And let's talk a little bit more about
21 those, I think, just to make sure the record is
22 clear. Your ensemble sets you created using a
23 Sequential Monte Carlo simulations?

24 A. Yes.

25 Q. And how many maps did you create in each

1 ensemble set?

2 A. I think the Harvard set is 6,000, and then
3 mine were 100,000.

4 Q. And, yeah, to be clear too, you did not
5 create the Harvard set.

6 A. The ALARM set, right. The ALARM set and
7 the Harvard set are the same thing --

8 Q. Those --

9 A. -- and, no, I did not.

10 Q. Those were pre-existing.

11 A. Yeah.

12 Q. And you did create two other ensemble
13 sets.

14 A. Yes.

15 Q. When you prepared your expert report in
16 this case, what's been marked as Exhibit 13, which
17 ensemble set did you use to calculate the ranked
18 marginal deviation score of the enacted map?

19 A. The restricted set.

20 Q. Could you turn to page 38 of your report?
21 That first paragraph under heading section 7.1,
22 there you say: "The least Republican district" --
23 actually, let me just have you read, if you don't
24 mind, the last sentence in that first paragraph.

25 A. Yeah. "The least Republican district in

1 the base set, which includes maps that would fail
2 the partisan bias test, was in the 94.255
3 percentile, while the least Republican district in
4 the culled set of 32,259 maps was in the 83.2
5 percentile."

6 Q. So you used that -- the term "base set" in
7 this paragraph. What did you mean by that?

8 A. Well, that was an unfortunate word choice.
9 I was using the "base set" as opposed to the "culled
10 set," but I'd also use the "base set" as a label for
11 that intermediate progression of maps. This is the
12 base set from the restricted set of ensembles.

13 Q. So is another way of saying -- the "base
14 set" here is another way to think about -- would
15 you -- it was -- you -- it is the restricted set,
16 right?

17 A. It is the restricted set.

18 Q. Is it all of the maps in the restricted
19 set?

20 A. The base set is.

21 Q. Right. How can we know that?

22 A. You can compare it, and if something
23 barely passed the base set, it wouldn't pass the
24 restricted set, probably.

25 Q. And is there any difference in the

1 partisan outcome, when you looked at it, between
2 your different sets?

3 A. No matter what I looked at, the map
4 passed.

5 Q. The restricted set -- your -- what we
6 called your restricted set, those were maps you
7 generated under constraints that make the
8 simulations conform as closely as practicable to the
9 requirements of Proposition 4?

10 A. Yeah. There were some problems identified
11 that we'll talk about later. But, yeah, that was
12 the idea.

13 Q. And you mentioned, I think earlier, or
14 testified earlier, that you also ran the "least
15 Republican vote share" test?

16 A. Yes.

17 Q. What were the results of that test?

18 A. It also passed, and it's not surprising
19 because the least Republican vote share and ranked
20 marginal deviation are very similar tests, at least
21 with four districts.

22 Q. Does Proposition 4 require you to run the
23 least-Republican-vote-share test?

24 A. I don't think so. It's just kind of what
25 I came up with initially. And I think once you

1 start using something, it looks suspicious if you
2 drop it, so I just kept using it.

3 Q. Besides the ranked marginal deviation test
4 and the least-Republican-vote-share tests, did you
5 apply any other statistical or scientific measures
6 to try to detect whether the enacted map
7 purposefully favors a political party?

8 A. Those are the main tests that were used.

9 Q. Great.

10 Let's talk, then, for just a few minutes
11 about the effects-based tests you performed. Did
12 you evaluate the enacted map under any effects-based
13 tests?

14 A. So this is a train wreck I saw coming the
15 moment I read the proposition -- the ballot
16 proposition, because everything's going great, and
17 then -- I mean, I think whoever drafted this should
18 be put in a cage and paraded around Salt Lake City.
19 There is this specific language, "including measures
20 of partisan symmetry."

21 And I looked at that, and I read the
22 King -- the Katz, King, and Rosenblatt article.
23 It's well known. I said, "Okay. The test I'm going
24 to use is well-defined. It's partisan bias,
25 period."

1 Q. And are these types of tests also called
2 partisan fairness measures?

3 A. Yeah, there's a whole family -- you've
4 heard about most of them at this point, but there's
5 a whole family of tests that measure effects, and
6 they are also referred to loosely as partisan
7 fairness.

8 Q. Do you have an opinion on partisan
9 fairness measures in general?

10 A. I generally don't like them because -- in
11 part because they -- some of it's philosophical. I
12 think that in -- when you have districts, it's
13 really the way the districts are drawn that's more
14 important. And I think if you really care about
15 effects, you should just pass proportional
16 representation and be done with it, and we can not
17 have unfair effects, full stop.

18 Part of it is that these partisan symmetry
19 measures always devolve into the type of fight we're
20 having here. Which version do you use? How do you
21 measure it? What races do you use? It just becomes
22 a mess.

23 Q. What effects-based tests did you end up
24 running here?

25 A. Here, I used partisan bias.

1 Q. Any others?

2 A. To start with, no. We came around to
3 mean-median, largely because the Democratic minority
4 leader had asked me about it a lot at the hearing.
5 So, okay. We can -- in this context, mean-median
6 actually enhances partisan symmetry because what
7 mean-median does -- when the mean-median is zero, it
8 means Districts 2 and 3 are going to be the same
9 distance from the average. They're going to be
10 symmetric. And that's what you want under partisan
11 bias.

12 So at least in this context, where you're
13 already doing partisan bias, the mean-median score
14 enhances that by making it strict, getting it as
15 close so that the two districts are the same
16 district -- distance from the midpoint as possible,
17 which is symmetry.

18 Q. And you've been in the courtroom to hear
19 the testimony from Dr. Chen and, certainly, Dr. Katz
20 this morning.

21 A. Yeah.

22 Q. And you heard them testify about the
23 partisan bias test.

24 A. Yes.

25 Q. So I don't want to rehash this at any

1 great length, but just a quick like
2 one-or-two-sentence summary of how that works.

3 A. There's lots of different ways to do it.
4 I did it the way that Bernie Grofman and I did it in
5 Virginia, which is -- and it appears in the
6 literature. You take -- Dr. Magleby has done it
7 this way.

8 You take the map, you get a hypothetical
9 50/50 outcome, and you see if the districts --
10 there's the same number of districts above 50
11 percent as below.

12 There's another way to do it, which is
13 to -- once you get that, to kind of perturb it, go
14 up in partisanship and down in partisanship and see
15 if you get similar results for the parties at
16 different points.

17 Once the mean-median test was added, that
18 meant that you were going to get a pretty good score
19 if you did that perturbation up and down, but
20 initially it was just the 50 percent.

21 Q. And you're aware that on the same day the
22 legislature passed the enacted map, it passed this
23 SB 1011 requiring the partisan bias test as a
24 measure of partisan symmetry?

25 A. Yes.

1 Q. In your opinion, does the state of the
2 social science literature support that choice by the
3 legislature?

4 A. Yeah, it's -- if you say "partisan
5 symmetry," partisan symmetry is measured by partisan
6 bias. It's -- I don't think you have a choice.

7 Q. So in your opinion, based on the social
8 science literature, is the partisan bias test the
9 best measure of partisan symmetry?

10 A. I think it's the only -- and I spent a lot
11 of time trying to think of a way to get around this
12 because I didn't want to be sitting here. I knew
13 this was coming. Partisan symmetry is measured by
14 partisan bias.

15 Q. Is that test a perfect measure?

16 A. I don't think so. I've heard the
17 critiques of it, and most of them are, "Well, if you
18 do partisan bias, it comes with bad outcomes,"
19 however that's defined.

20 And if I were drafting this statute, it
21 wouldn't have the "including measures of partisan
22 symmetry" language in it, but it does, and the best
23 social science is that partisan symmetry is measured
24 by partisan bias. Maybe mean-median, not the
25 efficiency gap.

1 Q. Why not the efficiency gap?

2 A. Well, it's laid out in the Katz, King, and
3 Rosenblatt article, that you can have a map that
4 follows the partisan symmetry measure that does
5 terribly on the efficiency gap. It was -- it was an
6 original promise of the efficiency gap that just
7 turned out to be false.

8 Q. When were you first exposed to this
9 efficiency gap test?

10 A. Oh, I was there from the beginning. The
11 efficiency gap articles come out in 2013 and 2014,
12 and then a year later, they are in redistricting
13 litigation, trying to be written into the 14th
14 Amendment.

15 Q. What happened in that litigation?

16 A. So in the Gill v. Whitford case, the Court
17 didn't full-blown endorse it, but it used it as
18 part -- as an acceptable part of a measure for
19 partisan fairness, and it went up to the Supreme
20 Court and got reversed and sent back down.

21 In the Nichols case -- or in the North
22 Carolina case, it went up, and that's when the
23 Supreme Court ruled that political gerrymandering
24 was non-justiciable. So that was kind of the end,
25 at least in federal court, of the partisan fairness

1 measure experiment.

2 Q. Did you run the partisan bias test on the
3 enacted map?

4 A. I did.

5 Q. What were your results?

6 A. It passed.

7 Q. And did you use the mean-median test on
8 the enacted map?

9 A. I did.

10 Q. Did it -- what were your results?

11 A. It passed.

12 Q. Did you use the mean-median test in that
13 Virginia redistricting assignment you mentioned
14 earlier?

15 A. We did.

16 Q. How did the mean-median score of your
17 Virginia maps compare to the mean-median score of
18 the map here?

19 A. One of the mean-median scores of the
20 Virginia map, I think it was the Senate, was higher
21 than this map. But in Virginia, I don't remember if
22 we had a strict cutoff, but we were willing to
23 accept something that was at least substantially
24 similar to this map.

25 Q. Did you also use the partisan bias test in

1 your Virginia assignment?

2 A. Yeah, that was a secondary one, but we did
3 use it.

4 Q. I want to ask you a few questions,
5 Dr. Trende, in response to some of the criticisms of
6 your report that we've heard over the course of
7 these couple of days. During one of the legislative
8 redistricting committee hearings, Representative
9 Owens suggested it was impossible to meet the
10 partisan bias test while drawing a Democratic
11 district. How would you respond to that?

12 A. First off, "Democratic" just means
13 Democratic on the index. It doesn't mean Democratic
14 performing. You know, two of the districts in this
15 map have lower index scores than the least
16 Republican district in the 2011 map, which sent
17 Democrats to Congress twice and had close races in
18 two of the elections -- two of the other elections.

19 But the other thing is that there are
20 actually maps in the ensemble with partisan bias
21 scores that passed the test that are coded as
22 Democratic leaning, so it's just not true.

23 Q. Do you think Democrats can win any of the
24 districts under the enacted map?

25 A. My first reaction was -- I heard the

1 partisanship of the districts, and I thought, "Well,
2 they're going to make a lot of hay about this."

3 And then the second reaction was, "Wow, if
4 the Democrats run Ben McAdams in one and Evan
5 McMullin in another, they're going to have half the
6 delegation."

7 The least Republican district in the 2011
8 map is, on the spread, eight points more
9 Democratic -- or, yeah, in the 2011 map, it's eight
10 points more Republican than the least Republican
11 district in this map. And it's four points more
12 Republican than the second-most Democratic district
13 in this map.

14 So there's two districts in this map that
15 are more Democratic than a district that elected
16 Democrats and had very close races in the previous
17 cycle.

18 Q. One of the plaintiffs' experts in this
19 case has proposed using a test called standard
20 deviation of vote share. What do you understand
21 that measure -- or that test to measure?

22 A. So this is a new one, but the idea is that
23 you look at the standard deviation of the districts,
24 and I guess higher standard deviation is good, and a
25 lower standard deviation is bad, because you want to

1 have districts that are further from the mean.

2 The problem is I just don't know what you
3 do with that. Okay. You get a test statistic, like
4 how much is too much? I don't know. You can try to
5 tie it back to the simulations, but then you're
6 mixing an effects test with a purpose test, and
7 you're kind of taking effects and tying it to
8 purpose. And we already have a pretty good, widely
9 accepted purpose test. So...

10 Q. We've heard a lot of testimony in the past
11 couple of days about the efficiency gap, and we've
12 testified a little bit about that earlier as well.
13 What's your understanding of the social science
14 right now -- social science literature right now as
15 it relates to the efficiency gap?

16 A. I mean, there's people who swear by it,
17 who like it, and there's people who hate it. It's a
18 controversial measure.

19 Q. And you're familiar with some of the
20 critiques of it?

21 A. Yes.

22 Q. Do you agree with those critiques?

23 A. Broadly speaking. They're spelled out in
24 my report in more detail, but yeah. I have
25 consistently disliked the efficiency gap for a

1 decade now.

2 Q. Is there anything in the social science
3 literature that you're familiar with or in prior
4 case law to suggest why the efficiency gap is not an
5 effective measure in a state like Utah?

6 A. Well, it -- you know, when they initially
7 ran the efficiency gap litigation in the Gill v.
8 Whitford case, they were specific that it was only
9 to be used in states with seven or more
10 congressional districts.

11 That's something that Senator Escamilla
12 brought up in my testimony, that was, it's not to be
13 used -- this is like the one thing that there was
14 bipartisan agreement on in my testimony was that,
15 you know, the efficiency gap doesn't work well in
16 states with small numbers of districts.

17 Q. So a related, I think, but slightly
18 different question. In your opinion, given the
19 state of the social science literature, did the
20 legislature have a good basis for not including the
21 efficiency gap test among the best statistical and
22 scientific measures to determine whether a proposed
23 plan is a partisan gerrymander?

24 A. Yes, because there is a lot of critique.
25 I mean, Dr. Magleby has called the -- who was the

1 Democrats' witness, has called the conception of
2 wasted votes in it dubious. You have Dr. Katz's
3 article suggesting it doesn't even measure symmetry.

4 I understand they're experts -- social
5 scientists don't agree on anything, but there are
6 people who like it, but it's controversial.

7 Q. In your opinion, does the efficiency gap
8 test measure partisan symmetry?

9 A. No.

10 Q. I want to ask you a couple of questions,
11 Dr. Trende, about Dr. Chen's testimony. We've heard
12 some of Dr. Chen's criticisms of you and your
13 report, particularly about the contiguity issue.
14 How would you respond to those criticisms?

15 A. Well, that was embarrassing. I was
16 actually in a little bit of a panic because, when I
17 first read about it, I thought that I had messed --
18 when I removed contiguities, I thought I had messed
19 something up and made it that like districts would
20 start in San Juan and skip over to Rich County, and
21 that would be a huge problem.

22 And so what I did to detect -- to figure
23 out what was going on, I took a sample of maps, and
24 I looked at them in Dave's Redistricting. Most of
25 them didn't have contiguity issues -- this is from

1 my restricted set -- but what happened in a few
2 instances -- Sandy looks like Swiss cheese. There's
3 holes in it in the city boundaries.

4 And some of those census blocks that are
5 in the holes got put in with precincts that were --
6 that lie outside the city of Sandy. And so there
7 are districts where those holes in the city of
8 Sandy -- since the city of Sandy remains intact most
9 of the time, there are districts where those holes
10 in the city of Sandy that have 2 or 300 people in
11 them would get put with the -- with the precinct
12 outside.

13 Q. So when you found that out, did you do any
14 looking to see if it affected your conclusions?

15 A. So I went through and I looked at the
16 population of those, in the restricted set at least.
17 And there may be other ones. They didn't show up in
18 my sample of 50, so those are probably rare, but
19 those are low population.

20 And since the goal is to find the
21 partisanship, moving a block of -- block of 200
22 people, fewer votes, fixing that in effect, isn't
23 going to change the partisanship of that district
24 enough to impact the overall conclusion.

25 Q. Have you ever criticized people in prior

1 cases for having noncontinuous districts?

2 A. Yeah, actually Dr. Magleby, the Democrats'
3 witness at the hearing in Nassau County, had some
4 maps that had pretty substantial contiguity
5 problems. So this is tough stuff, and it happens,
6 but thankfully in this case it wasn't a map that
7 jumped from San Juan to Rich County.

8 Q. Did you hear Dr. Chen critique your work
9 based on the number of county splits in your
10 simulations?

11 A. I did.

12 Q. How would you respond to those critiques?

13 A. So the county splits that go up, you know,
14 to six -- again, the Independent Redistricting
15 Commission was drawing districts with as many as six
16 splits. It's within the boundaries of range. So,
17 again, I was happy that you didn't end up with 27
18 county splits, which would be outside the range.

19 But this is downstream of treating cities
20 as counties and -- rather than the county boundaries
21 itself. And I thought it would contain it within
22 Salt Lake, but it does allow more splits of Salt
23 Lake. Again, thankfully, the splits of Salt Lake
24 are similar to what the Independent Redistricting
25 Commission was coming up with.

1 Q. Did you hear Dr. Chen critique your work
2 based on the compactness of the districts in your
3 simulations?

4 A. Yeah, so this one I thought had less
5 merit.

6 Q. How would you respond to those critiques?

7 A. As I've said a couple times, people -- and
8 not just myself, the Commission, people submitting
9 maps, were drawing maps in this range from about
10 0.25 Polsby-Popper up to 0.45, so within the range
11 of what my simulations are producing, which is what
12 you want, outside the range of what Dr. Chen was
13 constricting simulations to.

14 So, again, our -- we actually had kind of
15 a real-world exercise in at least like 20 people
16 draw maps and see what could they come up with, and
17 they were coming up with a range of Polsby-Popper
18 similar to mine.

19 Of course, Polsby-Popper isn't the be-all
20 end-all of compactness, right? People who are
21 drawing maps are paying attention to these other
22 aspects of compactness that can affect the
23 Polsby-Popper score.

24 If you look at Dr. Chen's sample maps,
25 they tend not to follow that Colorado River

1 boundary. They follow the straight county line
2 boundaries. You can go through -- you can go
3 through his report and look at them. One of them
4 actually jumps across the Colorado River.

5 Because it's so constricted on
6 Polsby-Popper, it's searching out for straight
7 boundaries to follow because that keeps the
8 perimeter low.

9 Q. Did you hear Dr. Chen's critiques of your
10 work based on duplicated maps in the ensemble set?

11 A. Yeah.

12 Q. Are duplicated maps in the ensemble set a
13 problem?

14 A. They aren't. Well, they can be. They can
15 be.

16 So one of the problems with simulations is
17 that if you over constrict them, they have what's
18 called low acceptance rates. The computer keeps
19 trying to come up with different ways to draw the
20 maps, and it keeps rejecting them.

21 And if their acceptance rate falls too
22 low, that's a problem because you're not getting a
23 good poll of maps, which is what we're trying to do.
24 You're not getting a good sample, and a symptom of
25 that is low plan diversity.

1 But if you wanted to know the height of
2 American males and so you do a poll, you're going to
3 get a lot of five-nines, five-tens, five-elevens.
4 The only way we know that six-ten or four-ten is
5 unusual is because you get that number over and over
6 again.

7 And so sometimes the simulation sets finds
8 a -- you know, a combination that works really well
9 and will tend to draw it over and over again.
10 That's part of why we do this ridiculous number of
11 maps, 100,000, so that we're still doing a good
12 representative sample of the available maps.

13 Q. Are there diagnostics you can run in the
14 Redist package to see if there are problems with the
15 duplicates?

16 A. Yeah. Yeah. So we discussed those
17 earlier.

18 Q. Did you run those diagnostics?

19 A. I did. I did. And so there's duplicate
20 maps, but not so much that it triggers the warning
21 that -- you know, again, the duplicate maps are the
22 symptom, not the disease, and the disease of low
23 acceptance rates wasn't present.

24 Q. Did you see Dr. Chen's charts showing
25 that, with higher numbers of county splits, you get

1 more Republican-leaning districts?

2 A. Right.

3 Q. How would you respond to that?

4 A. I mean, I see the point, but people are
5 drawing maps -- you don't just target or evaluate on
6 what the enacted map does because, if you constrain
7 the maps that you look at only to the criteria of
8 the enacted map, eventually you just come up with
9 the enacted map compared to itself. You want to
10 compare it to a wider range of potential outcomes,
11 which is what people were doing here.

12 Q. Did you hear Dr. Chen's -- or did you see,
13 excuse me, Dr. Chen's charts comparing compactness
14 scores to the number of Republican-leaning
15 districts?

16 A. Yes.

17 Q. How would you respond to that?

18 A. Well, again, I wasn't drawing, saying that
19 there was going to have to be a Polsby-Popper score
20 of .39. I don't know what a Polsby-Popper score of
21 .39 looks like. I wanted a decent-looking map, and
22 if you draw a decent-looking map, you're going to
23 get an okay-looking compactness score across the
24 board.

25 And that's what ended up happening. My

1 maps were a range from .24 to .38, and so it would
2 be inappropriate to just peg that one Polsby-Popper
3 score and see what happens there.

4 Q. Did you hear Dr. Chen's testimony about
5 the Markov Chain Monte Carlo stage at the end of his
6 map process?

7 A. Yes.

8 Q. Is there a -- or is there or is there not
9 a Markov Chain Monte Carlo in the simulated Monte
10 Carlo approach?

11 A. No, there's -- at the end of his sequence,
12 as I understand it, he does the split of the state,
13 and then he randomizes changes at the boundary. I
14 think that's -- maybe Dr. Duchin in her article
15 misunderstood what the goal of it was, but that's, I
16 think, what she's probably talking about. That's
17 not in the Sequential Monte Carlo program, that
18 flipping at the end.

19 Q. Now, with respect to some of the maps in
20 your set, did you hear Dr. Chen yesterday testify
21 about some strange-looking districts pulled from
22 your sample set?

23 A. Yes.

24 Q. Which set were those samples from?

25 A. They were from the base set, the

1 three-criteria set.

2 Q. And, again, the base set is different than
3 the restricted set.

4 A. Right.

5 Q. And which set did you use for the
6 measurements in your report?

7 A. The restricted set.

8 Q. Do all the simulations in your base set
9 look like the examples Dr. Chen discussed yesterday?

10 A. No.

11 Q. Is it a known issue that a simulated Monte
12 Carlo process can produce strange maps?

13 A. Yeah, it's drawn by a computer. So at the
14 end of the day, computers are going to see things a
15 little different. It's like -- it's like, you know,
16 ChatGPT. Sometimes it just comes up with a weird
17 way of looking at things, because it's a computer.

18 So, yeah, no matter what you do with
19 Sequential Monte Carlo, you will get some subset of
20 maps that look weird, but those are -- not all of
21 them look like that.

22 Q. Can you weed out the funny or
23 weird-looking maps?

24 A. So I actually kind of thought about that
25 with the, you know, looking at every map. If I sat

1 down and looked at every map and spent a minute on a
2 map and did nothing but that for 12 hours a day, it
3 would take me 132 days to actually look -- you can't
4 look at all the maps.

5 So, no, you can't go through and kind
6 of -- and even then, not everyone would agree with
7 me about what a weird-looking map looked like, you
8 know, which map should be used. So you just kind of
9 take the set, and thankfully, not all of them look
10 like that.

11 Q. So if you use this state-of-the-art Redist
12 program, you will always get some odd-looking maps
13 in your sample.

14 A. Yeah.

15 Q. Does that bother you?

16 A. It doesn't, because the goal of this isn't
17 to get an idea of, you know, the partisanship of
18 beautiful maps that are the platonic ideal of what
19 should be passed. It's what is available to someone
20 drawing under a certain set of constraints.

21 And with -- like, say what you will about
22 those districts looking weird. The Polsby-Popper
23 score falls within a range that other people were
24 drawing. It just has a different conceptualization
25 of what the map looks like, but that's available to

1 someone drawing in that Polsby-Popper range.

2 MR. GREEN: Can we have -- is there a way
3 we can bring up the screen?

4 MR. GABER: Oh, yes.

5 MR. GREEN: Thank you.

6 Q. (By Mr. Green) After seeing that
7 critique, did you go back through your base set and
8 find some other examples?

9 A. Yes. No, through the restricted set.

10 Q. Excuse me. I'm sorry. I misspoke.
11 Through the restricted set.

12 Is this one of those examples?

13 A. Yes.

14 Q. Could you talk about this map for a
15 second?

16 A. Again, I think it -- you know, it's not
17 zeroed out. So in the real world, I would go into
18 Davis County and take 328 people out of it to zero
19 it out, but I think most people looking at this
20 would see a reasonably configured map.

21 Q. And here's another -- is this another
22 example?

23 A. Yes.

24 Q. Could you talk about this map?

25 A. Again, this is another look that kind of

1 has the same configuration. It's a little bit
2 different up in District 1, but it's another
3 combination of districts that looks reasonable.

4 Q. Was this another example you pulled?

5 A. It is.

6 Q. And could you comment on this one?

7 A. You know, it's a little weirder because it
8 kind of comes around Salt Lake County, but the IRC
9 drew maps with multiple splits of Salt Lake County,
10 and it would be wrong to exclude it. And, again, it
11 doesn't look like the snake districts that they were
12 showing. I mean, again, if I go through and
13 cherry-pick the worst-looking districts, I can do
14 that.

15 Q. Have you seen the Independent
16 Redistricting Commission's purple map?

17 A. Yes.

18 Q. What does it look like?

19 A. It starts at Tooele County and goes along
20 the northern boundary counterclockwise and then all
21 the way over to take in part of Grand County.

22 Q. Dr. Trende, there was some question about
23 your partisan leanings when you presented your maps
24 to the legislative redistricting committee. When
25 was the last time you voted for a Republican for

1 president?

2 A. 2012.

3 Q. So you have voted for Republicans and for
4 Democrats for president?

5 A. Absolutely.

6 Q. And have you worked for both Republicans
7 and Democrats as an expert witness?

8 A. Yeah, I was on deck to be the expert
9 witness against Kari Lake if she had sued Maricopa
10 County again. I was on deck in 2022 and 2024, even
11 though control of the Senate was at stake.

12 Q. And do you consider yourself to be a
13 Republican?

14 A. I don't.

15 Q. Did you hear testimony yesterday from
16 Dr. Chen about the case in New Mexico where he was
17 the expert for the defense?

18 A. Yes.

19 Q. Do you know who the expert for the
20 plaintiff was in that case?

21 A. Me.

22 Q. What algorithm did Dr. Chen use in that
23 case?

24 A. Something similar to what he uses here.

25 Q. And which one did you use in that case?

1 A. SMC.

2 Q. And which expert did the Court credit?

3 A. Me.

4 MR. GREEN: Thank you, Your Honor. No
5 more questions.

6 THE COURT: May I ask, before you step
7 down, the three maps that you showed --

8 MR. GREEN: Yeah.

9 THE COURT: -- can you make those
10 available just for the record?

11 MR. GREEN: Absolutely.

12 THE COURT: Okay.

13 MR. GREEN: Yep.

14 MR. GABER: Your Honor, I wonder if we may
15 take a quick break.

16 THE COURT: Yes, we can do that. It's
17 11:30. You want to just take five or ten?

18 MR. GABER: Sure.

19 THE COURT: Same? All right.

20 MR. GABER: Thank you.

21 THE COURT: And, Dr. Trende, you're under
22 oath. My request, do not talk to anyone about your
23 testimony until you have been excused.

24 THE WITNESS: Of course.

25 THE COURT: Okay?

1 THE WITNESS: Yes. Thank you, Your Honor.

2 THE COURT: All right. Court's in recess.

3 (Recess taken.)

4 THE COURT: All right. We are back on the
5 record.

6 Go ahead, Mr. Green.

7 MR. GREEN: Sorry. Yeah, before yielding
8 the witness, you asked for copies of these maps.
9 We've got copies here. Move their admission as
10 Defendants' Exhibit Number 17.

11 THE COURT: All right. No objection,
12 correct?

13 MR. GABER: No objection.

14 THE COURT: All right. Defense 17. And
15 this, just for the record, is three maps that were
16 reviewed with Dr. Trende during his testimony.

17 (Defendants' Exhibit 17 received.)

18 THE COURT: All right.

19 Mr. Gaber?

20 MR. GABER: Thank you, Your Honor.

21 And if we could switch to the computer
22 screen, please?

23 ***

24 ***

25 ***

CROSS-EXAMINATION

BY MR. GABER:

Q. Good morning, Dr. Trende. It is nice to see you again.

A. Good to see you too.

Q. We have spent some time together this year, correct?

A. Yes, we have. I still like you, though.

Q. Likewise.

So I want to start talking a bit about the map-drawing process and your engagement before we move on to other topics. I think I heard you say on direct that your engagement started with assessing the maps during this legislative process that led to the map before us today and then grew into the map-drawing; is that correct?

A. Yes.

Q. Now, were you retained by the legislative defendants in this case prior to 2025, this current redistricting process?

A. I don't know if I -- I don't know if I'd been formally retained. I had worked with this law firm on a different matter, and they had reached out to me about this, I think, in even 2024. But I don't know what the date on the retention letter is.

1 Q. Okay. So you were working on the Utah
2 case prior to 2025?

3 A. No.

4 Q. No.

5 A. No, I didn't bill a minute until whenever
6 the ruling came down.

7 Q. Now, who was your point of contact during
8 the -- for the map-drawing process with the
9 legislative defendants -- or with the legislature?

10 A. Mr. Green.

11 Q. And --

12 A. I'm going slow, so if there's anything
13 that needs to be objected to, it can be.

14 Q. And any -- have you spoken to any members
15 of the Utah legislature ever?

16 A. Yeah.

17 Q. Which?

18 A. My testimony.

19 Q. And prior -- prior to that, had you spoken
20 to, say, Senator Sandall or Representative Pierucci
21 as it relates to Utah redistricting?

22 A. I have no idea who those people are, so I
23 don't think so.

24 Q. Okay. And in terms of any instructions
25 that you received about how to go about the

1 map-drawing process, did those come from Mr. Green?

2 A. It would have come through Mr. Green.

3 Q. Whose idea was it to have five map
4 options?

5 A. I don't know.

6 Q. Was it your idea?

7 A. I don't think so. I don't remember ever
8 saying five is the magic number.

9 Q. Were -- at any point, were there more than
10 five options on the table?

11 A. I submitted more maps. I don't know if
12 any of them were ever on the table or seriously
13 considered. But, yeah.

14 Q. How many did you submit?

15 A. I don't know. I think I did three for
16 taking the enacted map, and then the rest were
17 computer-generated maps from the ALARM set or from
18 my sets that had been adapted, similar to what
19 Dr. Oskooii was doing.

20 Q. And how many from the ALARM set or your
21 set were you initially submitting to the legislature
22 for consideration?

23 A. I honestly don't know. Maybe 15 total. I
24 shouldn't even say that because then there's a
25 record. I -- more than ten.

1 Q. And when did that happen?

2 A. Probably a couple weeks after -- it --
3 can -- I don't like to ask you questions, but can
4 you give me a date or some type of baseline for when
5 the ruling came down that set this in motion?

6 Q. Sure. So I believe it was August 25th,
7 2025, was the Court's ruling. And then there was an
8 extended time after that for the legislative
9 process.

10 A. Yeah, I think it was mostly done between
11 my testimony -- between that August 25th ruling and
12 my testimony, which I think was September
13 20-something.

14 Q. September 22nd, I believe --

15 A. Thank you.

16 Q. -- was the date.

17 And so you then say -- excuse me. So you
18 submitted perhaps ten or more maps via Mr. Green to
19 the legislature for consideration; is that right?

20 A. That's right.

21 Q. And among -- so I -- let me just get that
22 right. So ten or more maps from the simulation
23 sets, correct?

24 A. Yes.

25 Q. And that included both the ALARM -- from

1 the ALARM set and from your own simulated set?

2 A. Yes.

3 Q. And, then, I think I heard you say that
4 you had three maps that you drew from -- starting
5 with the 2021 map; is that right?

6 A. Right.

7 Q. Did you conduct any analysis of the
8 partisan characteristics of the maps, those ten
9 simulated maps and the three that were drawn by you,
10 before you submitted them to the legislature?

11 A. So, again, because everything was done on
12 a rolling basis, I don't know if I did for the first
13 set, but at some point, you know, we got more and
14 more simulation sets and I was able to incorporate
15 that type of analysis.

16 But even then, it was never, you know,
17 "This is a 52 percent Trump district" or whatever.
18 I gave the -- I see you have summary pages, and
19 that's the way I did it because -- I think once, the
20 very first time, I gave the quantiles, and then I
21 realized that that actually gives partisan
22 information. So that's why you get the between 5
23 percent and 95 percent.

24 Q. And when you say "once," are you referring
25 to one map? Or one set of submissions to the

1 legislature?

2 A. No, I don't think -- I think it was the
3 very first map or one of the first maps I sent that
4 I had the quantile information. I had like
5 "quantiles," and I realized the legislature probably
6 doesn't know exactly what that means, and with the
7 indices, you -- it doesn't translate well. But I
8 still probably shouldn't even give that. So that's
9 when I started giving the ranges.

10 Q. And which map was that?

11 A. No idea.

12 Q. Where did it fall on the quantile?

13 A. It was within bounds, I'm pretty sure, but
14 I don't know.

15 Q. You don't know specifically within the --
16 where in the 95 percent range?

17 A. I don't.

18 Q. And who, then, decided on the five options
19 that were before the legislature? Was that your
20 decision? Or was that a decision by the
21 legislature, among the broader set that you had
22 given them?

23 A. Someone who was not me.

24 Q. But you can't say who that was?

25 A. No.

1 Q. Whose idea was it to draw maps from the
2 simulated set for consideration?

3 A. I don't know if -- I got the idea from the
4 Christopher Kenny tweet that, "Hey, you can draw
5 from the simulated maps, and there's really no
6 question of partisan intent with one of those maps
7 because it's drawn by a computer."

8 But I don't remember if this was something
9 that was simultaneously reached by multiple people,
10 but I definitely had -- the idea occurred to me.

11 Q. And I guess my question is, more
12 precisely, was it the legislature via Mr. Green that
13 gave that idea, that we should pull maps from the
14 simulated set?

15 A. And that's why I gave the answer I did,
16 because I know it occurred to me from that
17 Christopher Kenny tweet, but I can't remember if
18 this was my idea or something that simultaneously
19 occurred to multiple people.

20 Q. And whose idea was it to have three maps
21 where you physically drew it from the base point of
22 the 2021 map?

23 A. I don't think the number three was ever
24 agreed on.

25 Q. So I just said that because that's the

1 number you gave me, but whose idea was it to --
2 generally, to draw -- physically draw maps starting
3 from the 2021 map?

4 A. As I remember, the legislature was like,
5 "We need to get going. We'd like to at least have
6 some ideas."

7 And so that's when I thought, "Well, the
8 best idea that I have is to take this map and fix it
9 and send some different ways of fixing it."

10 Q. So that -- so that was your idea. That
11 wasn't the instruction or request from the
12 legislature?

13 A. No. Well, yes, it was my idea. No, it
14 was not an instruction or request from the
15 legislature.

16 Q. And why, then, did you decide that you
17 should do both manual drawing from the 2021 map and
18 send simulated set options?

19 A. Well, I think I came to the idea of the
20 simulated set after I'd done that, but, I mean, this
21 was six weeks ago of a lot of stuff, including
22 another trial that you and I did together. So I
23 don't remember the exact timeline.

24 I think it was just I looked at this map.
25 They wanted looks -- they wanted ideas quick, and so

1 that was something I could do. And either I was in
2 the process of trying to extract maps or I had the
3 idea later. I really don't know.

4 Q. So your recollection is that you -- first
5 you did the manual drawing from the 2021 map and
6 then after that had the idea to pull from the
7 simulated set for options.

8 A. I mean, that -- that is the best of my
9 recollection, but, again, all this stuff was a blur.
10 So if you showed me something with dates that had a
11 different chronology, then I'm just misremembering,
12 but that's how I recall it now.

13 Q. And so you can recall three that you drew
14 yourself; is that right?

15 A. That's right.

16 Q. And how -- so of the ones that the
17 legislature was considering, it seems to me at least
18 that Maps A and C were the ones that you drew
19 manually. Does that accord with your recollection?

20 A. I think that's right.

21 Q. And then Maps B and E appear to me to come
22 from the ALARM set and D from your own simulations;
23 is that right?

24 A. I'll accept you on that. I don't -- I
25 don't know -- I think there are two from the ALARM

1 set and one from mine. I don't know which is which.

2 Q. And maybe -- I don't want you to have to
3 just guess things.

4 MR. GABER: So if I could, Your Honor,
5 approach with Plaintiffs' Exhibit 12?

6 THE COURT: Yes. Thank you.

7 Q. (By Mr. Gaber) Now, we just mentioned
8 this, Dr. Trende. Do you recognize Plaintiffs'
9 Exhibit 12?

10 A. Yes.

11 Q. And what is this?

12 A. This is the evaluation -- the summary
13 sheets that I put together for maps.

14 Q. And could you just describe a little bit
15 more like what it is that you were summarizing and
16 whose idea this was and why did you do it?

17 A. Yes. So the idea was how do you convey
18 information to the legislature in kind of a nice
19 packet that's also, you know, vague enough that it
20 doesn't, you know, give anything bad away.

21 And so the first thing is, are -- is the
22 population deviation zero? Well, yes. You can
23 answer that easily.

24 Which counties are split? You can list
25 that. For the county splits, obviously, I started

1 out, depending on how you count splits to keep
2 cities, because there is that open question of what
3 you do with that. Which cities were split?

4 The bias of 50 percent, and then the three
5 simulation sets with all the maps involved, and then
6 the three simulation sets that were culled down to
7 maps that passed the partisan bias test, the
8 Polsby-Popper scores, and the Reock scores.

9 Q. Now, at the top of these, you have --
10 there's -- in red, it says, for the first page,
11 "option A Trende sim UT NS2 zeros, evaluated
12 9/18/2025."

13 And this was like a bit of hieroglyphics
14 to me when I first saw it. So Map A came from one
15 that you hand drew, correct?

16 A. That's right. The option A is not -- the
17 red option A is not something I did. I don't know
18 where that comes from.

19 Q. Okay.

20 A. But --

21 Q. The -- I think it's the legislature.

22 A. I don't know. I -- that would be my
23 guess. But the "Trende sim UT NS2," so it's the --
24 yeah, that's one of the hand-drawn maps that zeroed
25 out.

1 Q. And the word "sim" in the title, that --
2 that's just an error that -- it's not -- this
3 doesn't come from the simulated set.

4 A. Right. I didn't even catch that reading
5 it here. Yeah.

6 Q. And the "NS," that refers to north-south.
7 What is meant by that?

8 A. So two of the splits were done on the
9 north-south split. One of them was done on the
10 east-west split.

11 Q. Split of what?

12 A. Well, so there's the four quadrants in
13 Salt Lake City. Two of them were done north-south
14 quadrants put together. One of them was done with
15 the east-west quadrants put together.

16 Q. And so Map A was one of the north-south.
17 Does that mean that the dividing line down Salt Lake
18 County was going north to south?

19 A. So let's start in the northwest and call
20 that 1, and then go clockwise, quadrant 2, quadrant
21 3, and quadrant 4. The north-south is quadrants 1
22 and 4, and 2 and 3 together. The east-west is
23 quadrants 1 and 2, and 3 and 4 together.

24 Q. I see. So Map A was one of the
25 north-south, and that meant that the line through

1 Salt Lake County would go north to south; is that
2 right?

3 A. Yes.

4 Q. Okay. And then if you look at Map C,
5 which is on the third page of Exhibit 12, this is --
6 this is the one that became the enacted map,
7 correct?

8 A. Yes.

9 Q. And this also is -- this is titled "base
10 Utah North-South Zeros, Evaluated 9/18/2025." Is
11 that right?

12 A. Yes.

13 Q. And the "base," I gather, refers to the
14 fact that it was being drawn from the base 2021 map?

15 A. I guess. I don't know what I was thinking
16 there, but that's reasonable.

17 Q. Okay. And "zeros," that just refers to
18 the population being balanced?

19 A. Yeah, so when I initially submitted them,
20 there was a little bit of a scuffle, and I was like,
21 "I'm not zeroing out every single map I send you.
22 That is a miserable task that takes forever. So
23 we'll get it close, and if the legislature decides
24 it likes a map, then I can go and do the scut work
25 of zeroing it out."

1 It's -- I hate it.

2 Q. And Map C, it -- you know, like it says,
3 that is also one that divides Salt Lake County with
4 a line that goes north to south generally, correct?

5 A. Yes.

6 Q. And among the five options, the other
7 three were from the simulated sets, right?

8 A. Yes.

9 Q. And so the hand-drawn map that was
10 rejected or not presented by the legislature after
11 they received it from you was the version that
12 splits Salt Lake County with a -- into two
13 districts, one in the north and one in the south; is
14 that right?

15 A. Right.

16 Q. And that's one that the legislature
17 rejected.

18 A. Right. Well, I guess. I --

19 Q. It wasn't --

20 A. Someone, not me, rejected it.

21 Q. It wasn't presented among the five
22 options.

23 A. That's right.

24 Q. And going back to the -- do you recall
25 which order you -- or what order did you submit the

1 hand-drawn options in?

2 A. I don't know. Obviously, the one that's
3 numbered two was probably before the other
4 north-south, but as for the east-west, I don't know.

5 They could have all been submitted
6 together, actually. I do not know.

7 Q. Okay. How did you submit them to the
8 legislature?

9 A. Well, I believe I sent block assignment
10 files to counsel, and then I think the earliest
11 versions had images of the maps attached to them.
12 And then that just grew too cumbersome when the
13 number of maps coming in got overwhelming, so I
14 stopped doing that.

15 Q. For the hand-drawn maps, those were the
16 earliest ones that you submitted to the legislature,
17 right? They came before the simulated?

18 A. Well, again, I think I said that's how I
19 remember it, but if something comes in with a
20 different chronology -- I mean, it's hazy enough it
21 really could be a different chronology, but I think
22 that's right.

23 Q. And so the hand-drawn ones, then, would
24 have been the ones that were -- the three hand-drawn
25 ones were the ones that would have been accompanied

1 by an actual image of the maps.

2 A. I think they would have gotten an image of
3 those, yeah.

4 Q. Did you conduct this analysis -- or for
5 the three hand-drawn maps, did you provide this
6 analysis that's shown in Plaintiffs' Exhibit 12 for
7 each of those and submit it to the legislature?

8 A. I believe so.

9 Q. And --

10 A. So this is 9/18, right? So this is --
11 these are the five that are going to go up for
12 consideration to the redistricting committee and
13 have testimony on. So I don't know -- I assume
14 there are earlier versions that wouldn't have been
15 zeroed out, for example. But that's -- this 9/18
16 gives some context on what this is.

17 Q. The map that you -- the third map that you
18 drew, that was the east-west -- the east-west
19 labeled one that had a line that divided from east
20 to west in Salt Lake County and so that it would
21 have a northern Salt Lake County district and a
22 southern Salt Lake County district, did that -- did
23 you report whether that passed the partisan bias
24 test to the legislature?

25 A. I believe so.

1 Q. And did it?

2 A. I believe so. Because I think everything
3 that I reported passed. I wasn't going to send
4 them, you know, illegal maps that might get enacted,
5 but -- so I'm pretty sure that it did, unless I just
6 didn't have that stuff up and running yet. But I'm
7 pretty sure I did.

8 Q. And what was your process for drawing the
9 map -- the hand-drawn map, the east-west map that is
10 not among the five that the legislature put forward?

11 A. So it was the same basic process. I
12 started with Salt Lake City, because that seemed to
13 be what was drawing the most ire, and split -- you
14 know, put quadrants 1 and 2 and 3 and 4 together and
15 then proceeded from there. But I honestly have --
16 in the volume of maps that were evaluated, I have no
17 idea what I did past that.

18 Q. So I have on the screen -- you recognize
19 Dave's Redistricting app, correct?

20 A. Yeah.

21 Q. You use it with your students, and you use
22 it in your expert engagements?

23 A. I -- Yes.

24 Q. And so I have on the screen a copy of the
25 Utah 2022 congressional map. Do you see that?

1 A. Yes.

2 Q. And you actually drew the hand-drawn
3 options, the Map A, C, and then this east-to-west
4 one we're talking about -- You used Dave's
5 Redistricting app to draw those?

6 A. Right.

7 Q. And did you start -- you know, the home
8 page --

9 MR. GABER: And I can show you this for
10 the Court's benefit.

11 Q. (By Mr. Gaber) The home page of Dave's
12 has all 50 states, and you can click on a state, and
13 it has an official collection of the maps of that
14 state; is that right?

15 A. Right.

16 Q. And is that how you generated the map from
17 which you drew?

18 A. Right. You click on the map of the state.
19 You hit "produce a copy." Where it says "view
20 only," there's the folder next to it, and you --

21 Q. I need to --

22 A. Not that.

23 Q. I know. I need to get on the Internet,
24 actually. Give me one second. Sorry. As in Texas,
25 my hotspot works better.

1 Okay. So --

2 A. When I saw you had my cross, I knew we
3 were going to be drawing in Dave's together again.

4 Q. We're going to be spending time on Dave's.
5 Not as much as we did in Texas, I promise you.

6 A. Okay.

7 Q. Okay. So this will take a second to load,
8 and maybe I'll refresh it and see if that --

9 A. Well, you -- you click on that little file
10 folder thing next to "view only," and it produces a
11 duplicate of the map.

12 Q. Okay. And I did that, so we don't have to
13 spend time doing this.

14 So you see on the screen the 2022
15 congressional map, and this is what appeared on your
16 screen when you clicked "duplicate it." Is that
17 right?

18 A. Right.

19 Q. And this is what the screen looked like as
20 you did the map drawing.

21 A. Right. It probably would have had
22 precincts on it, but -- yes.

23 Q. And so I put the precinct lines on, and
24 would you have the county lines on as well?

25 A. Probably.

1 Q. What about the city lines?

2 A. Probably not at this point, because what
3 I'm -- what I would have done is locked the
4 districts that I wasn't changing, put it at the
5 county level, and then clicked and filled.

6 Q. Okay. Did you -- did you leave the screen
7 as it was here? Or did you change any of the
8 settings like -- you know, you can show different
9 racial data, or you can choose election sets. Did
10 you do any of that?

11 A. I don't think so.

12 Q. So this is basically what it looked like?

13 A. Yeah.

14 Q. And that would have had the district
15 details with the total population, voting age
16 population by racial group, and then Dave's has a --
17 like a default composite election score?

18 A. Yeah, thankfully for Utah, it goes back to
19 2012. So it's not terribly helpful, but yeah.

20 Q. And then on the right side of the screen,
21 as you're selecting, you see the precinct details
22 line on the right side?

23 A. Uh-huh.

24 Q. As you select a precinct to move in and
25 out of a district, you can see the characteristics

1 of that precinct.

2 A. I said, "uh-huh" before, and I meant yes.
3 And I mean yes now.

4 THE WITNESS: Sorry, Your Honor.

5 Q. (By Mr. Gaber) And then what that shows
6 is the population of that precinct; the -- you know,
7 the racial population by total population and voting
8 age population; and then again, that composite
9 election score for that particular precinct. Is
10 that right?

11 A. Right.

12 Q. Now, for the -- the east-to-west map that
13 would have had the northern Salt Lake District and
14 the southern Salt Lake District, do I -- do I take
15 it to mean you started in Salt Lake County and then
16 you would have combined what is on here, green
17 District 2 and blue District 1, into one group?

18 A. We're really doing colors again?

19 Q. Oh, I'm so sorry. I forgot -- I forgot,
20 Dr. Trende.

21 A. I'm red and green color blind.

22 Q. The -- okay. Let me do it in directions.
23 I did pretty well, I thought, in our last one on
24 this. Okay. So -- and those are the colors that --
25 yeah, I'm sorry.

1 Okay. So District 2, which is -- and let
2 me see if I can help you with this.

3 A. You know, true story, Dave's has the
4 viridis color scheme, and that's because of me.

5 Q. Oh, really? I --

6 A. I asked them to --

7 Q. Well, I know you're a contributor, but
8 they -- that's good. Well, do you want me to change
9 it? I can --

10 A. No, no, it's fine.

11 Q. Okay.

12 A. I put the District 2 chunk in the
13 northwest with the District 1 chunk in the
14 northeast, the blue -- I can see that's blue.

15 Q. Okay. So for -- for the rest of us,
16 that's the blue and the green district in the
17 northern half of the county, right?

18 A. Yeah.

19 Q. And those would have been together in one
20 district.

21 A. Right.

22 Q. And then the District 4 section of Salt
23 Lake County in the 2021 map and the District 3
24 section of Salt Lake County in the 2021 map, those
25 would have been together in a -- sort of a southern

1 Salt Lake County configuration.

2 A. That's right.

3 Q. And then what about with respect to the
4 rest of those districts, once you did that, and
5 maybe just generally?

6 A. I honestly don't know.

7 Q. You don't have any recollection of that?

8 A. No. I mean, that's -- that's a month and
9 a half and probably 40 maps evaluated since.

10 Q. Okay. And what about with respect to
11 Map A? You don't recall whether you drew that one
12 before or after Map C?

13 A. I think, because Map A is numbered 2, I
14 probably drew it before Map C.

15 Q. Okay. Before Map C.

16 A. Right.

17 Q. And it comes before it in the alphabet. I
18 don't know if that means anything.

19 A. I think it's just the number.

20 Q. Okay.

21 A. Like, I put 2 because this is version 2,
22 but -- I probably shouldn't be helpful, but I think
23 that's right.

24 Q. And then -- so I'm going to show you
25 Map A.

1 MR. GABER: And for the Court's record,
2 I'll -- we'll submit these links to the Court --

3 THE COURT: Okay.

4 MR. GABER: -- but we've agreed with
5 counsel on this.

6 THE COURT: Perfect.

7 MR. GABER: So that's C I'm showing.

8 Q. (By Mr. Gaber) So this -- do you
9 recognize on the screen Map A that you drew?

10 A. Yes.

11 Q. And so what -- and I'm going to zoom into
12 Salt Lake County, and this is obviously after you've
13 combined the -- you know, this is the end result of
14 your work. And I'm going to put the city lines on
15 so you can see the cities and the city boundaries.

16 And what was your process -- you know, you
17 talked through the process that you had for Map C.
18 What was the process that led you to this
19 configuration for Map A?

20 A. Yeah, so the main differentiator for this
21 is that, if you look at that base north-south split,
22 Salt Lake City is split down the middle. It's not a
23 given which district Salt Lake City should go in.
24 So I did it once with the eastern District and once
25 with the Tooele District.

1 Q. And as I read your expert report, you
2 know, where you describe the process -- let's see if
3 I can find it.

4 So starting on page -- do you have a copy
5 of your expert report there?

6 A. Yeah. Okay.

7 Q. So starting on page 32 -- and then you
8 kind of step-by-step describe how you got to -- how
9 you got to the end result of Map C, right?

10 A. Right.

11 Q. And the first thing you noted, and you
12 mentioned this on direct, was that it was -- the
13 first -- and this is at the bottom of page 32,
14 quote: "The first problem to resolve was obviously
15 the four-way split of Salt Lake County and the
16 accompanying city splits in the 2021 map." Is that
17 right?

18 A. Right.

19 Q. And you viewed that as a violation of
20 Prop 4's criteria, right?

21 A. Right.

22 Q. And you told the legislature that at the
23 September 22nd hearing when they asked about, you
24 know, how the -- how the maps -- the prior maps --
25 the commission maps and their map held up under

1 Prop 4, right?

2 A. Right.

3 Q. And so in your view, the -- to be
4 compliant with Prop 4, the county need not be split
5 any more than one time.

6 A. There might be -- it need not, yes, that's
7 right.

8 Q. So you say that -- and on page 33, you
9 kind of talk through -- you start talking through
10 how you made the decisions of what to put where and
11 that you decided to combine two quadrants on the
12 west side and on the east side. Do you see that?

13 A. Yeah.

14 Q. And was there any -- like, what went into
15 that decision-making process? Like, how'd you come
16 to that?

17 A. Well, so if you're doing the north-south
18 split, you know, obviously the parts in Districts 2
19 and 4 are combined, and then 1 and 3 are combined,
20 and then you have to decide which district they go
21 in.

22 But there's really only two things you can
23 do with this. You can either -- in our little
24 quadrants, you can put 1 and 4 together and 2 and 3
25 together, or you can put 1 and 2 together and 3 and

1 4 together. And those are the two, kind of,
2 combinations I explored.

3 Q. When you say "the north-south split," what
4 you mean is the line that goes north to south.

5 A. Yes.

6 Q. I just want to make clear about
7 north-south district versus -- with an east-west
8 line versus an east-west district divide with a
9 north-south line.

10 A. Right. It's which quadrants were
11 originally combined and how that line went. I mean,
12 obviously Salt Lake City is right in the middle, so
13 when you make Salt Lake City whole, you're no longer
14 going to have that nice, neat line running north and
15 south. But that's how it started.

16 Q. Now, you said that -- you know, that the
17 only two options were these, to combine either the
18 top two quadrants and the lower two quadrants, east
19 to west, together to create a north-south district
20 or to combine the -- you know, on either side so
21 that you'd have an east-west configuration. Did you
22 consider just starting over?

23 A. No.

24 Q. So the quadrant configuration that the
25 legislature chose in 2021, that was just necessarily

1 built in to how you were going to move forward with
2 the hand-drawn maps.

3 A. I didn't want to be the map drawer, and so
4 this is how I started with this. And then I knew we
5 were, at some point, going to be going to
6 computer-simulated maps.

7 Q. Why didn't you want to be the map drawer?

8 A. Because I didn't want to be sitting here.
9 This isn't fun.

10 Q. This isn't that bad.

11 A. Not yet. I know it's coming. You're a
12 nice guy until about 45 minutes in.

13 Q. Now, the explanation on the bottom of
14 page 33 for why you chose to put Salt Lake City into
15 District 3, which is the district that would go down
16 into San Juan County, was that District 2 was
17 already severely overpopulated. Is that right?

18 A. Right.

19 Q. Why is that the case, given that you drew
20 Map A and put Salt Lake City into the opposite
21 district that would have been severely overpopulated
22 at this point? I mean, that wasn't a restriction.
23 That was just a choice you made, right?

24 A. Right. I -- the first thing I looked at
25 was I've got to put Salt Lake City somewhere.

1 District 2 is already overpopulated. And then I
2 said to -- after that was done, I said to myself,
3 "But, you know, I could have made that Salt Lake
4 City choice a different way, so let's see what it
5 looks like if I make it the other way. You're going
6 to have to do more surgery on District 2, but
7 sometimes you have to do that."

8 Q. So the population of Salt Lake City didn't
9 actually stand in the way of putting it in one
10 configuration versus the other because you could
11 make changes after that to resolve that.

12 A. It wasn't prohibited to do it the other
13 way. The natural way that I saw it at first was to
14 put all of Salt Lake City in the eastern district,
15 but it didn't have to be that way.

16 Q. The eastern district being the one that
17 goes down into San Juan County?

18 A. Yeah.

19 Q. But you drew Map A first --

20 A. No.

21 Q. -- that had it -- Salt Lake City in the
22 western --

23 A. No.

24 Q. -- district.

25 A. Map A is north-south 2.

1 Q. Okay.

2 A. Map --

3 Q. I think what you said earlier was that one
4 came before C, so I just want to be clear.

5 A. Well, if I said that, thank you for -- I'm
6 glad we are clarifying. Because, no, it wouldn't
7 make sense for me to number something 2 when I drew
8 it first.

9 Q. Okay.

10 A. So the first thing I drew was the map --
11 what became Map C. Then I would have done
12 north-south version 2.

13 Q. Did you assign the A, B, C, D, E labels to
14 these?

15 A. No.

16 Q. But in any event, you were -- you were
17 able to come up with a version that had Salt Lake
18 City going west to Tooele County, right?

19 A. Right.

20 Q. And you saw no problem with doing that?

21 A. No. There are some nice features with
22 that, with I-80 kind of continuing into the
23 district. But, you know, I-80 is going to go
24 through Salt Lake. It either goes from Tooele into
25 Salt Lake, or it goes from Salt Lake into Summit.

1 So either way, had a nice kind of centering on a
2 major artery.

3 Q. For the -- for the other option that you
4 drew that wasn't presented by the legislature, with
5 one district in the northern part of Salt Lake
6 County and one in the southern part, did --
7 similarly, did Salt Lake City go with Tooele County?

8 A. That's a -- I don't -- all I know from
9 that map anymore is that the northern half is put
10 together -- like, quadrants 1 and 2 are put
11 together, and quadrants 3 and 4 are put together.
12 But I honestly do not remember which side it went
13 into.

14 Q. Okay. But for the rest of the state, did
15 that kind of keep the same -- because A and C, to
16 me, look like they basically are almost -- they're
17 completely identical, outside of Salt Lake County.
18 Is that what you did for all three of these is just
19 focus on rearranging Salt Lake County to get from 4
20 to 2 and then keep the rest kind of the same?

21 A. So I think the north-south split would
22 have to be more severe or more substantially
23 different because of the differences in -- you know,
24 it's how -- it's how the map is configured. It's
25 going to -- let me -- if you have a single district

1 coming along the southern half of Utah County, you
2 have that chunk of a district that's left in the
3 northern part of Utah County that's going to have to
4 go somewhere.

5 And so I'm almost certainly not going --
6 I'd be surprised if I left it that way, but -- well,
7 is it in Utah County? Can you put the county
8 boundaries on?

9 Q. Yeah, let me -- I'll take the city ones
10 off for a second so you can see it.

11 A. Yeah, so that area around -- if you have a
12 district that cuts Salt Lake County on an east-west
13 axis, you've got that area in southern Utah County
14 around Lehi and Alpine and whatnot that's going to
15 impact -- so I guess that would probably have gone
16 into the eastern district. But because there's so
17 much population in southern Salt Lake County, I
18 think it demands reconfigurations elsewhere. But,
19 again, I -- I don't know.

20 Q. So it sounds likeliest that the northern
21 part of Salt Lake County in that map that didn't get
22 presented by the legislature was with Tooele County?

23 A. I would guess, but it's a guess.

24 Q. Okay. And remind me, did anyone from the
25 legislature suggest to you to start with the 2021

1 congressional map as the base map?

2 A. I don't think so.

3 Q. You knew at the time that that map had
4 been enjoined as a constitutional violation?

5 A. Yeah, as I read the decision, it was the
6 structural factors. So that's what I based it on.
7 I thought I could fix the structural factors.

8 Q. Now, one question about Dave's. What is
9 the login -- like the credential, the login username
10 that you used to draw Utah's map?

11 A. I don't know.

12 Q. Do you have one that you use? Or do you
13 have more than one?

14 A. I have more than one.

15 Q. What's the reason for that?

16 A. Because when I was doing the Virginia
17 maps, we did it in Dave's, and I didn't want my -- I
18 didn't -- I wanted to keep everything kind of
19 pristine there. And then you leave yourself logged
20 in, and you start drawing other stuff in your
21 previously pristine map set, and before you know it,
22 you have two logins.

23 Q. But you don't -- so did you create one
24 specifically for Utah?

25 A. No, because I didn't want to be the map

1 drawer.

2 Q. Okay. It would have been one of the ones
3 that you use for your -- either your consulting or
4 your personal use?

5 A. Yes.

6 Q. But you don't know the -- your username
7 for Dave's?

8 A. I don't know which one it was, that's
9 right.

10 Q. Can you recall any of them?

11 A. I think there's my name at Hotmail, and I
12 think there is a Trende.3.

13 Q. All of them would have your name in --
14 somehow in the --

15 A. Yeah.

16 Q. Now, the rationale for this -- for drawing
17 from the simulated set is that -- I think, as you
18 said earlier, that the computer is drawing those,
19 and there's no political data that's input into
20 that -- into that algorithm, correct?

21 A. Yeah, it would probably save an
22 uncomfortable cross. That was my exact thinking.

23 Q. And that sort of contrasts to this process
24 of using Dave's that, of course, has the election
25 data displayed on the screen, right?

1 A. Right.

2 Q. And how -- I noticed in your code that two
3 of them came from the ALARM data set, and one of
4 them came from your set. That's right?

5 A. Uh-huh. Yes.

6 Q. How did you -- it wasn't obvious to me,
7 though, how you like identified which particular map
8 numbers to draw from the simulated set. How did
9 that happen?

10 A. I think they were randomly selected.

11 Q. Did you use like one of those random digit
12 identifier things to, like, come up with one?

13 A. Yeah, I mean, I think they got filtered
14 down, I mean, so the ones that passed the partisan
15 bias test; you know, ones that had relatively few
16 county splits and municipal splits. I think they
17 were culled that way, but at the end, it was random.

18 Q. Okay. And same -- so that's for the ALARM
19 set. Is it the same answer for the one from your
20 set?

21 A. Yeah.

22 Q. Now, when you -- I think on your direct I
23 heard you say that you felt comfortable drawing from
24 the ALARM set because you thought that they had been
25 drawn with respect to the Proposition 4 criteria; is

1 that right?

2 A. No. No, I said that the major criteria
3 were similar, and then I became more comfortable
4 when I saw that the partisan -- whatever the
5 criteria were, the partisanship of the ALARM set
6 wasn't that far off the partisanship of my set.

7 Q. Did you know at the time that the ALARM
8 set was specifically created with the SB 200
9 commission criteria?

10 A. Yeah, it's what we had available at the
11 time.

12 Q. And so I'm going to go to the page on the
13 website here for -- you recognize this as the ALARM
14 redistricting page for Utah?

15 A. Right.

16 Q. And then they show four sample plans from
17 the ALARM set. Do you see that?

18 A. Yes.

19 Q. Or rather -- I'm sorry. Three from the
20 ALARM set and one from the enacted plan; is that
21 right?

22 A. You're right.

23 Q. And the three that they show would each
24 have a Democratic-leaning district; is that right?

25 A. Right.

1 Q. And then if we scroll to the bottom, they
2 present some pictures of the, you know, political
3 geography of the state and metrics for the ensemble.
4 And then at the bottom, they have the redistricting
5 requirements. Do you see that?

6 A. Right.

7 Q. And you can see they're linking to the
8 legislative code 20A-20-302.

9 A. Right.

10 Q. And those are the criteria that SB 200
11 adopted to be applied to the commission, but not to
12 the legislature because the legislature didn't apply
13 any criteria to itself, correct?

14 A. I'm sorry. What?

15 Q. The listed criteria are the ones that
16 would apply to the independent commission under
17 SB 200. Did you -- did you have that understanding?

18 A. No, I didn't follow this case until
19 August 22nd or whatever. But that's what they were
20 drawing under. So...

21 Q. Okay. Do you see that 4C here is
22 preserving the cores of prior districts?

23 A. Right.

24 Q. And do you know that that's not one of the
25 Proposition 4 criteria?

1 A. Right. So that's one that gave me some
2 pause, but then the way that they do core retention
3 is they basically shave off precincts on the
4 outside, and you can control how many precincts you
5 shave off the outside of the districts.

6 And so if you scroll back up to the
7 district maps, they were producing some pretty
8 different-looking districts. So I didn't take it to
9 be that they had constrained so heavily on core
10 retention that you weren't going to get -- I was
11 worried that you might get the previous map over and
12 over and over again, because that's what strong core
13 retention would do. But it's not what happened.

14 Q. And we can -- they say -- and they have
15 their code and they say in the data that they fused
16 together all of the interior precincts, but then
17 allowed the two precincts around the edges to
18 change.

19 A. Right.

20 Q. Did you recall that?

21 So most of the precincts were split
22 together. It just -- it depends on how many people
23 live in the precincts around the edges, right? Or
24 how the -- or the size of the precincts around the
25 edges?

1 A. And see, this is where I get a little
2 confused. Because if you look at Sample Maps 1, 2,
3 and 3, like, those are pretty different. I mean,
4 like, the boundaries are very different. So
5 whatever they started with, they ended up with a
6 pretty diverse group of maps.

7 I knew that my final test wasn't just
8 going to be the ALARM map because of that, but
9 because they had some wildly different maps and a
10 lot of the constraints were the same as Prop 4, for
11 just getting the ball rolling, that was a good way
12 to start.

13 Q. Now, I want to pass out an exhibit.

14 MR. GABER: And what is our next number?

15 MR. REYMANN: Thirteen.

16 MR. GABER: Thirteen. So I'll -- we will
17 mark this as Plaintiffs' Exhibit 13. It is not
18 yet --

19 May I approach?

20 THE COURT: Yes.

21 Q. (By Mr. Gaber) Now, I've handed you what
22 will be Plaintiffs' Exhibit 13. And do you see at
23 the top, it says "Map 1239"?

24 A. Yes.

25 Q. And I'm going to put it on the screen for

1 you too, but I wanted to give everyone a paper copy.

2 Do you see that on the screen here?

3 A. Yes.

4 Q. Do you recognize this?

5 A. No, but I believe you it's Map 1239 from
6 the ALARM set.

7 Q. So if you'd go back to Plaintiffs'
8 Exhibit 12, the -- your data sheets for each of the
9 maps, and if you flip to Plan E -- Map E, do you see
10 that this says Map E 1239? This is one of the ones
11 you got from the ALARM set? Is that right?

12 A. That's where I started with, yeah.

13 Q. And then, you know, I can tell you that
14 this is pulled from the data that you produced of
15 the ALARM maps and is Map 1239. And maybe what I'll
16 do is see if I can't do a comparison screen here.

17 Okay. You see that I have Map 1239 on the
18 left side of the screen, and I have Plan E on the
19 right side?

20 A. No.

21 Q. Did I say that backwards?

22 A. No. I only see one map on the screen.

23 Q. Oh.

24 A. You can -- I mean, that's what I see.

25 Q. Yeah.

1 A. I'm sorry.

2 Q. No, no. No worries. I don't know --
3 okay. Maybe that is beyond -- that's beyond the
4 ability of the -- let me try this. Sorry. Okay.
5 Well, we'll just stick with this.

6 You see Map 1239 on the screen. Now,
7 would you agree with me -- so first of all, when you
8 saw this -- that this is one of the first ones you
9 pulled from the ALARM set, right?

10 A. Right.

11 Q. Did it give you any alarm as to what it
12 might look like in the ALARM set for Utah's maps?

13 A. I see what you did there. Yeah, there
14 were some problems that had jumped over the Colorado
15 River in southwest -- or in Southern Utah. But
16 again, these were just starting points that I took.

17 Q. I mean, it nearly wraps around the
18 entire -- the district -- let's see. What district
19 number is that? District 1 nearly wraps around the
20 perimeter of the entire state, right?

21 A. I mean, so I'll tell you, I thought about
22 a donut hole district that had all the rural
23 counties together. I mean, that actually seemed to
24 have some nice properties, and I know Utah has had a
25 donut hole shape before. So I wouldn't have ruled

1 that out from the get-go. But, yeah, it goes around
2 quite a bit.

3 Q. And suffice it to say, you changed this
4 quite a bit in constructing Plan E so that it
5 wouldn't look like it looks in the ALARM set, right?

6 A. I haven't looked at Plan E in a long time,
7 but I would guess, from the start, I took Iron,
8 Washington, and Kane and put them into District 3
9 and then worked from there.

10 And I need to stop being helpful and
11 telling you what I guess I did, but that's what I
12 think I did or I would have done.

13 Q. Okay. I'm going to move on to another
14 topic and --

15 MR. GABER: But I do want to ask Your
16 Honor what time you would like to do lunch.

17 THE COURT: I -- as I said before, I'll
18 take your lead, whenever counsel wants to break for
19 lunch.

20 MR. GABER: I'm happy to keep going if
21 that is fine. Is that okay?

22 THE WITNESS: I mean, how long do you
23 think you have?

24 Q. (By Mr. Gaber) Well, maybe for your -- I
25 mean, your flight is at what time?

1 A. It's at 4:00.

2 Q. Okay.

3 A. So -- and I don't think --

4 Q. That's not going to be a problem, no.

5 A. I have TSA pre.

6 Q. Yeah.

7 A. If you're going to go another half hour,
8 I'd say push through, because there's a two I could
9 get on.

10 Q. No, it's --

11 A. But if you're going an hour and a half,
12 let's get food.

13 Q. It'll be longer. Yeah.

14 A. Yeah.

15 Q. Okay.

16 MR. GABER: So let's -- if we can break
17 for lunch.

18 THE COURT: You want to break for lunch?

19 MR. GABER: Sure.

20 THE COURT: How long do you want to take
21 for lunch?

22 MR. GABER: Half hour, if that works?

23 THE COURT: Does that work?

24 MR. REYMANN: Or we could even go -- we
25 could even go less. Our food is here, but defer.

1 We can do 20 minutes.

2 MR. GABER: I'd say a half hour, if we
3 could.

4 THE COURT: Half hour?

5 MR. GABER: Yes.

6 THE COURT: Okay. Well, let's do a
7 30-minute break.

8 Dr. Trende, you are under oath. I just
9 ask you don't talk to anyone about your testimony
10 until you've been excused.

11 THE WITNESS: I can ask for my sandwich?

12 THE COURT: You can ask for your sandwich.
13 It's not about the testimony.

14 THE WITNESS: Of course. Thank you, Your
15 Honor.

16 THE COURT: All right. Court is in
17 recess. 1:05 return.

18 And do you -- you're more than welcome to
19 leave whatever you like here.

20 MR. GABER: Thank you.

21 THE COURT: We'll leave the doors open if
22 you want to come in and out.

23 (Recess taken.)

24 THE COURT: Let me know when you guys are
25 ready to start.

1 MR. GABER: I'm ready.

2 THE COURT: You're ready?

3 MR. GABER: Yes.

4 THE COURT: And we're on record.

5 All right. Back on the record, League of
6 Women Voters of Utah versus Utah State Legislature,
7 case 220901712.

8 All right, Mr. Gaber.

9 MR. GABER: Thank you, Your Honor.

10 Q. (By Mr. Gaber) Dr. Trende, I have on the
11 screen -- and I think you have a copy in front of
12 you -- of your expert report.

13 Do you recognize that?

14 A. Yes, I do.

15 Q. And I want to take your attention to
16 page 7, Table 1.

17 Do you see that?

18 A. Yes.

19 Q. Now, this is the table where you report
20 the core retention rates; is that right?

21 A. Correct.

22 Q. And I just want -- I'm not going to spend
23 much time on this, but you report each district in
24 the 2021 map and then each district in an active map
25 and then the core retention of that sort of

1 component of the map; is that right?

2 A. Right.

3 Q. The thing that struck me that -- if we
4 look at the first row, District 1 in the 2021 map,
5 District 1 in the enacted map, that's the highest
6 core retention rate in the plan; is that right?

7 A. That's right.

8 Q. At 84.3 percent?

9 A. Yes.

10 Q. The column that you have that says "Total
11 Moved," it says 689,862 were moved and that the
12 ideal district is 817,904. Should that be people
13 not moved?

14 A. Yeah, because that's how you get to 84.3.

15 Q. Okay. Now, you talked a little bit on
16 direct about -- in your report about the mean-median
17 test and the partisan bias test.

18 Do you recall that?

19 A. Yes.

20 Q. And -- let's see if I can do this.
21 If you go to page 30 of your report, you have a
22 section on mean-median.

23 Do you see that?

24 A. Yes.

25 Q. And in the middle of the paragraph, you

1 see the sentence I've highlighted. Could you read
2 that, please?

3 A. "This makes the most sense in the context
4 of a legislative body where control of the agenda
5 committees and ability to pass legislation is
6 closely tied to winning the median district."

7 Q. So your view is that the mean-median test
8 doesn't make nearly as much sense for a
9 congressional map as it does for a state legislative
10 map?

11 A. I mean, I think that's stronger than what
12 I wrote. We used it in Virginia to evaluate the
13 congressional as well as state legislative, so --
14 but I think it makes more sense in the context of a
15 legislative body.

16 Q. And you communicated that to the
17 legislature at the September 22nd hearing as well,
18 right?

19 A. I think so.

20 Q. Now, the state legislature is actually the
21 body that SB 1011 does not apply the mean-median
22 test to; is that right?

23 A. I don't know if that's true.

24 Q. SB 1011, do you understand that SB 1011
25 only applies in its metrics to the congressional

1 map?

2 A. I don't.

3 Q. You didn't know that?

4 A. No.

5 Q. Did you analyze how the current state
6 legislative plans for Utah would fare under the
7 partisan bias test and the mean-median -- or the
8 mean-median test?

9 A. No.

10 Q. You've never done that?

11 A. I don't think so. I certainly don't know,
12 as I'm sitting here.

13 Q. Now, another thing in the description of
14 your report on the partisan bias test -- and this is
15 from pages 29 to 30 -- you note that the partisan
16 bias test has a downside in that it relies on
17 hypothetical elections that didn't occur and
18 involves a fairly strong assumption of uniform
19 swing; is that right?

20 A. That's right.

21 Q. And in the real world, you know, we have
22 elections that have happened we can look at, right?

23 A. Yeah. They have their own problems, but
24 yeah.

25 Q. And that assumption of a uniform swing,

1 particularly if you're swinging from, say, 16 points
2 to get yourself down to 50/50, that's a pretty
3 strong assumption that may not be how it works in
4 the real world for that district, right?

5 A. Yeah. So in the Gill v. Whitford case, I
6 think -- it might be the North Carolina case, but I
7 think it was Gill, Dr. Jackman did an analysis of
8 uniform swing that suggested it was still -- it was
9 a good assumption because he swing -- he evaluates
10 the efficiency gap by kind of perturbing it both
11 ways. So it is a strong assumption. It's got some
12 validity to it.

13 Q. You said Dr. Jackman evaluated the
14 efficiency gap?

15 A. No, because one of the ways Dr. Jackman
16 responds to the sensitivity to that 50/50 line is by
17 taking the map and then moving it in one-percentage
18 increments towards Republicans and then towards
19 Democrats and seeing how the efficiency gap changes.
20 And in that work was when he did the analysis and
21 said that uniform swing was viable.

22 I mean, I take your point, though, that
23 it's an assumption that may not always hold true.

24 Q. In terms of like real voters in the world
25 who might change their -- if Utah became 50/50 and

1 real voters -- that happened, the alliances that led
2 to that new 50/50 scenario might be totally
3 different than what the districts -- how we think of
4 what people in the districts know.

5 A. It could be, yeah.

6 Q. Now, I want to play a clip from your
7 testimony to the legislature on September 22nd. And
8 this is going to be Plaintiffs' Exhibit 19. You'll
9 see it says 13 on here, but that's because I
10 foolishly marked 13 already.

11 MR. GABER: Let me state for the record
12 what this is first. This is September 22, 2025,
13 your testimony to the Legislative Redistricting
14 Committee. And we'll be playing from one hour, 55
15 minutes, 43 seconds to one hour, 56 minutes, 34
16 seconds. And we'll provide a link for both the
17 Court and defense counsel of the video -- the full
18 video.

19 THE COURT: And you said this was
20 Plaintiffs' 19?

21 MR. GABER: 19.

22 THE COURT: Okay.

23 (Video played.)

24 Q. (By Mr. Gaber) Do you still think that
25 that's the case, that the partisan bias test is most

1 useful for a state legislative map?

2 A. Yeah, I think all of these partisan
3 fairness metrics are better in maps where you have
4 lots of districts, and those will tend to be state
5 legislative maps.

6 Q. And I got it from your last answer, you
7 don't know that SB 1011 actually doesn't apply the
8 partisan bias test to the state legislative maps, it
9 only applies it to the congressional map?

10 A. That may be the case, but the proposition
11 says symmetry, which means bias applies to
12 everything, whether they like it or not.

13 Q. And I wanted to talk about that. So that
14 is an opinion that you've said here on direct. It's
15 in your report. And what I understand of your view
16 is that in 2020, there was an academic article
17 published by Katz, King, and Rosenblatt; is that
18 right?

19 A. Right.

20 Q. And that, you know, prior to 2020, for the
21 2010s, there was a -- you know, a slew of measures
22 that were proposed in papers that were proposing new
23 measures of partisan symmetry and there was lots of
24 litigation and cases involving those measures. And
25 then in 2020, Professors Katz, King, and Rosenblatt

1 wrote an article and said, "No, our measure is the
2 only measure of partisan symmetry and here's why";
3 is that right?

4 A. Right.

5 Q. And it's your view that at that point the
6 ability of anyone to cull a different measure -- a
7 measure of partisan symmetry no longer held true?

8 A. I mean, people can cull whatever they
9 want, but I think the Katz, King, and Rosenblatt
10 article was pretty persuasive.

11 Q. Now, you would agree that the voters of
12 Utah, when they passed Proposition 4 in 2018, were
13 not thinking about -- well, probably weren't
14 thinking about any academic article, but were not
15 thinking about a 2020 article by Professors Katz,
16 King, and Rosenblatt, correct?

17 A. I don't think they were probably thinking
18 anything about partisan symmetry, but it's just the
19 text.

20 Q. But what we -- I mean, what we know, and
21 to answer my question, is that they could not have
22 been thinking about the 2020 article in 2018,
23 correct?

24 A. Well, that much is true.

25 Q. And you agree with me, as I think you just

1 said, that courts and academics, as of 2018, were
2 referring to any number of measures as measures of
3 partisan symmetry, correct?

4 A. Yeah. And when I was trying to think of
5 workarounds, this kind of originalist argument
6 you're hinting at is one that I thought about, and
7 if I wasn't having to use kind of state-of-the-art,
8 if there wasn't kind of an evolutionary aspect
9 written into the statute, I would have given that a
10 lot more thought.

11 Q. Now, you're familiar with the Gill versus
12 Whitford Supreme Court decision, right?

13 A. Yeah. Yes.

14 Q. And you've read it?

15 A. It's been a while, but yeah. Yes.

16 Q. You were -- you were an expert in the
17 case, weren't you?

18 A. Yeah. It was -- I definitely read it.
19 It's been a while, though.

20 Q. So I want to draw your attention just to
21 highlight it here -- I'll take it off so you can see
22 it better.

23 This is the Westlaw for Gill v.
24 Whitford from the Supreme Court, 585 U.S. 48, and
25 I'm drawing your attention to pages 71 through 72 of

1 the U.S. Reporter of that. And if you could just
2 read to yourself the header, right where it says 17
3 and starts with: "The plaintiffs and their amici
4 promise us?"

5 A. Yep.

6 Q. Now, the -- obviously the majority --
7 Chief Justice Roberts and the majority are -- you
8 know, they kind of -- they don't reach a conclusion,
9 but they don't like talking about this at all --
10 right? -- as we've learned in Rucho?

11 A. It's sociological gobbledygook.

12 Q. Yeah, yeah, yeah. But what I want to draw
13 your attention to is how they refer to the
14 efficiency gap and other measures. They say, quote:
15 "The plaintiffs and their amici promise us that the
16 efficiency gap and similar measures of partisan
17 asymmetry will allow federal courts to" -- and then
18 it goes on.

19 Do you see that?

20 A. Yes.

21 Q. And then again, later in the paragraph,
22 they refer to partisan symmetry metrics such as the
23 efficiency gap measure, right?

24 A. Right.

25 Q. So the U.S. Supreme Court, at least as of

1 June 2018, was referring to multiple measures of
2 partisan symmetry and including the efficiency gap
3 as among them, correct?

4 A. Yeah, they should have doubted the
5 plaintiffs' math because the efficiency gap -- this
6 is why you don't do a constitutional challenge on
7 the basis of a year-old provision, because a lot of
8 the promises they made in that complaint were false,
9 including this one.

10 Q. Now, I guess my point is -- I'm sure you
11 can imagine, is just part of your answer --
12 right? -- that the U.S. Supreme Court, in June of
13 2018, was referring to multiple measures of partisan
14 symmetry and specifically to the efficiency gap as
15 among them, right?

16 A. Those are the words, yes.

17 Q. The -- do you recall seeing anywhere in
18 this paragraph, partisan bias is the only measure of
19 partisan symmetry?

20 A. No.

21 Q. And the vote on Prop 4, that was in
22 November of 2018; is that right?

23 A. Yes.

24 Q. And that would have been just a few months
25 after the U.S. Supreme Court referred to multiple

1 measures of partisan symmetry, including the
2 efficiency gap?

3 A. Yes.

4 Q. Now, you just mentioned this -- and you
5 mentioned it in your report, too -- that you spent
6 some time, or quite a bit of time, I think, thinking
7 about how you would respond to the argument that as
8 of the time voters passed Proposition 4, the state
9 of the law and of the academy was that there were
10 multiple measures of partisan symmetry, right?

11 A. No, it wasn't how I would respond to the
12 argument. It was whether I could take that stance,
13 because I saw how this -- I saw how this train was
14 going and wanted to think if there was a way to get
15 off of it, and I didn't think there was.

16 Q. And that's --

17 A. I still don't.

18 Q. That's because you think that in 2020, a
19 single academic article by the proponents of the
20 partisan bias measure makes everyone else in the
21 academy who've culled their measures -- measures of
22 partisan symmetry just wrong?

23 A. Well, it's not just -- it's not just by
24 anyone. It's by Dr. Katz and Gary King, and I say
25 that without throwing any shade at

1 Professor Rosenblatt. But Gary King is a very, very
2 solid, well-respected methodologist, as is Dr. Katz.
3 I mean, if you want to draw from The Sopranos,
4 they're made guys in the academy. And so --

5 Q. I've never seen the Sopranos. Right over
6 my head.

7 A. Well -- okay. So I pay attention to that,
8 when they said that. I've read the problems that it
9 has in a state like this, but as far as I'm
10 concerned, when symmetry is in the statute, that's
11 it.

12 Q. So -- and the reason -- and we're getting
13 into, you know, legal interpretation here, not
14 political science, but the reason you've come to
15 that interpretation of Proposition 4 is because the
16 sentence begins with, shall use the best available
17 data and metrics -- I'm not quoting, but it's
18 something like that -- and, comma, "including
19 measures of partisan symmetry," correct?

20 A. I mean, I think the PI motion even says
21 that this is something that's allowed to evolve over
22 time.

23 Q. Now, you understand that the partisan bias
24 test, in a state like Utah, can have a paradoxical
25 result, correct?

1 A. Yeah, it's not as severe as some people
2 have suggested, because, again, there are maps in my
3 ensemble that have Democratic scores. But, yeah,
4 I'm familiar with the idea.

5 Q. And it's your legal interpretation that
6 because the statute says use the best available,
7 because two years later an academic article was
8 published and everyone knows that it might not be
9 the best available because of the paradox, that
10 nevertheless, that best available sort of moves the
11 definition of "partisan symmetry" out of what it was
12 in 2018 and into what three academics think it is in
13 2020?

14 A. Not just three academics, but, yeah, I
15 think the only available symmetry measure is bias.

16 Q. I want to -- let me go back for a minute
17 to the analysis of the maps that you performed. I
18 think on direct examination you said that first you
19 started with the presidential data, and then you got
20 guidance to use an index. What did you mean by you
21 first started with the presidential data in your
22 analysis?

23 A. The first -- so you have to come up with
24 some type of measurement of partisanship before you
25 can do the partisan fairness analysis. And so the

1 first thing I used -- usually when I'm judging the
2 partisanship of a district, the first thing I go to
3 is presidential. So that would be the first thing I
4 use. Now, Utah, that's a little bit tricky because
5 Donald Trump is Donald Trump, but that's the
6 starting point I usually use.

7 Q. And was that the 2024 presidential result?

8 A. Yes.

9 Q. And so the first thing you did is you
10 looked and saw what the presidential results were in
11 the various districts in the plan; is that it?

12 A. No, I would have had the computer
13 calculate the bias measure using presidential.

14 Q. I see.

15 And who was it that gave you the guidance
16 that you should use a composite of elections?

17 A. That guidance came through counsel.

18 Q. Mr. Green?

19 A. Yes.

20 Q. And when did that happen?

21 A. I don't recall.

22 Q. How -- roughly how far in advance of the
23 September 22nd hearing that you attended in the
24 legislature?

25 A. Well, I think we started -- pretty quickly

1 shifted to an index like within a week, and then --
2 and at some point close to the hearing, the -- one
3 of the one of the -- I think the treasurer race --
4 excuse me -- was either -- it was either added or I
5 had misunderstood whether or not that race was going
6 to be included, but that had to be added.

7 Q. So I noticed that when it first came out,
8 that the original text of SB 1011 partisan index
9 didn't match up with what you had analyzed the
10 plans, and then a subset -- days later, the
11 treasurer race was added in.

12 A. And that's what that was about.

13 Q. Okay.

14 A. And again, that was a little
15 nerve-wracking because I didn't know if all the
16 plans were suddenly going to fail, but it is what it
17 is.

18 Q. Now, that -- you said that that -- when
19 you say that, "We switched relatively quickly over
20 to the index," what you mean is that like a week or
21 longer before the September 22nd hearing is when
22 that happened?

23 A. Right. Right. I think within a week of
24 getting started the index was established. But for
25 like the very first run of coding and such, it

1 started with presidential.

2 Q. And was the legislature aware that it
3 was -- originally just the presidential result was
4 being used to calculate the partisan bias test?

5 A. I don't know.

6 Q. Did you send to the legislature analysis
7 that used just the presidential -- 2024 presidential
8 result for the partisan bias test?

9 A. That's another one that I just don't know.

10 Q. That would substantially change the
11 scoring, right?

12 A. Yes.

13 Q. It would make a lot more plans that had a
14 Democratic district pass the partisan bias test if
15 just the 2024 presidential election were used?

16 A. So, no, like the district is going to
17 perform -- this is -- the district is going to
18 perform how the district is going to perform,
19 regardless of which elections we use to measure the
20 district's partisanship, right?

21 If you look at the -- if the next person
22 who runs in this district, the Democrats are going
23 to get 51 percent of the vote. That's true whether
24 I evaluate the district using presidential, whether
25 I use the McMullin race, whether I use the

1 governor's race.

2 That's -- that's something I'm trying to
3 get at, is that these index scores are just like a
4 rough way to rank how -- to get a sense of how
5 Republican or Democratic they are. But your choice
6 of races doesn't impact how the district's going to
7 actually perform in the fall.

8 Q. Dr. Trende, one of the reasons that
9 everyone talks about the Utah paradox for the
10 partisan bias test is that the Republicans have such
11 a larger statewide vote share on the composite,
12 something around 66 percent. And so for a district
13 to pass -- for a map that contains a Democratic
14 district to pass the partisan bias test, the least
15 Republican and the second least Republican districts
16 have to have just the right match to get it so that
17 map crosses the line, and there's two below and two
18 above the 50 percent threshold; is that reasonably
19 fair?

20 A. Well, yeah, they have to be below the
21 statewide vote share, but that doesn't necessarily
22 mean that the least Democratic district can't be --
23 and this is where I was quibbling with you, it's
24 whether it scored as a Democratic district or not.
25 That doesn't mean it's a Democratic district.

1 Q. And that's what I mean, scored as a
2 Democratic district.

3 A. Yeah, well, it's an important distinction,
4 though, so -- because I think districts well above
5 what the bottom two districts are here have a
6 potential for Democrats to win them.

7 But you're right, like, the more heavily
8 Democratic you make the index, the more
9 Democratic-leaning races you include, the more and
10 more it pushes districts that were otherwise
11 classified as Republican into the Democratic
12 category, even though the partisanship of the
13 district -- the performance of the district wouldn't
14 change.

15 Q. And so if we were to use the 2024
16 presidential election result where
17 Vice President Harris did substantially better than
18 the average -- the composite -- the partisan index
19 composite average Democrat did, that would make it
20 likelier the percentage of map options in which
21 there was a scored Democratic district that passed
22 the partisan bias test would rise quite a bit?

23 A. No. Well, so it's going to be the -- more
24 or less, the same universe of districts that are
25 passing the partisan bias test because the statewide

1 average is going to drop as well for former
2 Vice President Harris. All that's going to change
3 is whether the scoring of the district, you know,
4 keys as Republican or Democrat. It's not going to
5 affect which districts you're allowed to consider or
6 which maps you're allowed to consider.

7 Q. But the distance you have to climb from
8 the actual vote share of the candidate to the 50/50
9 will have shrunk.

10 A. I don't understand you.

11 Q. So rather than have -- say the Democrats'
12 composite is 34 percent, and say the presidential
13 Democratic candidate got 39 percent. There's a
14 five-point reduction in the distance we need to
15 climb to get to the 50/50 hypothetical.

16 A. Well, no, because the 50/50 -- no, because
17 the statewide average is going to change as well.
18 All the districts are going to move up or down as
19 you add races in. All the statewide averages are
20 going to move up or down as you put races in.
21 And so for something like partisan bias, which is a
22 relative measure, it's not going to change.

23 Now, the efficiency gap, it'll make a big
24 difference because the efficiency gap changes
25 radically whether a district is classified as

1 Republican or Democrat. It's one reason I don't
2 like it.

3 Q. So your view is it just doesn't matter
4 which elections are in the -- in the composite or
5 whether there is a composite? It's all the same?

6 A. I -- for partisan bias, I don't think it
7 probably matters that much. And when you get 12 or
8 13 races in, I really don't think adding or
9 subtracting a district is likely to change the
10 outcome.

11 Q. Now, I want to move off of partisan bias
12 and on to simulations.

13 Now, I'm going to take you to page 36 of
14 your report. And at the end of the first paragraph
15 of section 7, do you see where you say: "Counties
16 were limited to no more than one split"?

17 Do you see that?

18 A. Yes, that was a mistake.

19 Q. That's not correct, right?

20 A. Right.

21 Q. And, in fact, in the code, you actually
22 change the definition of "county" for a number of
23 counties, including Salt Lake, Davis, Weber, Summit,
24 and Utah counties, perhaps others, so that the
25 county boundaries wouldn't even be recognized as

1 distinct units of a county but, rather, just their
2 individual municipalities.

3 A. Right. Right. So the ALARM data set had
4 an idea of using municipalities as the baseline
5 rather than the cities -- or the county boundaries,
6 again, to comply with the prioritization of
7 municipal splits. So that's where that came from.

8 Q. Now, the next sentence after that one
9 says: "The simulation's drawn maps with a
10 population deviation not to exceed 1 percent."

11 Do you see that?

12 A. Correct.

13 Q. That is also not correct, right?

14 A. I don't think that's right.

15 Q. So if we look at your code and you have a
16 plus or minus 1 percent deviation range, that would
17 be a 2 percent deviation, correct?

18 A. I think it does it as a 1 percent, because
19 the range Dr. Chen -- the total range Dr. Chen comes
20 up with tops out at less than 1 percent, I thought.

21 Q. I'm not going to do the math here. When I
22 looked at the code, I saw the possibility of going
23 up or down 1 percent.

24 But I do want to draw your attention on
25 this point to page 45 of your report. And the

1 second paragraph, kind of the middle -- and I'll
2 highlight it for you -- do you see where it says:
3 "I have constrained the simulations to draw
4 districts as close to equal populace as I could"?

5 Do you see that?

6 A. Yes.

7 Q. That is not correct, right?

8 A. No, that's true.

9 Q. So you're saying that Redist could not be
10 set to draw population deviations below 1 percent?

11 A. You can, but it stops working and you
12 start to really constrain the maps.

13 Q. So say a little bit more about that.

14 A. That's what I have to say. If you
15 restrict the population deviation too much, because
16 it can't manually split precincts, it stops being
17 able to find maps.

18 Q. And so the array of maps that it finds if
19 you use Redist to go below 1 percent population
20 deviation shrinks, and it wouldn't be a valid set to
21 compare against; is that what you're saying?

22 A. Correct.

23 Q. Now, that's a feature of Redist, that it
24 can't split precincts, correct?

25 A. That's right.

1 Q. Dr. Chen's algorithm, you understand, does
2 that, and that's how it achieves equal population,
3 correct?

4 A. Correct.

5 Q. And so if we were to look at a set of
6 simulations that attempted a .1 percent population
7 deviation in Redist, you would not have -- what's
8 the word I'm looking for? -- you would not have
9 faith that that would be a reliable set of
10 simulations to make an assessment for Proposition 4
11 purposes?

12 A. Yeah, given the size of some of the
13 precincts, that would make me nervous.

14 Q. Okay. Now, on page 37 of your report, the
15 first sentence of the second paragraph -- I think we
16 just discussed this on direct -- it says: "Maps are
17 all contiguous."

18 Not true, right?

19 A. Yes. That's embarrassing.

20 Q. Now, you were -- on direct, you were
21 quibbling a little bit with using Polsby-Popper as
22 the metric to compare compactness. And I gather you
23 don't object -- you use Polsby-Popper, right?

24 A. All the time.

25 Q. And at least under that metric, you would

1 agree that Dr. Chen's set of simulations, the
2 ninety -- the middle 95 percent range, is entirely
3 above the middle 95 percent range for your set of
4 simulations, correct?

5 A. That's right.

6 Q. You did not account in your simulation set
7 for any communities of interest; is that right?

8 A. I don't think that's right because one of
9 the conceptualizations of communities of interest is
10 counties and municipalities, so it's built in that
11 way. I think that's even something Dr. Chen
12 suggested in his testimony. The --

13 Q. My question wasn't precise enough, sorry.

14 A. Okay.

15 Q. What I meant is you didn't add something
16 in addition to the county or municipal --

17 A. Well, I made sure the reservations were
18 kept intact.

19 Q. In the simulations, you have that?

20 A. Yeah. Duchesne, Uintah, and Grand
21 Counties are fused together.

22 Q. There are other reservations in Utah, you
23 understand?

24 A. So none -- yes. None of them fall outside
25 of precincts or counties that could be split, so

1 the -- I think it's the Apache reservation that goes
2 across the south of San Juan County, San Juan County
3 can't be split in the restricted set, so that wasn't
4 something that gave me concern. All the other ones
5 I think are entirely within single precincts.

6 Q. When you were -- in your ensemble, in your
7 simulation, your algorithm, you didn't code it to
8 keep Riverton, Herriman, and Bluffdale together as a
9 community of interest, did you?

10 A. No.

11 Q. You didn't code it to keep any of the
12 canyons in Salt Lake County with the mouths of the
13 canyons in Salt Lake County?

14 A. So I don't think that's right. At least
15 to the extent that they're in unincorporated areas
16 on the boundary, those precincts were fused together
17 so that a map couldn't, like, zip down the -- or
18 couldn't split down and skip over that way.

19 Q. But to the extent the mouths of the
20 canyons extend into municipalities, you didn't
21 instruct it to keep the particular canyon with the
22 particular municipality that would be characterized
23 as the mouth of that canyon?

24 A. That's correct.

25 Q. You didn't code your ensemble to have

1 districts conform to the Salt Lake County Council
2 districts, did you?

3 A. That's correct.

4 Q. You didn't code your ensemble to conform
5 to the Salt Lake School District boundaries,
6 correct?

7 A. That's correct.

8 Q. Did anyone at the legislature tell you
9 that you should do these because these are
10 communities of interest that the legislature
11 recognizes?

12 A. No.

13 Q. In fact, on the day of your presentation
14 on September 22nd, the legislature released a
15 PowerPoint that identified several communities of
16 interest, correct?

17 A. I didn't know that.

18 Q. Were you unaware of the military base,
19 university -- universities, the Native American
20 reservations, and then the grouping of Uintah,
21 Grand, and --

22 A. Oh, no, I was aware of that, and so Uintah
23 and -- Uintah, Grand, and Duchesne are kept together
24 in the map. The other reservations are kept
25 together because of how the map's drawn or because

1 they're within precincts. The universities are kept
2 together generally because the -- appropriate with
3 the prioritization of this is number 4, because the
4 cities will tend to be kept together.

5 So, again, this is one of those things
6 we're keeping the cities together keeps most of the
7 legislatures-identified communities of interest
8 together.

9 Q. Okay. One of the things you told the
10 legislature -- we can play it, but I think you'll --
11 one of the things you told the legislature is that
12 communities of interest can be in the eyes of the
13 beholder and that they were -- often could be used
14 as post-hoc rationalizations or justifications,
15 correct?

16 A. Yes.

17 Q. And that might be especially so if those
18 communities of interest that are identified arise
19 after the fact and not during the legislative
20 process. You'd agree with that?

21 A. Right. And that's why I like that all
22 these communities of interest were subsumed into
23 other considerations with the exception of Uintah,
24 Duchesne, and Grand, which is where that reservation
25 runs in all three counties. So that was a good

1 reason to keep those together, I thought.

2 Q. Now, on your direct examination, I
3 heard -- well, first I heard you say that the five
4 maps came -- that were considered were from computer
5 simulations. If you said that, that was an error,
6 right?

7 A. If I said that, yes. I'm sorry.

8 Q. Okay. I just want the record to be clear.
9 It probably already is, but...

10 And then I heard you say that the fact
11 that several municipalities, including Santaquin,
12 Park City, Draper, and Bluffdale, cross over county
13 lines means that it forces you to have a county
14 split. Do you recall that?

15 A. If you count -- yes.

16 Q. Are you talking about if you're -- because
17 it doesn't for- -- you can draw the map so that
18 there is no split, you just put the surrounding area
19 together in a district, right?

20 A. But there's still a split. You can't just
21 have a district -- you can't have a map so that the
22 southern -- the boundary between Utah -- if you
23 do -- if you count the municipal -- the county split
24 forced by those two municipalities, I'm pretty sure
25 you could not have a map that uses the southern

1 boundary of Salt Lake County as a district boundary.

2 Q. Right. So we're saying different things,
3 then.

4 A. Okay.

5 Q. What I'm asking is, say, for example,
6 Park City crosses county boundaries, right? And I
7 have -- Map A's on here as an example.

8 Do you see that?

9 A. Right. Okay, I see where you're going
10 with this. I was thinking in the context of Salt
11 Lake City, where we know Salt Lake County has to be
12 split, so --

13 Q. But, for example, Wasatch County and
14 Summit County can be put in the same district --

15 A. Yeah.

16 Q. -- and you're not going to force it to
17 have a county split because of that fact of the
18 municipal vote?

19 A. That's right. And the place -- the only
20 place this really becomes an issue in most of the
21 maps is that -- those two cities, Draper and
22 Bluffdale.

23 Q. And if you -- you've seen plaintiffs'
24 proposed maps in this case, correct?

25 A. Only here.

1 Q. Okay. And did you recall from seeing them
2 that because Bluffdale and Draper are put into a
3 district with Utah County, you're not adding an
4 additional county split beyond the one you have to
5 have in Salt Lake County?

6 A. That's right.

7 Q. And so doing that would mean that we would
8 not force an additional county split, correct?

9 A. Well, you just push it down, so now Utah
10 County is forced to be split. You still can't use
11 that southern boundary of Salt Lake City as a
12 boundary between districts.

13 Q. Correct. I agree with you on that. But
14 you can -- but you -- do you agree that the fewest
15 splits you have to have on the map is three -- three
16 counties?

17 A. Yes.

18 Q. And you can do that in Utah, correct?
19 And then that's unaffected by the fact that several
20 municipalities cross county borders?

21 A. Right. But it just really constrains the
22 way these districts can be drawn, is all I was
23 saying. But I see the point, I went back and forth
24 on how to deal with those four cities.

25 Q. Now, I think on your direct you mentioned

1 an article that Dr. Chen wrote in which he conducted
2 an academic analysis and allowed for population
3 deviation below -- above zero, right?

4 A. Right.

5 Q. You understand that that was an academic
6 article about state legislative districts?

7 A. Yes.

8 Q. And so that, of course, has a different
9 legal standard than is the case for congressional
10 districts, right?

11 A. Yeah.

12 Q. You -- on direct examination, you said
13 that it was your idea to cull for -- cull the
14 ensembles for partisan bias and that plaintiffs here
15 are saying you must cull for some different
16 criteria.

17 I saw that in your expert report. I don't
18 know what that's referring to. Is it -- is it that
19 plaintiffs' position is that the Proposition 4
20 criteria must guide the ensemble construction?

21 A. I think we have a different understanding
22 of what the Proposition 4 criteria is about. What
23 I -- what I was getting at here is that in my -- in
24 the testimony, Dr. Magleby said that culling the
25 data was wrong; it was selecting an independent

1 variable, which it isn't; you just should not cull.

2 As I understood Dr. Warshaw's report,
3 culling is good because if you don't cull -- however
4 you want to do the partisan bias test, we agree that
5 some of those maps are going to be illegal if you
6 don't do any culling. We just disagree on what you
7 should cull on the basis of which test.

8 Q. Okay. So --

9 A. And so my point -- the bigger point is
10 that no one agrees on how you do this.

11 Q. Okay. So I have an under -- I'm
12 representing plaintiffs. I haven't understood this
13 to say that there should be any culling of ensembles
14 under any test.

15 MR. GREEN: Objection, Your Honor. I
16 think counsel is testifying.

17 MR. GABER: I might be.

18 THE COURT: Sustained.

19 MR. GABER: It's getting late in the day.

20 Q. (By Mr. Gaber) Okay. Sorry, Dr. Trende.

21 A. That was interesting.

22 Q. You -- we talked a little bit about the
23 contiguity issues. You saw that Dr. Chen analyzed
24 the partisan characteristics of the maps in your
25 simulations that were contiguous and those that were

1 not, correct?

2 A. Right.

3 Q. And you don't dispute any of those
4 calculations that he's done?

5 A. Well -- but it doesn't say that it's due
6 to those lack of contiguities. What's probably
7 going on is that a map that's not contiguous in
8 Sandy is also a district that splits Sandy off
9 from -- I think it's Millcreek to the north and
10 Cottonwood something or another. And so those types
11 of maps have a different -- what do you call it? --
12 partisan lean to them than the ones that don't split
13 Sandy off from those cities.

14 Cottonwood Bluffs.

15 Q. So I have on the screen Appendix E from
16 Dr. Chen's report and -- starting on Figure E17.

17 Do you see that?

18 A. Yes.

19 Q. And I think I heard you say that the --
20 you compared against the restricted set for
21 determining passage of partisan bias --

22 A. Yes.

23 Q. -- on direct and not the base set; is that
24 right?

25 A. Right.

1 Q. That had me a little confused because if
2 we go back to Plaintiffs' Exhibit 12, the summary
3 sheet that you gave the legislature for all of the
4 maps, you compare it at both the base and the
5 restricted.

6 A. For my report here, I use the restricted.

7 Q. Oh, I see.

8 Would you -- looking at the map that we
9 see on Figure E17 on the screen, this is Trende
10 Restricted Simulated Map 40,085. Would you assess
11 that this map complies with Proposition 4's
12 criteria?

13 A. It's weird-looking.

14 Q. So no?

15 A. I'll give you that, but I don't know that
16 there's a not-weird-looking provision. It's
17 probably not what I would have drawn.

18 Q. Okay. Well, how about District 2? Do you
19 see how it kind of wraps -- can you even get
20 through -- from Salt Lake --

21 A. So I'm going to just stop you and tell you
22 that District 2 and 3 look identical to me.

23 Q. Okay. District 2 is the one that -- can
24 you see the difference at all?

25 A. No.

1 Q. Okay.

2 A. I'm sorry.

3 Q. Well, let's take a look at the next one.

4 A. Okay.

5 Q. This is Figure E18. Do you see that?

6 A. Yes.

7 Q. And do you see -- first, do you see it's
8 seven divided counties into eight county divisions?

9 A. Yes.

10 Q. Would you agree that that is not
11 consistent with Proposition 4's requirements?

12 A. The IRC was drawing them up to six divided
13 counties. Whether seven would be acceptable to
14 someone, I don't know. It's not how I would have
15 drawn it.

16 Q. Did you know, Dr. Trende, that the
17 Proposition 4 was not in effect when the IRC was
18 drawing its map?

19 A. No.

20 Q. You didn't know that?

21 A. No.

22 Q. Okay. But you would agree that this is
23 not -- did you see District 4 on the map?

24 A. Yes.

25 Q. That's not how one should draw a district,

1 correct?

2 A. Yeah, it's not how I would draw
3 District 4, for sure.

4 Q. And rather than make you go through all of
5 these, would you agree with me that there are a
6 large number of maps in both the base and restricted
7 set that are inconsistent with Proposition 4's
8 neutral redistricting criteria?

9 A. So I don't know. If this is a random
10 sample that Dr. Chen did, I'd be more inclined
11 towards that. If this is him going through and
12 finding the worst-looking maps -- I mean, even this
13 one, there's probably an unpopulated --

14 Q. Sorry.

15 A. -- probably an unpopulated --

16 Q. I'm sorry, Dr. Trende. There's too many
17 screens open on here.

18 A. I understand. That's me and my laptop.
19 There's a -- or at least lightly
20 populated, because Rich County is a lightly
21 populated precinct that could be flipped into 4.
22 And then you actually don't have a terrible-looking
23 map.

24 Q. Do you see how Salt Lake County is treated
25 there?

1 A. No, because I can't tell District 2 and 3
2 apart.

3 Q. Okay. Well, Salt Lake County in the map
4 is split between Districts 2, 3, and 4.

5 Do you see that? Or do you -- you look up
6 above, you see it says: "Salt Lake County,
7 Districts 2, 3, and 4" in the list of divided
8 counties?

9 A. So if there's a three -- again, the IRC
10 was drawing a three-way split of Salt Lake County,
11 so reasonable people not trying to hurt the good
12 people of Utah can draw Salt Lake County that way.
13 And if it's a regular-looking split, then...

14 Q. You testified earlier you thought that
15 Proposition 4 required splitting it no more than one
16 time, right?

17 A. No, I said that you have to split it at
18 least one time.

19 Q. Right.

20 A. And when I was drawing, to try to avoid
21 these fights, I was trying to make it only three
22 splits across the entire map.

23 Q. You would agree with me that there are a
24 number of errors in your report?

25 A. Yes.

1 Q. This is not the first time that you've
2 given testimony in a case in which your report
3 contained a number of errors, correct?

4 A. There have certainly been errors in
5 reports before, yeah.

6 Q. One example -- and you've talked about
7 this before -- the Pierce versus North Carolina
8 State Board of Elections case. You're familiar with
9 that one?

10 A. That's right.

11 Q. And you did an expert report that was, in
12 large measure, focused on margin of errors of
13 citizen voting age population calculations?

14 A. That was -- that was a big part of the
15 report. I don't know if I'd say it was in large
16 measure on that, but, yeah.

17 Q. Okay. Well, for that big part of the
18 report, every single one of the calculations was
19 inaccurate?

20 A. That's right.

21 Q. And then you made that same mistake in the
22 Alabama State Conference of NAACP versus Allen case?

23 A. Although in that case, the judge said it
24 was inconsequential and relied on my report, finding
25 for the defendants.

1 Q. In both of those cases, you did not
2 double-check your work, someone else identified the
3 errors, correct?

4 A. Well, I double-checked it. If we had
5 computer code up here, you'd understand a little
6 more.

7 Q. Oh, I've looked at it.

8 A. Yeah, it's not easy to code. I think it
9 was on like line 614 of 2000.

10 Q. But the point is someone else identified
11 the error, right?

12 A. Yes, that's right.

13 Q. Now, your testimony has been excluded or
14 discredited by several Courts; is that right?

15 A. Well -- I actually don't know.

16 Q. In the Fair Fight Action versus
17 Raffensperger case, your testimony was excluded,
18 correct?

19 A. So that one, the Court said I didn't have
20 sufficient experience to testify as an election
21 administrator, which is probably true.

22 Q. True.

23 In the Soto Palmer versus Hobbs case about
24 Washington's legislative district map, the Court
25 criticized a data visualization that you provided as

1 misleading; is that correct?

2 A. And I'm not sure what happened there
3 because we were both in the room where the judge
4 said he thought I was a very good witness and
5 wouldn't say anything negative. And I agree that
6 the data visualization that he pointed to shouldn't
7 be used for the purpose that he thought. There was
8 a table on the next page of the report that did what
9 he was looking for. So something -- either I
10 garbled my testimony or whatever, but, yeah, the
11 report -- the opinion says what it says.

12 Q. In the -- you testified in the Maryland
13 partisan gerrymandering case that was ultimately
14 decided by Maryland's high court?

15 A. I did both the state congressional case
16 and the high court case, yeah.

17 Q. And the Court there concluded that your
18 analysis had, quote, the appearance of rigor, end
19 quote, but had a, quote, superficial quality to it
20 that rendered it, quote, entitled to little weight;
21 is that correct?

22 A. Oh, I completely agree with the Court
23 there. I was asked to calculate Polsby-Popper
24 scores and put up some maps, and that was it.

25 Q. Good with Polsby-Popper in the Maryland

1 case?

2 A. Yeah, yeah. I -- good with Polsby-Popper
3 here.

4 But, yeah, it was a superficial report.
5 It didn't even have an opinion in it. It's what I
6 was asked to do.

7 Q. You also testified in the Louisiana
8 redistricting case -- not the one that's at the --
9 well, maybe you did, but the one that the supreme
10 court --

11 A. No. No, I had nothing to do with that
12 one. Don't blame me.

13 Q. Yeah, but in the Nairne versus Ardoin
14 case, you testified --

15 A. Yes.

16 Q. -- and the Court in that case, in its
17 opinion, characterized your analysis as, quote,
18 oversimplistic, unhelpful, fundamentally flawed, and
19 completely useless, end quote; is that correct?

20 A. So, again, that was a fight about whether
21 you would use population compactness for purposes of
22 the Voting Rights Act as opposed to just the shape
23 of the districts. And if the shape of the district
24 is a proxy for population compactness, then I
25 actually agree, my opinion was completely irrelevant

1 and unhelpful. The point of view of the defendants
2 was that it -- population compactness should be part
3 of the analysis. The Court disagreed. That's life.

4 Q. So the quote, though, is -- I accurately
5 read that?

6 A. Yeah. Given the legal conclusions, I
7 actually agree with her.

8 Q. Now, I'm going to go to page 37 of your
9 report. At the bottom of the page 37 -- and you
10 mentioned this on direct -- you say: "I
11 occasionally check the partisanship of the
12 simulations to see if the changes that I made
13 radically altered the composition and to ensure that
14 the simulations were not becoming overly
15 constrained."

16 A. Right.

17 Q. I understand the first part of that
18 sentence. Why would the partisanship of the
19 simulations bear on -- or why would the -- what are
20 you talking about with respect to not becoming
21 overly constrained?

22 A. So we talked about this some in Texas,
23 actually, that if you -- you can create a bottleneck
24 where it's hard for the simulations to move through.
25 And that throws errors in the diagnostics that the

1 Redist program gives you.

2 And I actually found -- so I think the
3 first thing I tried to -- I did was remove the
4 Tooele-Box Elder crossing and then the Great Salt
5 Lake. And then I moved over to try to change how
6 the map went through Morgan County in the northern
7 Wasatch.

8 And what happened was when you constrained
9 it there, it started throwing errors. It said that
10 it couldn't get enough plan diversity for that
11 northern district. So that's what I was looking in
12 on and checking as I went.

13 I would do a series of boundary removals
14 to make sure that the map couldn't do something
15 funky, and then I would check to make sure I wasn't
16 doing anything -- well, I checked to make sure that
17 I wasn't making the program break, which did happen
18 around Morgan County and only around Morgan County,
19 and then to see if I was doing something that you
20 were going to yell at me about on cross.

21 Q. But what I'm confused about is why the
22 partisan data bore on whether the mountains were
23 constraining district diversity.

24 A. The partisan data doesn't bear on that.
25 It's two different things. So when you remove a

1 bunch of adjacencies from the simulation file so
2 that the map can no longer travel in a certain
3 direction, you can overly -- it's completely
4 independent of the partisanship.

5 Q. Okay. So --

6 A. You can make it so that the program
7 breaks, which is what happened.

8 Q. I --

9 A. I also wanted to know -- if I was going to
10 do something that took the median district from .55
11 Republican to .65 Republican, that was going to
12 cause me a headache, and I wanted to know it was
13 coming, which is why I recorded it as I went. It's
14 all on my code so you can see exactly how every
15 change I made affected the partisanship. And I
16 never rejected a change because of the partisan
17 change that it created.

18 Q. So I'm just trying to understand this. So
19 the -- this last part of this sentence -- these
20 should be two sentences, then, is that --

21 A. With apologies to Faulkner, it's a bit of
22 a run-on.

23 Q. Okay. I just wanted to understand.

24 A. No, I understand. It's a bad sentence.

25 Q. Now, you were asked on direct to respond

1 to Dr. Chen's criticisms. Do you recall that
2 conversation?

3 A. Yes.

4 Q. And a number of the answers that I heard
5 you say were talking about your map goals for the
6 enacted map and how the enacted map has, in your
7 view, good compactness scores and few splits and
8 whatnot. Do you recall that from your direct?

9 A. No, but --

10 Q. Okay. So maybe I misheard, but would you
11 agree with me that the point -- Dr. -- the point of
12 Dr. Chen's criticism is that the simulations exist
13 in SB 1011 as the benchmark against which we compare
14 the enacted map to see if the partisan
15 characteristics of the enacted map are in line with
16 those of the simulations, right?

17 A. Right. But when you're doing the
18 simulations, the goal is to get a sense of what real
19 people drawing with the generalized constraints
20 could come up with. I don't think anyone drew a map
21 with a Polsby-Popper of .47. Like, by
22 constraining -- by being that strict with the
23 Polsby-Popper score, he takes the simulations out of
24 the universe of anything that anyone submitted in
25 this entire map-drawing process. It's just like a

1 different universe of maps.

2 Q. There -- they, to the maximum extent
3 possible, maximize compactness?

4 A. I don't think it says to the maximum
5 extent possible --

6 Q. Or to the greatest extent practicable.

7 A. Does it even say that on compactness? I
8 thought it just says draw compact districts.

9 Q. The phrase that applies to all of the
10 criteria.

11 A. Well, to the greatest extent practical,
12 draw a compact district, what does that mean?

13 Q. But the --

14 A. I can -- I can understand that for
15 reducing municipal and county splits. I didn't
16 interpret that as maximize your Polsby-Popper score,
17 especially since no one that was submitting maps was
18 drawing maps.

19 I mean, it's fine if you think that's how
20 people should have done it, but at that point, your
21 evaluation of the maps, any discrepancy between the
22 score of the map and the score of the ensemble is
23 attributable to the fact that an ensemble is taking
24 a different interpretation of things than people
25 submitting maps were taking.

1 Q. And so back to my original point, though,
2 do you agree that the point of the ensemble is to
3 create a set of maps that follows the legal and
4 geometric criteria set up in law and compare the
5 enacted map against that set of maps that follows
6 those criteria to assess partisan intent, partisan
7 effect?

8 A. That's the basic idea, but the problem is
9 if you constrain them -- different people can look
10 at a set of law and have different ideas of what
11 that means, especially when you're --

12 Q. Clearly.

13 A. Well, yeah.

14 -- especially when you only -- I'm sorry,
15 that was funny -- especially when you only have one
16 score that you're measuring it on and people drawing
17 maps are just thinking compactness, not
18 Polsby-Popper score of .47.

19 I mean, I just think his maps are too
20 compact for what real people were thinking when they
21 were drawing.

22 Q. Okay. I think you told the legislature at
23 the hearing that you didn't think generally that the
24 drive time was a useful measure for Utah because of
25 the, you know, substantial size and underpopulated

1 area of parts of rural southern Utah.

2 Do you recall that?

3 A. Yes.

4 Q. And that's your position here as well?

5 A. I just -- yeah, I didn't use drive time, I
6 just looked to see if major roads connected things.

7 Q. Now, I want to draw your attention back to
8 Dave's Redistricting for a moment. And, again, this
9 is where you started this process -- right? -- with
10 this screen open like this?

11 A. Right.

12 Q. And, actually, I -- that's not quite
13 right. With this screen open like this, right?

14 A. I don't know what the difference between
15 the two is, but yeah.

16 Q. We have the -- we have all of the
17 available data that comes up when you open Dave's
18 Redistricting App.

19 A. Okay.

20 Q. And I'm going to play what will be marked
21 as Plaintiffs' Exhibit 17. And this is a recording
22 from the Utah House Republican Conference, a podcast
23 between Senator Sandall and Representative Pierucci
24 from minute 3, 50 to minute 4, 46.

25 (Audio recording played.)

1 Q. (By Mr. Gaber) Now, did anyone from the
2 legislature tell you that you were drawing the
3 legislature's map on a tool with partisan data shown
4 that they considered disqualifying for a map to be
5 drawn on?

6 A. I never talked to anyone from the
7 legislature, so no.

8 Q. And no one from counsel for the
9 legislature told you, "Do not use this map, this
10 application. Do not have partisan data shown while
11 you're doing it. The legislature considers that
12 disqualifying"?

13 A. That's correct.

14 Q. Now, this is not a new concern of
15 Senator Sandall's. I'm going to play Plaintiffs'
16 Exhibit -- what will be marked as Plaintiffs'
17 Exhibit 18. This is from the November -- wait.
18 Sorry.

19 THE COURT: The last one that just played,
20 that was Plaintiffs' --

21 MR. GABER: That was Plaintiffs' 17.

22 THE COURT: And what was the date on that
23 again?

24 MR. GABER: That's September 18, 2025.

25 THE COURT: Okay.

1 MR. GABER: So just a few days before the
2 22nd hearing.

3 The next will be Plaintiffs' Exhibit 16.
4 And this is just audio because that's what's posted
5 on the legislature's website. But this is from the
6 Legislative Redistricting Committee from November 1,
7 2021. And this is the day that the UIRC members
8 came and presented their proposals to the
9 legislature.

10 And I'll be playing from 2 hours,
11 6 minutes, 55 seconds to 2 hours, 7 minutes, 24, I
12 believe. And -- perhaps not.

13 If the Court will give me one moment,
14 please.

15 Would the Court mind if we just play it
16 from the computer's audio?

17 THE COURT: Not a problem.

18 MR. GABER: I'll put it next to the
19 microphone.

20 THE COURT: Yep. That should be fine.

21 (Audio recording played.)

22 Q. (By Mr. Gaber) And so you were not told
23 by anyone, "Don't use this program, don't have the
24 political data showing while you're drawing the
25 map"?

1 A. That's right.

2 Q. And you didn't use an option to hide the
3 political data from the screen as you were drawing
4 the map?

5 A. Well, it was set to a worthless standard,
6 which was the default composite going back to 2012.
7 So even if I had looked at it, it wouldn't have told
8 me anything.

9 Q. The 2012 to 2020 composite?

10 A. Right. Going back to 2012.

11 Q. Okay.

12 MR. GABER: I pass the witness.

13 THE COURT: All right, Mr. Green.

14 Redirect?

15 MR. GREEN: Thank you, Your Honor.

16 No further questions.

17 THE COURT: Okay. Anything else for this
18 witness?

19 MR. GABER: No. He may be excused, and
20 this time I'm not causing you to miss a flight.

21 THE WITNESS: Thank you. Thank you.

22 THE COURT: Thank you, Dr. Katz.

23 THE WITNESS: Thank you, Your Honor.

24 THE COURT: Or, sorry, Dr. Trende.

25 THE WITNESS: I was honored.

1 THE COURT: Well -- yes. Thank you for
2 your time and testimony.

3 MR. GEIGER: Your Honor, defendants call
4 Dr. Michael Barber.

5 THE COURT: All right. If you would just
6 come forward, we're going to ask you to provide some
7 testimony under oath. The clerk of the Court will
8 administer the oath.

9 Go ahead and raise your right hand.

10 (Witness sworn.)

11 THE COURT: All right. Dr. Barber, a
12 couple things. Everything we do is recorded, but
13 it's audio only, so when you speak, make sure you
14 speak into the microphone. And then when you
15 respond, use words, "yes" and "no." "Uh-huh" and
16 "huh-uh" don't really translate on the record.

17 THE WITNESS: Okay.

18 THE COURT: All right. Thank you.

19

20 MICHAEL BARBER, Ph.D.,
21 called as a witness, being first duly sworn,
22 was examined and testified as follows:

23 ***

24 ***

25 ***

DIRECT EXAMINATION

BY MR. GEIGER:

Q. Good afternoon, Dr. Barber.

A. Good afternoon.

Q. What do you do for a living?

A. Aside from this, I'm a professor at BYU in the political science department.

Q. How long have you been teaching at BYU?

A. I started there in the fall of 2014.

Q. And what kind of classes do you teach?

A. I teach mostly classes about American politics and about methodology, so statistical analysis in the use of social science data.

Q. Do you have any other connections to the state of Utah?

A. Many. I was born here in Provo -- well, not here in Provo, but I was born in Provo. My family moved away. I grew up in Washington. However, all of my extended family, more or less, live in Utah, so we made annual summer treks to our grandparents' farm in Vernal.

I came here as a student to BYU in 2004, I believe. Went to BYU, moved away for a few years to go to graduate school, moved back here to be a professor at BYU. So, yeah, I've been here a long

1 time. This is home for me.

2 Q. Could you briefly describe your
3 educational background?

4 A. Yeah, so as I said, I have a bachelor's
5 degree from Brigham Young University. I have a
6 master's degree in political science and a Ph.D. in
7 political science from Princeton University, and
8 then -- well, yeah, that's my educational
9 background.

10 Q. How would you describe the focus of your
11 Ph.D. studies?

12 A. Broadly, again, in American politics and
13 political methodology. My dissertation was on the
14 topic of representation in the United States,
15 particularly the influence of political campaign
16 donations on policymaking in the United States at
17 the federal level, but also at the state legislative
18 level.

19 My research tends to focus on those same
20 topics. I've branched out, and I do research on
21 survey research methods. I have some methodological
22 pieces that look at the measurement of political
23 data and how to use political data in various
24 contexts. But it's mostly somehow or another
25 related to American politics more broadly.

1 Q. You mentioned earlier that you teach
2 classes on statistics. Could you describe a little
3 bit more about what you teach in that study?

4 A. Sure. To the chagrin of many of our
5 majors, we require a statistics course in our major.
6 And so I teach that -- or I have taught that course.
7 I'm not teaching it this semester, but I've taught
8 it in the past.

9 So that course covers -- it takes people
10 from basically assuming they have no knowledge of
11 statistics all the way up through what is a pretty
12 advanced undergraduate level in the use of
13 statistical data. And so we talk about how to
14 summarize data, how to collect and analyze data, how
15 to identify or think about causality, how to
16 incorporate data into research design, that sort of
17 thing. The course uses statistical software.
18 We've -- you've heard a lot today about R. So
19 that's the software that we use to teach the
20 students.

21 I also teach a course on data
22 visualization. So that's the idea of once you've
23 done the analysis, how do you present it in a way
24 that's going to be both persuasive but also honest,
25 how to kind of communicate very difficult concepts

1 to a lay audience, that sort of thing.

2 Q. Who were your Ph.D. advisors?

3 A. The primary -- my primary advisor was
4 Brandice Canes-Wrone, and she's now at Stanford
5 University.

6 The other two people on my dissertation
7 committee were Kosuke Imai, who is now at Harvard,
8 and then Nolan McCarty, and he is still at
9 Princeton.

10 Q. Is that the same Kosuke Imai who has
11 performed simulations in redistricting cases?

12 A. It is, yes.

13 Q. Have you received any awards for your
14 academic work?

15 A. I have. My dissertation was awarded the
16 best dissertation in the study of legislative
17 politics by the American Political Science
18 Association. That's the -- that's the flagship
19 organization that represents political scientists.
20 They host conferences, they publish journals, that
21 sort of thing.

22 I have some -- I have a paper that was
23 awarded an award at a journal for
24 legislative-related papers. I've won an Early
25 Career Award at BYU as well. So here and there.

1 Q. Have you served as an expert witness in
2 redistricting cases before?

3 A. Yes, I have, in a number.

4 Q. In what states or jurisdictions have you
5 served? Do you recall?

6 A. This may not be an exhaustive list, but
7 the ones that I can think of now are New York,
8 Pennsylvania, North Carolina, Alabama, Louisiana.
9 Those are the ones that are coming to my memory at
10 the moment.

11 Q. Were there any partisan gerrymandering
12 claims in those cases?

13 A. Yes. The New York case was a partisan
14 gerrymandering claim. There was a -- I worked for a
15 city in New York, for Buffalo. There was a partisan
16 gerrymandering claim in Buffalo, New York, as well.
17 One of the times that I've been in North Carolina
18 was a partisan gerrymandering case as well.

19 Q. Have you been retained only by
20 Republican-leaning jurisdictions?

21 A. No. Those two New York cases, one for the
22 state legislature and one for the City of Buffalo, I
23 was retained by the Democratic Assembly in the New
24 York state case. The city council was the group
25 that retained me in Buffalo, and they have partisan

1 elections in their city council, and they were -- I
2 believe at the time they were entirely Democratic.

3 And I just finished a case in Alabama
4 representing a county commission, and particularly
5 two of the members whose districts were being
6 challenged were Democrats.

7 Q. Thank you.

8 MR. GEIGER: Your Honor, defendants offer
9 Dr. Michael Barber as an expert in computational
10 redistricting, statistics, quantitative analysis,
11 and partisan symmetry analysis.

12 MR. GABER: No objection.

13 THE COURT: All right. You may proceed.

14 Q. (By Mr. Geiger) You've been retained by
15 the legislative defendants in this case; is that
16 right?

17 A. Yes.

18 Q. What were you asked to do?

19 A. I was asked to evaluate these three maps
20 that we've been talking about using the various
21 tests that were articulated in the statute. And
22 then the task, in some ways, kind of grew as other
23 tests were suggested, and so we kind of continued to
24 add to those analyses with these additional
25 suggested tests.

1 Q. What kind of tests were these, and what
2 were you testing for?

3 A. Sure. So we've heard all of these
4 mentioned a few times in the last two days. So
5 there's the partisan bias test, the mean-median
6 test. Then there's the family of tests that you
7 would say all kind of fall under the ensemble
8 analysis, so the ranked marginal deviation, the
9 standard deviation of the vote share test, the least
10 Republican vote share test. I think I'm hitting all
11 of them. Oh, and then the efficiency gap as well.

12 Q. Did all of these -- and I think you maybe
13 just answered that, but require a comparison of
14 simulations?

15 A. No, not all of them. The first two I
16 mentioned, the bias test and the mean-median test,
17 those do not involve the use of ensembles or
18 simulations.

19 Q. The others do?

20 A. They do, yes.

21 Q. Are some of these tests, in your view,
22 more reliable than others for the state of Utah?
23 Utah's congressional district, I should say.

24 A. Yes, I think some of them are more
25 probative than others in this context.

1 Q. Which would those be?

2 A. I think that each of them tests
3 something -- you know, each of them tests in a
4 slightly different way, slightly a different
5 question. I think that of the -- of the list that I
6 just enumerated, it's my view that the efficiency
7 gap's the least valuable or the least useful in the
8 state.

9 Of the others, I think that they -- you
10 know, they can all shed light on what the properties
11 of the map in slightly different ways. And so that
12 can be helpful.

13 Q. Is it your understanding that Utah law
14 requires any specific test to be applied to a
15 proposed redistricting plan?

16 A. So I am familiar with the recently passed
17 statute that does enumerate the measures of -- you
18 know, kind of gives more detail to the measures of
19 partisan symmetry. So the bias test, the
20 mean-median, and then the ranked -- the ranked
21 marginal deviation test using the ensemble.

22 Q. Does the 2025 plan -- I should maybe ask
23 one preceding question. Did you analyze the 2025
24 plan according to those three tests?

25 A. Yes.

1 Q. And did it pass those tests?

2 A. Yes, it did.

3 Q. Did you analyze Plaintiffs' Plan 1
4 according to those three tests?

5 A. Yes.

6 Q. Did they pass?

7 A. That map did not pass those tests.

8 Q. And for Plaintiffs' Plan 2?

9 A. I -- yes, I analyzed that as well.

10 Q. And did it pass?

11 A. Some of the tests, it did, and others it
12 did not pass.

13 Q. Let's take them one by one quickly. We've
14 talked about them at length over the past couple of
15 days. Partisan bias test first. What is this test?
16 What is your understanding of the partisan bias
17 test?

18 A. Well, we'll do this again. We've heard a
19 lot about these tests, but -- so I'll try to be very
20 brief. But the idea of that test is simply do the
21 parties -- are the parties treated equally under the
22 map? In other words, if the positions were
23 reversed, would the reverse -- would the outcome
24 reverse, essentially?

25 And so if under this map, party A is

1 treated in this way, if party B were to obtain the
2 same vote share, would it also be treated in the
3 same way? The way that it's typically evaluated is
4 by saying, what if both parties were to earn
5 50 percent of the vote statewide, would they earn
6 50 percent of the seats statewide?

7 Q. In your view, is this test only
8 appropriate when elections are presently
9 competitive?

10 A. No, I don't think that's the case.

11 MR. GEIGER: Can you share the screen,
12 please?

13 Q. (By Mr. Geiger) Let's look at this table,
14 which is from page 19 of your initial report.

15 Do you have it open?

16 A. Is this the binder? I've got a lot of
17 binders that I don't know what they are up here. Is
18 this -- yeah, it looks like this.

19 Give me one second. I apologize.

20 Q. Page 19. No problem.

21 A. Okay. I am -- I am with you.

22 Q. How did the 2025 plan fare under the
23 partisan bias test?

24 A. So here, you can see that I've applied the
25 test across all of these different elections and

1 then, at the bottom, the average of these various
2 elections. And you can see that it passes in all of
3 those cases.

4 Q. And how did Plaintiffs' Map 1 fare?

5 A. Again, you can read down the column very
6 quickly and see that it does not pass in all of the
7 cases.

8 Q. And Plaintiffs' Map 2?

9 A. So in Plaintiffs' Map 2, you can see where
10 I said that in some cases, it fails this test, and
11 in other cases, it passes this test.

12 Q. What, if anything, does that tell you
13 about the fairness of Plaintiffs' Map 2?

14 A. You know, I would want to -- I guess you
15 could say, "Well, we should get more data. We
16 should look and see how it performs under some of
17 the other tests."

18 Q. Let's move on to the next test, the
19 mean-median difference test. What is that test,
20 briefly?

21 A. Okay. So very briefly, again, this is
22 simply taking the average vote share -- there's been
23 kind of two suggestions of how to do that -- and
24 then taking that vote share and subtracting the vote
25 share of the median district in the plan, and then

1 simply observing the difference between those two
2 numbers.

3 Q. Is there a difference that is too great or
4 too large?

5 A. It -- no, there's not a kind of bright
6 line that you would use. It's something that would
7 obviously be at the discretion of either someone
8 writing the statute, or when it's not specified,
9 I've seen it fall into the hands of the Court to
10 decide.

11 Q. Under your understanding, is there a
12 bright-line threshold under Utah law?

13 A. So in Utah, they've specified a negative 2
14 up to 2, that kind of within that window is a safe
15 harbor, you might say.

16 Q. In your experience with this test and its
17 application, is that a reasonable standard?

18 A. Yeah, I've seen maps that have been put
19 forward as unbi -- or, you know, claims to be
20 unbiased maps or remedial maps that perform
21 comparatively that are in that range. I think
22 it's -- yeah, to me it seems like a pretty
23 reasonable standard.

24 Q. Let's look at Tables 3 and 4 from page 22
25 of your report. We have two tables here. Can you

1 explain why we have two tables?

2 A. Yeah. So it came to -- kind of in the
3 exchange of complaints and reports, it seemed to me
4 that there was a slight disagreement as to the
5 method by which this score should be calculated.
6 The bottom line is it doesn't really make a big
7 difference, and I've seen it done both ways in
8 academic work as well as in litigation.

9 The top table shows the way that is
10 specified in the statute. The bottom table shows an
11 alternative method of calculation that I think I saw
12 in one of the -- one of the amended complaints. The
13 results don't really differ, the broad conclusions
14 are the same, so it's not really terribly important
15 that we look at one versus the other.

16 But if we just look at the top, you can
17 see the mean-median score for each election for each
18 of the plans, and then at the bottom again is the
19 average across all of those various elections and
20 the -- and the score for each of the maps.

21 Q. When you look at the results and the
22 averages, what did you find for each of the maps?

23 A. So the 2025 plan has a mean-median score
24 of 1.45, the Plaintiffs' Map 1 has a score of
25 negative 5.82, and the Plaintiffs' Map 2 has a score

1 of negative 2.38.

2 Q. With this additional test, does this tell
3 you anything about the fairness of the three maps at
4 issue?

5 A. So looking at these two tests, the 2025
6 plan would be the only one that is passing both of
7 them.

8 Q. Let's move on to the ensemble analysis and
9 the test that that analysis employs. First, do the
10 tests we just looked at again to confirm the
11 partisan bias test and the mean-median test require
12 use of the ensemble analysis?

13 A. No. So there's no simulations or
14 ensembles used for those calculations.

15 Q. Did you generate a simulation ensemble for
16 your work in this case?

17 A. Yes, I did.

18 Q. And how did you go about creating that
19 ensemble?

20 A. So this is something I've done in a number
21 of other cases. So I typically go about this in
22 kind of the same way, broadly speaking.

23 The simulations, as we've heard a number
24 of times today and yesterday, the idea is you begin
25 with a set of geographic units, and you instruct the

1 algorithm to generate districts by grouping those
2 units together into districts, subject to
3 constraints that you instruct the algorithm to
4 follow. You then run that through the computer, and
5 it produces a very large set of maps.

6 At that point, you can then -- and that
7 set of maps is, you know, representative of the type
8 or the typical type of maps that you might see under
9 those criteria.

10 And then you would then compare that set
11 of maps to a map in question. And depending on your
12 objective, you would compare it using a whole host
13 of tests. I've seen -- you know, these ensembles
14 are sometimes used in partisan cases. I've seen
15 them used in racial gerrymandering cases. It
16 depends on the context.

17 But at the end of the day, you're
18 comparing that set of simulated maps to some
19 comparator map. In this case, these three maps are
20 the ones that you're making comparisons to.

21 Q. What software did you use?

22 A. So I used the R, which is the software --
23 the statistical language, and then I used the Redist
24 program, which we've heard a lot of discussion
25 about.

1 Q. Who publishes the Redist program?

2 A. So it's a project that is led by
3 Professor Imai. A variety of other scholars are
4 involved as well. Dr. Cory McCartan is one of them.
5 Dr. Christopher Kenny is one of them. One of the
6 kind of early scholars was Dr. Benjamin Fifield. He
7 and I went to graduate school together. So it's a
8 group of people that have been working on this
9 project for several years now.

10 Q. Does this have something to do with the
11 ALARM group that we've heard about as well?

12 A. Right. Yes. So they've -- at some point
13 they kind of gave themselves a creative name, and
14 ALARM was the name they chose.

15 Q. Why have you chosen to use their package
16 and their software, the R software?

17 A. Yeah, it has a lot of virtues. First of
18 all, it comes with just an enormous amount of
19 theoretical backing, you might say. These are very
20 smart, very serious scholars, and they have done an
21 enormous amount of work to show that this algorithm
22 is functioning as you would want, which is that when
23 you draw these large set of maps, you don't want --
24 you -- the purpose of this is you're trying to get a
25 picture of what the universe of possible maps could

1 look like.

2 And they've shown, through various
3 mathematical proofs, that the universe of possible
4 maps that could be drawn is -- it's literally
5 infinite. It's bigger than the number of atoms in
6 the universe. So you're never going to get that, no
7 matter how smart your computer is. And so you're
8 only -- you're going to sample, just like -- you
9 know, you can often draw comparisons between it and
10 survey research. You're never going to interview
11 every American as you try to talk about, you know,
12 the public opinion in the country.

13 So you sample. You sample people, or in
14 this case you sample maps. And the idea of the
15 sampling is that it produces a representative sample
16 of that unknown universe of maps. So I said it
17 comes with a lot of theoretical backing, and that's
18 because they've spent, you know, a lot of time
19 writing peer-reviewed research, engaging with other
20 scholars, and showing that this particular algorithm
21 does that.

22 And that was -- that was a really big
23 accomplishment, because that wasn't always the case
24 with other -- you know, different programs and
25 different algorithms that preceded this one.

1 As a result, this algorithm is, I would
2 say, the most common algorithm used in redistricting
3 litigation. It's -- you know, everywhere I go, it
4 tends to pop up. It was used -- I said I was in New
5 York. It was used in New York -- not by me, but
6 by -- well, I did some simulations, but other
7 experts did as well.

8 Dr. Imai has used it in a variety of
9 jurisdictions. Dr. McCartan has used it in a
10 variety of other locations. It's just -- it's been
11 used a lot, which means it's also been scrutinized
12 enormously because, you know, everybody's exchanging
13 code.

14 They're -- and on top of that, it's
15 publicly available, so anyone can go on and look at
16 the code, can ask questions about it. They are
17 actually quite responsive, and they'll write back
18 and give you answers for why they did what they did.
19 They're always updating it, producing reports about
20 the updates that they've done, that sort of thing.

21 It's just really, it's out there. It's
22 well-known. It's been peer-reviewed, and -- on a
23 number of occasions. It's a very reputable -- it's
24 a very reputable algorithm.

25 Q. What was the number of maps that you

1 generated with this simulation algorithm?

2 A. So I instructed it to generate 50,000
3 maps.

4 Q. Is that a commonly large number to produce
5 for litigation like this?

6 A. The number always varies. Different
7 scholars might have different preferences. You want
8 a big number. There's kind of reduced -- you know,
9 limited marginal returns, you might say, if you're
10 going beyond -- you know, I don't know that I've
11 seen anybody go beyond 100,000.

12 I think as time has gone on, experts kind
13 of settled in this range of, you know, 50,000, as
14 I've seen quite often. And that allows you some
15 flexibility if you want to look at particular
16 subgroups of the maps or things like that. So,
17 yeah, I would say that's a very common large number
18 to go with.

19 Q. How long did it take for your computer or
20 your software to run a simulation ensemble of that
21 size?

22 A. It's quite computationally efficient. It
23 takes, I would say, at most, 25 minutes to run once
24 you click -- push "Enter."

25 Q. Does the Redist package allow you to

1 program criteria and parameters into the types of
2 maps that the ensemble will produce?

3 A. Yes, it does.

4 Q. And are you aware that Proposition 4 has a
5 ranked list of criteria for redistricting standards?

6 A. Yes, I am.

7 Q. Did you program all of Proposition 4's
8 higher ranked criteria into your simulation?

9 A. I did, yes.

10 Q. Let's talk first about population
11 equality. Did you program districts in your
12 simulated maps to have population equality?

13 A. I programmed it to have very close to
14 population equality. I allowed for a one-tenth of
15 1 percent deviation for any particular district in
16 those simulations.

17 Q. Did you encounter any issues with the
18 resulting simulation set having set the population
19 equality at that parameter?

20 A. No. That's one of the really nice things
21 about this algorithm, is that because it comes with
22 these mathematical guarantees, you can then check if
23 the algorithm ran properly. The statistical term
24 for that is if it "converged."

25 And so there's a variety of diagnostic

1 checks and diagnostic statistics that you can look
2 at after the algorithm has completed its run to make
3 sure that you didn't run into any of these issues.

4 So sometimes if you constrain the
5 algorithm too aggressively, you can run into issues
6 like -- they call them bottlenecks, which means that
7 if you think of the algorithm as kind of like
8 driving around looking at different parts of the
9 state, a bottleneck would be like if it got stuck in
10 like a particular part of the state.

11 You can run into issues of sample
12 diversity, meaning that it kind of just keeps doing
13 the same thing over and over and over and over and
14 over, and you're not getting an actual sample of
15 difference -- different types of maps that you could
16 draw.

17 There's measures of what are called the
18 weights that are applied, and you can check the
19 value of those weights, and you don't want them to
20 get too high.

21 And so you can check all of those
22 diagnostics. And I, of course, check those after I
23 run the algorithm, and there are no issues in the
24 set that I ran.

25 Q. Did you program your set to avoid

1 municipal splits?

2 A. Yes.

3 Q. Did you program your set to avoid county
4 splits?

5 A. Yes.

6 Q. Did you program your set to treat all 29
7 counties in Utah the same?

8 A. So the algorithm is instructed to treat
9 all of the counties, with the exception of Salt Lake
10 County, the same. And so Salt Lake County is
11 treated differently because it is unique of the 29
12 counties, in that it's the only county that has too
13 much population to fit entirely within one district.
14 So we know that it's going to be split by the
15 algorithm.

16 And so at that point, I gave it
17 instructions to give a special -- to it special
18 attention to municipal splits within Salt Lake
19 County, to kind of -- because we're going to be
20 splitting the county, please pay extra attention to
21 the municipalities within Salt Lake County.

22 I don't necessarily always tell it
23 "please," but "pay attention."

24 Q. Did you program the simulations to
25 generate geographically compact districts?

1 A. Yes.

2 Q. And I guess one more question, backing up
3 just a step. Why didn't you program your simulation
4 to generate perfectly equal maps in terms of
5 population?

6 A. Yeah, so there's two -- there's two
7 reasons for that. The first reason is that the
8 algorithm is composing districts, as I said at the
9 beginning, by assembling precincts. And so in many
10 cases, precincts are just a little too big to reach
11 perfect equal population.

12 And we've seen that in these three maps.
13 None of them is -- avoids a precinct split. They
14 all -- when they actually get down to the final
15 decision of zeroing out the population, they all
16 eventually have to break those precincts and start
17 working at the census block level. And so the
18 algorithm says -- by giving it just a tiny little
19 bit of wiggle room, you're essentially kind of
20 getting it to that very last step.

21 And then at that point, if you were for
22 some reason wanting to, like, pick one of those maps
23 out -- which I don't know that I would necessarily
24 recommend. I think, you know, the algorithms,
25 that's not really the purpose. It's being used for

1 something else. But it's getting you to that very
2 last moment where things are very close, but you
3 could then go in and adjust within a precinct at the
4 census block level.

5 The other reason is that if you constrain
6 it too far, then you can run into some of these
7 convergence issues. You can get it to -- it will
8 start to produce errors and say, "Hey, I can't" --
9 "I can't do this. This" -- "this problem is too
10 hard."

11 And -- and so allowing it a very small
12 amount of flexibility on population solves that
13 problem.

14 Q. Proposition 4 has other criteria as well
15 ranked below the ones you've just discussed.

16 First, geographic boundaries. Did you
17 program your simulations to respect geographic
18 boundaries of Utah?

19 A. I did not give it any sort of additional
20 instruction aside from the ones we've talked about.
21 It -- it is the case that many of these county and
22 municipal boundaries also happen to be geographic
23 features, so rivers and mountain ranges and things
24 like that. And so by virtue of following the county
25 and the municipal boundaries, you're going to end up

1 with a lot of -- a lot of adherence to that
2 criteria. But I did not instruct it beyond that.

3 Q. What about maintaining district alignment
4 to the greatest degree practicable between different
5 types of districts, that criteria?

6 A. So again, I -- I did not give it any
7 additional instructions on that criteria. And
8 that's, again, for two reasons. So we're already
9 following the county and the municipal boundaries.

10 Beyond that, I think it -- you start to
11 arrive at a point in which you have to start to make
12 some subjective decisions. Would I prioritize state
13 legislative districts, or would I prioritize
14 school -- like state school board districts? Would
15 I prioritize school districts? Would I prioritize
16 county commission districts or county council
17 districts?

18 At that point, you know, that's a kind of
19 subjective choice. And so rather than directing the
20 algorithm to go in one of those directions, I think
21 it's probably best to not specify beyond those
22 higher level criteria.

23 Q. There's also a criteria about communities
24 of interest. Did you program your simulation set to
25 do anything special with communities of interest?

1 A. Yeah. So, again, for very much the same
2 reason, you ask, you know, six people what the most
3 important communities of interest are, and you might
4 get ten answers. And so I don't know that it would
5 be -- again, I don't think it's wise to introduce a
6 kind of subject -- at that point, subjective
7 criteria. There's, you know, a lot of choices that
8 a person could make. You might want to put, you
9 know, certain municipalities together, but that's
10 kind of, again, taken care of by the "don't split
11 municipalities if you think of municipalities as
12 communities of interest."

13 Beyond that, you know, I think yesterday
14 we talked -- I heard in court discussion of these
15 communities of interest that were sent to the
16 Independent Redistricting Commission. But, you
17 know, again, these are just -- these are comments
18 from people that -- you know, that -- there's a
19 bunch of partisan data in there. And so now maybe
20 your communities are really just kind of shoehorning
21 partisan preferences. And so I think it's probably
22 best to just avoid those subjective decisions,
23 given, especially since it's a much lower criteria.

24 Q. Did you find that your simulation ensemble
25 with 50,000 maps accurately reflected Proposition 4's

1 criteria?

2 A. Yes.

3 Q. How do you know?

4 A. So in my report, I produce a table that
5 compares the outcome of the simulations to these
6 three maps that we are looking at on these different
7 criteria. So these -- especially these
8 higher-ranked criteria.

9 And so you can see the number of municipal
10 splits, the number of county splits, the compactness
11 scores held up, you know, for these three maps in
12 comparison to the distribution of those outcomes in
13 the algorithm, in the simulation.

14 And what you see is that you're -- you
15 know, you're getting a -- you're getting similar
16 results. They're not going to match identically,
17 but that's by design. You are -- the whole point of
18 the algorithm is to find variation in different ways
19 to apply and weigh these criteria, and so you would
20 expect to see variation in those different criteria.

21 MR. GEIGER: Excuse me. Could you
22 double-check that the link is made between my
23 computer and the screen?

24 Should we unplug and re-plug?

25 UNIDENTIFIED MALE SPEAKER: Is it plugged

1 back in?

2 MR. GEIGER: It is.

3 Q. (By Mr. Geiger) All right. Is this
4 Table 5 on page 25 of your report you were just
5 alluding to?

6 A. Yes.

7 Q. Could you briefly, just in a sentence or
8 two, explain again what this table shows?

9 A. Certainly. So as you read across each
10 row, you can see how these three submitted plans
11 perform, and then you can see the range -- or the
12 95 percent range of these simulations.

13 And so just as an example, reading across
14 the top row, you can see the different number of
15 municipal splits that are contained in each of the
16 three maps, and then on the right, you can see that
17 in the -- in the 50,000 simulations, that 95 percent
18 of those simulations have somewhere between one and
19 five municipal splits, with the median reported in
20 the middle at two.

21 Q. Did you use the same simulation as
22 Dr. Trende?

23 A. No.

24 Q. Did you hear Dr. Chen testify about
25 Dr. Trende's base simulation set, and also

1 Dr. Trende, just earlier today, testify about the
2 base simulation set?

3 A. I did, yes.

4 Q. Did you use that set?

5 A. No.

6 Q. Did you hear testimony about the ALARM set
7 that was generated from the ALARM project?

8 A. I did, yes.

9 Q. Did you use that set of 6,000 maps?

10 A. No.

11 Q. Is this an entirely different set of
12 50,000 simulations?

13 A. It is, yes. I suppose the analogy, you
14 could say we're all driving cars, but we're driving
15 different cars.

16 Q. Okay. Let's now turn more briefly to the
17 different tests that you employed with your
18 simulation ensemble. Ranked marginal deviation
19 first.

20 Okay. This is a table -- or Figure 5 on
21 page 28 of your initial report, what does this
22 figure show?

23 A. So this figure is -- well, there's two.
24 There's two histograms here, and so what I do is I
25 calculate the ranked marginal deviation measure for

1 each of the three maps, and then I also calculate
2 that same score for each of the 50,000 maps.

3 And we've heard about this test before, so
4 I don't think we need to, like, go into the
5 nitty-gritty details of it, but it's essentially
6 saying how different is a map from the average
7 simulation. And so obviously each simulation is
8 different from the average simulation, and that's
9 where you get that gray distribution.

10 Then, on top of that, there are three
11 lines. Each line shows the ranked marginal
12 deviation of one of those three maps. So it's a
13 little hard to see, but on the far right, there's a
14 solid line and a dotted line. And then next to each
15 line, the map is labeled and the percentile -- so in
16 other words, the percent of maps that have a lower
17 score than that map -- is noted.

18 And so if you read from right to left, the
19 2025 plan falls in the 83rd percentile, the
20 Plaintiffs' Map 1 falls in the 81st percentile, and
21 then the Plaintiffs' Map 2 falls in the
22 20th percentile when compared to the full 50,000
23 simulation set.

24 Q. But you also culled that simulation set to
25 a smaller number, didn't you?

1 A. I did, yes. I took, of those 50,000 maps,
2 those that passed the partisan bias or the partisan
3 symmetry test that we've heard about. And so
4 there's about 26,000 of those, and that's what that
5 bottom figure shows, is the ranked marginal
6 deviation when compared against that set of maps.
7 And then, again, you can see where each of the three
8 plans falls in that distribution. The 2025 map is
9 in the 66th -- sorry -- 66th percentile, Plaintiffs'
10 Map 2 is above the 99th percentile, and Plaintiffs'
11 Map 1 is also above the 99th percentile.

12 Q. Why did you cull the ensemble?

13 A. Because the statute says to cull the
14 ensemble.

15 Q. Have you ever culled ensembles in other
16 cases?

17 A. I have, and I've seen others. I -- so,
18 for example, in North Carolina, I used simulations
19 in a partisan gerrymandering case. North Carolina
20 has very unique and particular language about how
21 counties are allowed to be split, down to like which
22 counties can be split. And so I culled that set of
23 simulations so that they were in compliance with
24 that particular, very unique North Carolina statute.
25 I actually think it might be in their constitution.

1 Q. Looking at that bottom chart, how many
2 maps in the ensemble resemble the ranked marginal
3 deviation score of plaintiffs' two maps?

4 A. Plaintiffs' 2 map? There's a handful. I
5 don't know the number off the top of my head.
6 It's a few.

7 Q. And to clarify, I meant both plaintiffs'
8 maps, but -- so I'll ask -- I'll break it apart.

9 A. Okay.

10 Q. In plaintiffs' second map, how many in
11 your culled ensemble resemble the ranked marginal
12 deviation score for that map?

13 A. I believe there's a handful. I don't know
14 the number exactly off the top of my head. I mean,
15 the percentile tells us it's less than 1 percent.

16 Q. And for Plaintiffs' Plan 1?

17 A. Again, it's less than 1 percent. My
18 memory is there's none.

19 Q. And you deployed additional tests using
20 your ensemble, didn't you?

21 A. Yes.

22 Q. And which ones were those again?

23 A. So there's the least Republican vote
24 share, there's the standard deviation of the vote
25 share, and then the final test I ran was the

1 efficiency gap.

2 Q. And why did you use those tests?

3 A. Those tests, I noticed them being
4 mentioned at some point in either reports or
5 complaints, and so it seemed reasonable to, I guess,
6 be better safe than sorry. And so I thought, why
7 not include those?

8 Q. Let's go to least Republican vote share
9 next. Based on your simulation analysis, how often
10 in Utah is the least Republican congressional
11 district Republican-leaning?

12 A. Yeah, so this test, it's pretty simple.
13 It's just what is the lean of the least Republican
14 district? And these are all calculated, again,
15 using that index of elections that we saw in those
16 tables. So there's those 13 elections, and they're
17 lumped together and averaged together.

18 So this is giving, like, a sense of the
19 district's partisan lean. It's obviously not a
20 perfect prediction. And there's a variety of
21 reasons why that might be the case, that
22 congressional candidates might perform a little
23 differently than state -- statewide candidates,
24 things like that.

25 So I would never, like, stake the results

1 of this on future elections. You know, I wouldn't
2 predict exactly what will happen or the vote share
3 that a candidate might win in a future election
4 based on these results. These are -- these are
5 meant to give a general sense of the tendency of a
6 district.

7 With that caveat, about half of the
8 districts in the -- about half of the least
9 Republican districts in the simulations had an
10 average index above 50 percent, and about half had a
11 least Republican district that was below the
12 50 percent line.

13 Q. Fifty percent Republican share? Or it
14 doesn't matter, I suppose --

15 A. Well, I guess it doesn't matter --

16 Q. -- at that point.

17 A. -- yeah. But, yes, 50 percent on either
18 side.

19 Q. And when you culled the ensemble for the
20 partisan bias test, what did you find?

21 A. So the distribution shifts, as you can
22 see -- oh, I guess we haven't moved the screen to
23 Figure 6, but --

24 Q. Oh, it got -- froze again.

25 A. Did we lose it again?

1 Q. Okay. Least Republican vote share.

2 A. Okay. So that bottom figure again is
3 looking at only the set of maps that passed the
4 partisan symmetry test. And here we can see that
5 there are many fewer least Republican districts that
6 are less than 50 percent. There are some, but the
7 distribution certainly shifts.

8 Q. What does this communicate to you, if
9 anything, about look -- noticing the difference
10 between that least Republican district's partisan
11 vote share when compared to the full ensemble versus
12 the cold ensemble?

13 A. So, I mean, what it communicates to me is
14 that the political geography of Utah is unique, and
15 it's obviously going to interact with both of these
16 tests, the least Republican test and with the
17 partisan symmetry test.

18 And, you know, given that partisan
19 symmetry is asking would the parties be treated
20 equally if the positions were reversed, what that
21 suggests is that plans that generate heavily
22 Democratic districts don't typically satisfy that
23 criteria. They don't meet the objective of if the
24 positions were reversed, would the parties be
25 treated equally.

1 Q. Let's move on to standard deviation of
2 vote share test. Could you just remind us briefly
3 what this test tests for?

4 A. Certainly. So the -- a standard deviation
5 is a statistical measure. It's simply asking what
6 is the average deviation or the average distance
7 from the average, if that makes sense.

8 So the idea is you take the four
9 districts, you calculate the standard deviation of
10 their vote shares, and then you simply compare that
11 score for each of the maps to that same score for
12 each of the -- each of the simulation maps.

13 Q. And looking at these two graphs, the top
14 one, could you explain what the two are and what you
15 found?

16 A. Certainly. So, again, we see this
17 histogram and the three lines on top. The 2025 plan
18 falls in the 42nd percentile, the Plaintiffs' Map 2
19 falls in the 72nd percentile, and Plaintiffs' Map 1
20 falls in the 86th percentile.

21 Q. And when compared to the culled set?

22 A. So when compared to the culled set, we see
23 that the distribution shifts again because we're
24 only looking at 26,000 of the maps. And the 2025
25 plan falls in the middle of the distribution at

1 about the 77th percentile, and the Plaintiffs' Map 2
2 and Plaintiffs' Map 1 are both above the
3 99th percentile.

4 Q. Do those percentiles in the cold sets
5 suggest anything to you about the nature of the
6 plans at issue?

7 A. They do. So if you think about the
8 standard deviation as a measure, if all four
9 districts have very similar vote shares, which would
10 be an indicator of a political cracking. So you're
11 making each district, you know, slightly or maybe
12 safely for the -- whatever party you're talking
13 about. And so you're trying to -- and so you would
14 try to get the districts kind of to be similar to
15 each other. And that's going to -- that's going to
16 yield a very low standard.

17 On the other hand, if you were attempting
18 to pack all of the partisans of a particular party
19 into one or -- you know, in this case, into maybe
20 all three -- you know, if you're trying to put all
21 the Republicans into the three districts and as many
22 of the Democrats into that fourth district, that's
23 going to really pull apart those four district
24 values and that's going to then lead to a higher
25 standard deviation of the vote shares.

1 And so what we're seeing here is the
2 Plaintiffs' Map 2 and Plaintiffs' Map 1, they have a
3 much larger variation in the district partisanship
4 because they're essentially doing that. They're
5 creating a much safer Democratic-leaning district by
6 making much -- three much safer Republican
7 districts.

8 Q. Let's go to the final test, the efficiency
9 gap test you've heard a lot about. Did you perform
10 an efficiency gap analysis on the three plans?

11 A. Yes.

12 Q. And what were your initial findings?

13 A. So, again, we're looking at these
14 histograms. So I calculate the efficiency gap for
15 each of the three maps and then do the same
16 calculation for each of the 50,000 simulations, and
17 we see this distribution looks a little different.

18 You have like a really big spike over
19 there on the right side, and you have a kind of
20 smaller spike in the middle and on the left, and
21 that's partly a function of how the efficiency gap
22 works. It's very chunky, you might say, and so when
23 you only have four districts you get very big kind
24 of chunky movements along the scale.

25 But the test -- you know, the test doesn't

1 change. You can see the 2025 map is there over on
2 the right at the 79th percentile, the second
3 plaintiff map at the 35th percentile, and the first
4 plaintiff map at the 23rd percentile.

5 Q. And what do those graphs and those
6 percentiles communicate to you?

7 A. Again, what they communicate to me is that
8 the 2025 map is pretty typical. It looks very --
9 you know, it resembles the most common outcome in
10 that distribution.

11 Q. Wrapping up your partisan fairness
12 analysis using these six tests, what are your
13 bottom-line conclusions?

14 A. My bottom-line conclusions are that the
15 2025 map is pretty unremarkable in that way. It
16 doesn't stand at the edge of any of these tests.
17 You know, at this point you've subjected it to five
18 or six tests, two different ways. It's just like
19 every time, it just kind of comes up in the middle.

20 Q. What are your conclusions -- what are your
21 conclusions with regard to plaintiffs' two maps
22 after conducting these ensemble analyses and
23 partisan biasing mean-median tests?

24 A. Yeah, it's certainly much less the case.
25 They fall at the edges more often. This is

1 particularly the case when we're looking at these
2 maps that pass the partisan symmetry or the partisan
3 bias test. It's not only that -- you know, that we
4 looked at the mean-median, they had much more --
5 they had much larger absolute mean-median scores.
6 They -- well, Map 1 failed on the partisan bias
7 test. Map 2, it was a mixed bag.

8 Q. Okay. Before I move on, I want to
9 double-check that I'm not frozen again. I think I
10 might be.

11 UNIDENTIFIED MALE SPEAKER: (Inaudible.)

12 THE COURT: Oh.

13 MR. GEIGER: Okay.

14 THE COURT: Do you --

15 UNIDENTIFIED MALE SPEAKER: Just give me
16 like a couple minutes.

17 THE COURT: We need a couple minutes to
18 restart.

19 MR. GEIGER: Sounds good.

20 THE COURT: Do you want to take a break?

21 MR. GEIGER: That sounds good. Sure.

22 THE WITNESS: Thank you.

23 THE COURT: Just for you, Dr. Barber, you
24 are under oath. Don't talk to anyone about your
25 testimony until you've been excused, okay?

1 THE WITNESS: Okay. Thank you.

2 THE COURT: Let's take a brief recess.

3 MR. GEIGER: All right.

4 THE COURT: Court's in recess.

5 (A recess was taken.)

6 THE COURT: All right. Back on the
7 record, League of Women Voters of Utah versus Utah
8 State Legislature.

9 Mr. Geiger, whenever you're ready.

10 MR. GEIGER: Okay. Thank you.

11 Q. (By Mr. Geiger) Dr. Barber, have you ever
12 been asked to draw a redistricting map in a
13 redistricting case?

14 A. Yes, I have.

15 Q. More than once?

16 A. I was appointed as a mapping special
17 master in a racial gerrymandering case for the state
18 legislature in Michigan. And so I was asked to
19 redraw the district boundaries for a portion of the
20 state that was at question. It was the area in and
21 around Detroit.

22 Q. And you were familiar with traditional
23 redistricting principles --

24 A. Yes. Yes --

25 Q. -- and -- sorry.

1 A. Oh, I apologize. I didn't mean to
2 interrupt you.

3 Q. And also with Proposition 4-specific
4 criteria?

5 A. Yes.

6 Q. And you are personally familiar with the
7 state of Utah?

8 A. Yes.

9 Q. Have you looked at both the plaintiffs'
10 maps submitted at this stage of this case?

11 A. Yes, I have.

12 Q. Looking at Plan 1, which I'll pull up on
13 Dave's Redistricting, as we've done the past couple
14 of days -- thanks -- I've got county boundaries on,
15 city boundaries on. Did anything in Plan 1 stand
16 out to you?

17 A. There are kind of two things that I took
18 note of when I -- when I saw the plan. The first
19 is -- and I think we kind of talked about it -- or I
20 didn't, but it was discussed yesterday, is in
21 zeroing out the population between the blue and the
22 green district, the plan actually like splits a
23 housing development in half in an unincorporated
24 part of Weber County.

25 So right here you can see this

1 development. It's called Edgewater Beach Resort.
2 It actually happens to be -- my sister owns her
3 houses there. It's not a beach, and it's not a
4 resort. I don't know why they call it that.

5 But anyway, it's about 20 houses. And you
6 can see that it chops off about three of them in the
7 corner there. And so that to me is like, you know,
8 not desirable. If you were zeroing out population,
9 you'd maybe try to keep -- do it while
10 simultaneously keeping something as, you know, kind
11 of small and cohesive as a housing development
12 together. So that was something that stood out to
13 me, also kind of somewhat by virtue of just a
14 happenstance that it was -- you know, I know where
15 that is.

16 The other part that stood out to me is if
17 you go down into Utah County to the way that Alpine
18 is treated, you can see that Alpine is put in the
19 green district -- I don't know the numbers, but the
20 green district there. Oddly enough, this is -- I
21 have another sister that lives in Alpine. So -- I
22 don't know if Dr. Oskooii like has a thing for --
23 you know, out for my family.

24 But Alpine, it sits up in the corner
25 and -- and so it's only connected to civilization

1 via the -- the other cities there, Highland and
2 Cedar Hills and Lehi. And there's -- and so it's
3 really orphaned in some ways in this plan.

4 It's definitely more a part of the --
5 those northern -- northern Utah County
6 municipalities. You know, I'm there quite often.
7 It's hard to sometimes even know, am I in Highland?
8 Am I in Alpine? Am I in Cedar Hills? And so, to
9 me, that's a very unusual choice, to kind of orphan
10 a municipality like that.

11 Q. And then going over to Plan 2, again on
12 Dave's, did you notice anything about the changes
13 that Dr. Oskooii made in Plan 2?

14 A. Yeah. I mean, it has the same split of
15 the housing development up there near Huntsville,
16 and -- and so the -- I think the district boundary
17 is identical in Map 1 and 2 there. But for me, the
18 more kind of unusual decision here is the way that
19 it allocates the municipalities in Salt Lake County.

20 You can see that it -- at first it starts
21 to look like, oh, this is going to be a kind of
22 northern -- northern valley district, but then it
23 jumps across, it skips over West Jordan and
24 South Jordan, and then it links that with Riverton
25 and Herriman. And the only connection there is,

1 again, via basically the -- you know, the Kennecott
2 Mine and the open -- the -- the Oquirrh Mountains.
3 That, to me, again, is a kind of -- strikes me as an
4 unusual decision.

5 You know, and when you think about the
6 Salt Lake Valley, at least, you know, my
7 understanding and my kind of familiarity with it is
8 those cities down in the southwest, they tend to
9 kind of have similar interests. They have
10 similar -- they're, like, facing similar issues,
11 they sometimes lobby together for county
12 representation and county funding. And so it
13 doesn't -- you know, it's just a kind of unusual
14 orientation.

15 And then on top of that, you have
16 Bluffdale that's, like, not included with its kind
17 of two neighboring cities of Riverton and Herriman.
18 So that is -- I think, in my view, strikes me as an
19 unusual decision.

20 And then if you go over to the east side,
21 over to kind of the east bench, you've got the six
22 canyons that feed into the valley. And so City
23 Creek is obviously a part of Salt Lake City, so it's
24 in the blue district.

25 But then right there, you have Immigration

1 Canyon that's not linked, even though, you know,
2 that's really kind of the only way in and out. I
3 suppose you could go up and over Little Mountain.
4 But, you know, for practical purposes, it's more
5 kind of part of Salt Lake City, even though it's
6 technically its own separate municipality.

7 But then on top of that, you have the
8 canyons themselves. So you have, you know, Parley's
9 and Millcreek. And the communities at the bottom,
10 these east bench communities, they -- you know, it's
11 really important what goes on up in that canyon.

12 They face issues of, you know, like water
13 quality, recreation, and, like, traffic management.
14 There's all these issues about the ski resorts and
15 the federal land that's up there and how to treat
16 it. There's -- you know, and anytime any of those
17 changes happen, that's a federal issue because
18 they're all -- you know, there's lots of public land
19 up there.

20 And so, like, any time we want to make a
21 change to how the Bonneville Trail moves, you have
22 to get an act of Congress, is my understanding. And
23 in fact, I think they just did that like a month
24 ago. They were negotiating about getting a piece of
25 federal land moved over so that the Bonneville Trail

1 could go through there.

2 So, you know, in my view, these canyons
3 are very -- you know, they're just kind of very
4 closely connected to the communities that sit at the
5 bottom of them, and yet here they're not placed in
6 the same district. And so, you know, that kind of
7 scrambles representation in that -- in that regard.

8 Q. I'm going to go back to the southwest part
9 of the county and ask you about Bluffdale once more,
10 as you mentioned.

11 A. Yes.

12 Q. You notice that Bluffdale's municipal
13 limits do cross county lines?

14 A. I do know that. Is the map supposed to
15 show that?

16 Q. Well, here we have -- I believe it does.
17 I think --

18 A. Oh, I think it -- it must have froze
19 again.

20 Q. -- the county line going like this -- oh,
21 it froze again? Oh, sorry.

22 THE COURT: Sorry.

23 MR. GEIGER: Sorry. There's no flight to
24 catch, Dr. Barber.

25 THE COURT: Do you have a flight to catch?

1 THE WITNESS: No, no, I live in Provo. I
2 can avoid all the traffic --

3 THE COURT: Wait a minute, Friday at 4:00
4 or 5:00 --

5 THE WITNESS: Yeah, it might be faster to
6 fly.

7 Q. (By Mr. Geiger) So zoom back down on the
8 Bluffdale area in southwest Salt Lake County. And
9 here's the county line, following my cursor, and you
10 can see Bluffdale city lines crossing the line.

11 A. Yes. Yes, I see that.

12 Q. Dr. Oskooii testified yesterday that he
13 kept Bluffdale out of District 2 and in District 3
14 to avoid an additional county split. Does that
15 reason, in your view, warrant moving Bluffdale
16 across districts?

17 A. No. The portion of Bluffdale that sits in
18 Utah County doesn't have any people in it. And so
19 it doesn't, to me, make a ton of sense to move the
20 whole municipality and all the people that live in
21 it in order to preserve what is somewhat arbitrary,
22 which is a county line that moves across an
23 uninhabited portion of the city.

24 Q. Did you drive from Provo to Salt Lake City
25 yesterday?

1 A. I did, yes.

2 Q. What route did you take?

3 A. I went right through the Bluffdale --
4 right at the border there where the I-15 -- over the
5 point of the mountain, past Bluffdale, and through
6 Draper.

7 Q. Did you notice anything about the
8 Bluffdale-Draper boundary there?

9 A. Well, it follows the freeway. I guess --
10 yeah. And then above that, there's the little
11 former prison site. But, yeah, right there at the
12 bottom, that's I-15 that's going up.

13 Q. What did you see at the former prison
14 site?

15 A. Currently, it's a large field with some
16 bulldozers in it.

17 Q. Let me back out just once more. We heard
18 Dr. Oskooii testify yesterday that he attempted to
19 make the least disruptive changes to Legislature
20 Map C as he could to reduce municipality and county
21 splits. Having reviewed the changes that he made,
22 does this appear to you as a least changes plan?

23 A. No. You've reduced the county splits by
24 uniting an unpopulated area. So I don't -- in my
25 view, I don't know that that is that critical to

1 begin with. But then, you know, in doing so, you've
2 reallocated about 500,000 people and created a
3 somewhat oddly -- oddly shaped treatment of the
4 municipalities in Salt Lake County.

5 Q. Dr. Barber, did you review Dr. Chen's
6 initial and supplemental reports in this case?

7 A. Yes.

8 Q. Did you review his simulated maps?

9 A. Yes.

10 Q. Did you review Dr. Chen's simulation
11 algorithm?

12 A. As best as I could, given the very -- the
13 very limited time that we're operating on.

14 Q. Did you file a supplemental report in this
15 case?

16 A. Yes.

17 Q. Generally, what did your supplemental
18 report cover?

19 A. So my supplemental report covered opinions
20 of Dr. Chen's algorithm, as well as a response to
21 some of the criticisms that he offered in his
22 supplemental report.

23 Q. Just a moment ago, you answered my
24 question that you reviewed Dr. Chen's algorithm to
25 the best of your ability, given time constraints.

1 What do you mean by that?

2 A. I mean, from the first day that the code
3 was available, which my recollection is was
4 somewhere in our -- like, Saturday midday. So, you
5 know, we've had about six days. These are really
6 complicated algorithms, and so I wouldn't venture
7 to -- I would not be confident that I've, you know,
8 sufficiently or fully explored what exactly the
9 algorithm is doing and how it operates in that -- in
10 that amount of time.

11 Q. Have you seen his algorithm before?

12 A. No.

13 Q. Had you -- was it made available to you
14 online before this case?

15 A. No. So that's -- one of my kind of points
16 of concern is the fact that it's just not something
17 that's publicly available, it's not been broadly
18 scrutinized, it's -- there's not a kind of record of
19 peer-reviewed scholarship, looking at it.

20 And so it's much harder to know exactly
21 what it's doing and how it's operating versus the
22 algorithm that I used, which, as I said at the
23 beginning of my testimony, it's been around, it's
24 been scrutinized. A lot of people have looked at
25 it. You know, they've opened it up, they've looked

1 under the hood. It is very different in how
2 they've -- the amount of public scrutiny that's
3 available to each of them.

4 Q. You also told me that you looked at
5 Dr. Chen's maps in his simulation ensemble. Were
6 you able to learn anything more about his algorithm
7 that generated those maps by looking at the maps
8 themselves?

9 A. Yes.

10 Q. And what did you learn?

11 A. I think that the key point of difference
12 is that the -- that his algorithm has a very
13 particular geographic preference, and that that
14 preference is to create a district in the northern
15 half of Salt Lake County. It very, very strongly
16 prefers to do that above -- maybe perhaps above all
17 other -- all other factors.

18 Q. Let's look at Figure 1 on page 7 --
19 Figure 1 on page 7 of your supplemental report.
20 What is this figure showing?

21 A. So this is -- this figure requires a
22 little bit of explanation, although I think you've
23 probably seen the top figure yesterday.

24 So this is a -- this is a common way of
25 showing the results of a simulation. And what it

1 does is it ranks each district from its least
2 Republican to most Republican district. So the
3 districts -- the district numbers don't matter.
4 It's the least most Republican, the second least
5 most Republican, so on and so forth.

6 And then what you do is you simply just
7 plot what is the partisan index, so this average for
8 each of those districts. And so the top figure
9 shows the outcome of that when you use Dr. Chen's
10 simulations. So the top half is the figure for
11 Dr. Chen's simulations. The bottom figure is the
12 same style of presentation, but for my set of
13 simulations, so the 50,000 simulations.

14 And the annotations I've added afterward
15 in my report. And the reason I added those
16 annotations is that you can see there's a stark
17 difference between the results of his simulations
18 and the results of my simulations. And when I saw
19 the results of his simulations, I was very surprised
20 because it's unlike any other set of simulations I
21 have seen in my work in redistricting because of
22 that very large gap. You can see there's a really
23 big gap between the lowest ranked Republican
24 district and the next lowest.

25 And so this is, by no means, a very

1 systematic calculation, but I simply kind of took
2 the middle of each of those clouds and said, you
3 know, that's about a 25 percent jump.

4 Now, if you look at the simulations that I
5 produced, you don't see that big discontinuity. You
6 see a very smooth transition across the different
7 districts. That's what I have more -- that's what I
8 have seen much more frequently in -- when using
9 these redistricting algorithms.

10 Conceptually, the reason for that is you
11 would expect the algorithm to slowly explore all the
12 variety of ways in which you could arrange districts
13 across the state. And as it slowly explores that
14 variety of ways of drawing districts, you would
15 expect very small changes to occur. And so you
16 would expect a kind of smooth gradation. You would
17 not expect to see really big discontinuities
18 appearing.

19 And so that was, to me, very surprising.
20 I was not -- I was very surprised to see the pattern
21 in the top half of this figure for that very reason,
22 that you would expect the algorithm to be kind of
23 slowly exploring a variety of different options.
24 And each of those options would be slightly
25 different from each other, and you would get a kind

1 of smooth transition.

2 Q. Could the difference between your two
3 simulation sets -- and maybe I should be more
4 clear -- Dr. Chen's simulation set and your
5 simulation set be your different applications of the
6 neutral redistricting criteria?

7 A. It's entirely -- I suppose -- I mean, it
8 has to be, right? There has to be some reason why
9 they're producing different results. And so a big
10 portion of my rebuttal report was a kind of
11 exploration of why or whether we could identify what
12 was going on.

13 And so you might think, oh, well, it has
14 to do with the way in which counties are treated or
15 the way in which municipalities are treated or the
16 weight that it gives to compactness, like something
17 has to be causing this difference to arise. Let's
18 see if we can identify what that difference is.

19 Q. So what did you look to first to try to
20 identify the difference?

21 A. Well, I suppose the first place you could
22 look is population deviation. So Dr. Chen has no
23 population deviation in his simulations. Mine allow
24 up to 800 people. That's really not -- there's just
25 no possible way that that could explain this

1 difference. An 800-person difference in an
2 800,000-person district is -- you know, it's a
3 rounding error. It's just not possible for that to
4 be an explanation. So I didn't really spend a lot
5 of time there.

6 So I then thought, well, maybe it's about
7 how municipalities are treated. So this figure
8 shows on the left a distribution of the number of
9 municipal divisions that are present in my
10 simulations.

11 I should clarify that this is a figure
12 that Dr. Chen produced of my simulations, but I --
13 you know, we can use it. No problem.

14 MR. GEIGER: If I could just, for the
15 Court's clarification --

16 THE WITNESS: Sorry. I got -- I got going
17 too long.

18 MR. GEIGER: That's fine.

19 This is Figure 8 on page 17 of Dr. Chen's
20 supplemental report and Figure 6.2 on page 92 of
21 Dr. Chen's initial report, side by side.

22 THE WITNESS: Okay. And then so on the
23 right is the distribution of municipal divisions in
24 Dr. Chen's algorithm. You can see we both -- the
25 modal outcome is three municipal divisions. There's

1 a few more by -- well, there's -- by number and
2 percent in mine that split two and one
3 municipalities. There's a few more in mine that
4 also split four and five municipalities.

5 But, you know, if you laid those two
6 distributions on top of each other, you'd get a lot
7 of overlap. So that didn't seem to be the
8 explanation, although I further -- you know, we can
9 further probe that question and see if it does, in
10 fact, make a difference.

11 Q. (By Mr. Geiger) First, did you hear
12 Dr. -- or perhaps read Dr. Chen's allegation that
13 you miscalculated municipal splits?

14 A. I did, yes. The -- my understanding of
15 his critique is that there's a few cases in which a
16 precinct overlaps two municipalities. I treat
17 whichever it falls most in as belonging to that
18 municipality. So these are going to be pretty rare
19 occurrences.

20 And you can see here that if you look at
21 this figure and then went back to the table that we
22 looked at at the beginning of my testimony, you're
23 not going to see enormous changes, you're going to
24 see a shift of basically one municipality on
25 average.

1 Q. Dr. Chen's Figure 8 contains his corrected
2 version of your municipal splits; is that accurate?

3 A. That's my understanding.

4 Q. I'm going to pull up Figure 4 on page 11
5 of your supplemental report. And what does -- with
6 respect to municipal splits, what does this show?

7 A. So what this figure is showing is it says,
8 well, let's see what happens if we divide the
9 simulations based on whether they have above-average
10 or below-average municipal splits. So the -- these
11 colors are not ideal. I should have picked
12 different colors. But the kind of bluish cloud are
13 the simulations that contain above-average municipal
14 splits, and the reddish cloud are the simulations
15 that contain below-average municipal splits.

16 The key takeaway of the figure is that
17 there's not a big difference. We don't see that if
18 you start selecting only the simulations that have a
19 particular -- meet a particular more restrictive
20 criteria, that you suddenly get a really different
21 picture.

22 Q. Moving beyond municipal splits to
23 compactness, first, Dr. Chen says that you
24 miscalculated your Polsby-Popper compactness score.
25 Is that so?

1 A. Again, I think this is really a kind of
2 distraction. When you use geographic information
3 systems and when you use Shapefiles, they
4 occasionally have to make simplifying assumptions to
5 smooth the boundaries of these precincts. That
6 creates ever so small variation, which ever so
7 slightly impacts the compactness score. It only
8 impacts the Polsby-Popper score because, as we
9 learned, the Polsby-Popper is doing the perimeter,
10 whereas the Reock is using the area.

11 So I guess the first response is that none
12 of this applies to the Reock score that I also
13 calculate and include in all of the tables in the
14 reports. But even if you said, like, "But we really
15 care about the Polsby-Popper score, we should really
16 focus on that," if you take the adjusted scores or
17 the -- you know, the scores that Dr. Chen produces,
18 you're really dealing with like hundredths of a
19 percent. It's just a tiny rounding error. It's not
20 a critique that is gonna have any sort of meaningful
21 impact on the results of the simulations.

22 Q. And -- yeah. Pulling up a
23 similar-looking -- or the same kind of chart, but
24 for compactness, let's see up there, Figure 2 of
25 your supplemental report, what does this figure

1 show?

2 A. So this figure is showing the same idea as
3 we just looked at, except now using compactness.
4 And so what I've done here is I've divided the
5 simulations based on whether they have above- or
6 below-average compactness.

7 And what you see -- again, the major
8 takeaway is you don't see a big difference. You
9 don't have -- you don't observe big shifts in the
10 partisan composition of the simulations based on
11 whether they are above or below average on their
12 compactness scores.

13 Q. And to clarify -- but we perhaps don't
14 need the clarification, but these are only your
15 simulated maps; is that right?

16 A. Yes, that's correct.

17 Q. Let's go to county splits. On pages 14 to
18 15 of Dr. Chen's supplemental report, he says that
19 your maps have more county splits than his maps do.
20 How many more are we talking about?

21 A. We're really talking about like one on
22 average.

23 Q. Is there a difference between county
24 splits and counties split?

25 A. There is. So you could think about how

1 many counties are split, you could think about how
2 many splits are there. So you could think, like,
3 one county split three times, you could think of
4 three counties split one time, and you could think
5 of everything in the middle there. You could have
6 two counties split once and one county split twice.

7 That's -- you know, there's sometimes a
8 point of disagreement about which is the way -- the
9 proper way. I've seen it calculated in both ways.
10 You can talk about counties split or county splits.

11 Q. Have you reviewed Proposition 4's
12 reference to divisions of counties?

13 A. Yes.

14 Q. And as a nonlawyer, do you read
15 Proposition 4 to take either side in that debate you
16 just mentioned?

17 A. Yeah, I'm certainly not a lawyer, and I'm
18 not offering any advice, I'm not offering any legal
19 opinions, but as, you know, someone who does this a
20 lot, it doesn't seem like it's suggesting one
21 particular interpretation, that you might interpret
22 something as reduce the number of counties split,
23 you might think about it as number of county splits,
24 or you might think about it as some sort of average
25 between those two concepts.

1 Q. Specifically, Dr. Chen critiques some of
2 your simulations that split Salt Lake County four
3 ways. How do you respond to that criticism?

4 A. Yeah, I think that my first response would
5 be, well, there's -- you know, that's a possibility.
6 There's a possible -- you could imagine that someone
7 would say, "Well, we want to reduce the number of
8 counties split." And we know that Salt Lake County
9 has to be split. So that's -- you know, that's a
10 way someone might interpret that provision.

11 Beyond that, I think that there's an
12 important distinction between how it's split versus
13 another concept, a related concept, which is how
14 many districts are wholly contained within Salt Lake
15 County. Because that's the only county that can do
16 that. It's the only county that can support an
17 entire district. And so you could -- you could
18 certainly split Salt Lake multiple times while
19 simultaneously also having a district that is
20 entirely contained within Salt Lake County.

21 Q. Do you recall how often that happens in
22 your simulated maps?

23 A. So about half of the time, my simulations
24 create a district that is wholly within Salt Lake
25 County.

1 Q. Do you recall how often that happens in
2 Dr. Chen's maps?

3 A. It happens about 9 percent of the time.
4 So, yeah, much less often.

5 Q. This is Figure 3 that I just pulled up on
6 page 10 of your supplemental report. What does this
7 figure show?

8 A. So this figure looks like the previous two
9 that we've looked at, but now we're dividing the
10 simulations based on whether they are above or below
11 average on the number of county splits. And, again,
12 the takeaway of this figure is you don't see a big
13 change. You don't see massive shifts in the
14 partisanship of these simulations based on whether
15 they have above or below average county splits.

16 Q. We've just looked at several criteria
17 individually. Did you perform any additional
18 analysis to determine whether the way that you
19 programmed Proposition 4's criteria into your
20 simulations versus the way Dr. Chen programmed his
21 criteria in your simulations can explain the
22 difference between yours and his partisan
23 distribution?

24 A. Yes. So those three figures that we just
25 looked at, those are each treating those criteria

1 separately. And so one thing you might say is,
2 "Well, but I want all of those things to be true at
3 the same time. I want -- I want low county splits,
4 low municipal splits, above average compactness,
5 and, you know, I also want a district wholly within
6 Salt Lake County. I want all four of those things
7 to be true." You can do that.

8 And so I did that, and there's a little
9 less than 10,000 maps that meet all of those
10 criteria simultaneously, and so I kind of
11 colloquially called them, like, the "Super Prop 4
12 sims." You know, they're doing all of these things
13 at once.

14 And so I ran that and then just, again,
15 ran those ensemble analyses. So compared the ranked
16 marginal deviation, the standard deviation of the
17 vote share, the -- oh, my gosh, I can't believe I
18 forgot.

19 Q. The least Republican vote share?

20 A. The least Republican vote share. Thank
21 you. And then the efficiency gap.

22 Q. And what did you find when you made those
23 comparisons?

24 A. So, again, when you run those comparisons,
25 you find basically the same thing as the original

1 simulation comparison, which is that the 2025 map is
2 not an outlier. It falls, again, within that
3 distribution.

4 Q. Given all of that, have you arrived at any
5 conclusions about what actually explains the
6 difference between your and Dr. Chen's simulation
7 maps?

8 A. I suppose I would say yes and no. No, in
9 that I have not figured out exactly how the
10 algorithm is applying the various weights to these
11 criteria that's producing such a divergent outcome.
12 Yes, in that I can see the results of that in that
13 we know that the algorithm is -- has an extreme
14 preference for a district that is almost all
15 contained in Salt Lake County and always sits at the
16 northern half of the county.

17 Q. When you say "almost all contained within
18 Salt Lake County," do you -- are you not meaning
19 wholly contained?

20 A. No, actually. So there's not very many
21 maps in Dr. Chen's simulations that make a district
22 completely within Salt Lake County. I think I said
23 earlier it happens about 9 percent of the time.
24 But about 70 to 80 percent of the time, it creates a
25 district that's like 95 percent in Salt Lake County

1 and a little bit in Davis County. For some reason,
2 the algorithm really likes to go just up into Davis
3 County and grab some precincts in that kind of North
4 Salt Lake/Bountiful area.

5 Q. Okay. Let's pull up Figure 6 of your
6 supplemental report, page 15.

7 What does this figure show?

8 A. So this is a map of Salt Lake County. And
9 so you can see Salt Lake City is at the top. And so
10 what I did was I thought, Well, an algorithm -- what
11 we want these redistricting algorithms to do is we
12 want them to explore a variety of ways in which you
13 could assemble districts broadly across the state,
14 but here, we're going to focus the attention to just
15 Salt Lake County.

16 So you would think, well, you know,
17 there's about one and a half districts' worth of
18 people in Salt Lake County. And so there's a --
19 there's a bunch of ways that you could assemble
20 those people together to create a district that's
21 wholly or at least 95 percent within Salt Lake
22 County.

23 And so what I did was I looked at my
24 simulations and I took every precinct in Salt Lake
25 County and I said, How often is that precinct

1 assigned to the district that is wholly within Salt
2 Lake County or 95 percent within Salt Lake County?
3 So I'll say, like, Salt Lake County-based.

4 And then -- so that's going to give you a
5 score for every precinct, and it's going to say,
6 "This precinct gets assigned to that Salt Lake
7 County-based district, you know, 60 percent of the
8 time, 70 percent of the time."

9 Then you can imagine the algorithm is
10 exploring, throughout the county, all the variety of
11 ways in which it can -- it can create that Salt Lake
12 County-based district. Well, simply by virtue of
13 the geography of the county, you would think ahead
14 of time, what precincts should be most often
15 included in that district?

16 Well, it's probably going to be the
17 precincts at the very center of the county, because
18 if you have a northern district, it's going to start
19 at the north border and it's going to run about a
20 little more than halfway down to kind of the bottom
21 of Taylorsville. If you start over on the east side
22 and you start moving west, you're going to get the
23 East Bench communities and you're going to -- you're
24 going to have to go across I-15 and you're going to,
25 again, end up basically kind of near Taylorsville.

1 If you start at the bottom and you go up,
2 you're going to get, you know, those communities at
3 the bottom, Herriman, Draper, South Jordan, West
4 Jordan, Sandy, but you're also going to end up
5 basically at Taylorsville again. And if you start
6 in the west and you move east, you're going to get
7 the whole kind of west side of the county, plus a
8 little bit further over, but you're going to, again,
9 go past Taylorsville.

10 So you're going to end up -- Taylorsville
11 is going to end up in that district more than anyone
12 else, simply because it happens to be right in the
13 middle. And so I mapped that, and this is the map
14 that it produced, and you get basically that -- that
15 red bullseye in the center is almost exactly the
16 boundaries of Taylorsville.

17 And then you can see that it kind of moves
18 out from there, and that's because as it moves
19 around, the municipalities that sit at the edges of
20 the county, they're going to be included a little
21 less often than the municipalities at the center of
22 the county.

23 So you can see that, like, Salt Lake at
24 the top, it's included in the Salt Lake County
25 District a little more than half of the time. And

1 that would make sense, because about half the time
2 it should make a district at the top, and about half
3 the time it should make a district closer to the
4 bottom.

5 You can see that's not going to be
6 perfect. Those cities at the bottom, they're not
7 always -- they're not included as often as Salt Lake
8 County, but they're still included, you know, 30, 40
9 percent of the time. Draper, I think, if you look
10 at the blue, it's about 20 to 30 percent of the
11 time. Bluffdale is included less often, but it's
12 still there. It's -- that blue is like 10 to 20
13 percent of the time.

14 And so to me, that -- that confirms that
15 the algorithm is doing what I would expect it to do,
16 which is explore the full space of possibilities,
17 because the intention is that it creates a
18 representative sample of the universe, like the
19 unknowable universe, of possible maps that could be
20 created.

21 Q. Did you do the same analysis for
22 Dr. Chen's simulations?

23 A. Yes, I did.

24 Q. And what did you find?

25 A. You find something incredibly different,

1 which is that the algorithm has a very, very strong
2 preference for a northern Salt Lake County district.

3 And so you can see that there's a very
4 clear line that, again, falls right at about the
5 bottom of kind of Taylorsville and West Valley. And
6 the precincts that are north of that boundary, they
7 are included in the Salt Lake County-based district
8 in Dr. Chen's algorithm 90 to 100 percent of the
9 time.

10 The communities at the southern end of the
11 valley, so these are, you know, Draper, Bluffdale,
12 Herriman, these communities are essentially never --
13 rarely, I would say, you know, less than 10 percent
14 of the time, they are included in the Salt Lake
15 County-based district.

16 And so you're not seeing the evidence of
17 the algorithm fully exploring the possible ways in
18 which you could assemble a Salt Lake County
19 district. You're seeing the algorithm develop a
20 kind of obsession with a northern Salt Lake County
21 district to the degree that it's doing it 90 to 100
22 percent of the time. It's not 100 percent, but
23 it's -- you know, it's more than 90 percent of the
24 time.

25 Q. Let's put them side by side. What

1 conclusions do you draw from this comparison, if
2 any?

3 A. So to me, what this suggests is that
4 there's something in the programming of the
5 algorithm that is creating a northern Salt Lake
6 County district all of the time, or nearly all of
7 the time. And I have not identified exactly why
8 that is the case, but to me, this is just -- this is
9 a telltale sign of a biased algorithm. The
10 algorithm should be producing a representative
11 sample of potential maps, and we're not seeing that
12 here. We're seeing a single orientation repeated
13 over and over and over --

14 Q. Did you --

15 A. -- more than 90 percent of the time.

16 Q. Did you hear Dr. Chen's explanation for
17 why his algorithm might naturally produce a district
18 containing the northern part of Salt Lake County?

19 A. Yes, I did.

20 Q. In your opinion -- well, first, what was
21 that explanation?

22 A. So my understanding is that his
23 explanation is because Draper and Bluffdale extend
24 into Utah County, that the algorithm would look at
25 that and say, like, can't go there. I don't want to

1 split the city in order to maintain the county
2 border. I don't want to split the county by
3 basically spilling down into Utah County to keep
4 those two municipalities whole.

5 That's my understanding of the explanation
6 he offered.

7 Q. In your opinion, can that explanation
8 explain that figure on the right?

9 A. No. For two reasons. The first reason is
10 that there's a -- there's a bunch of other
11 municipalities down there that don't split the
12 county -- or that don't cross the county boundary.
13 You know, South Jordan is there. It's wholly within
14 the county. Sandy is there. It's in the kind of
15 lighter blue color. It's wholly within the county.
16 Herriman, also wholly within the county. So
17 those -- that doesn't explain why those communities
18 would never be selected for this Salt Lake
19 County-based district.

20 The other explanation is that his
21 algorithm exhibits an interesting quirk, in that, as
22 I said earlier, it likes to go up into Davis County.
23 So that district is often all those areas plus a
24 little piece of North Salt Lake, or a little piece
25 of North Salt Lake and Bountiful.

1 So what that says to me is that it's not
2 as though the algorithm is, like, prohibited from
3 crossing a county boundary. It does it all the
4 time. It goes into Davis County and grabs a very
5 small portion of the population. So why couldn't it
6 do the equivalent at the southern end of the county?
7 Why couldn't it cross over and grab the rest of
8 Draper or the rest of -- well, there's no population
9 in that other piece of Bluffdale, so that doesn't
10 really -- that is even kind of a further reason.

11 And then why couldn't it just make that
12 district at the southern end of the county and say,
13 "Well, I'm gonna make a -- you know, I'm going to
14 make a district that's mostly southern Salt Lake
15 County plus the piece of Draper that goes into Utah
16 County, or plus Draper and, you know, a piece of
17 Lehi" or something like that, in the same way that
18 it does that at the northern end, "I'm gonna take a
19 piece of North Salt Lake," or "I'm gonna take North
20 Salt Lake plus a little piece of Bountiful."

21 Q. What is the very lengthy Appendix A to
22 your supplemental report?

23 A. So that is simply -- I saw this, and I
24 said, well, I want to verify that this is actually
25 happening, so I'm gonna use the files that Dr. Chen

1 provided that have each of the maps that he created,
2 and I'm just going to start looking at them.

3 And so I told the computer to basically
4 create maps of Dr. Chen's simulations. It takes the
5 computer a little while to do this, and so I let it
6 run overnight, and I got about 1800. That's -- that
7 was all I could get in the time that I had.

8 Q. Let's flip through some of these. And as
9 I do, I'd like to ask you just, what do you notice
10 as I'm flipping through?

11 THE COURT: Mr. Geiger?

12 MR. GEIGER: Yes.

13 THE COURT: Can I just ask, are -- have we
14 seen these before, or are these new?

15 MR. GEIGER: These are in the record,
16 having been admitted as an appendix to his
17 supplemental report.

18 THE COURT: Okay.

19 MR. GEIGER: There are 1800 in number.
20 And so we -- we can print them off for the Court.

21 THE COURT: Could you -- could we identify
22 this as a separate exhibit since you're just taking
23 a selection out of there?

24 MR. GEIGER: Sure.

25 THE COURT: Okay.

1 MR. GEIGER: Absolutely.

2 Do you know what exhibit number we're up
3 to now?

4 MS. ROGERS: Yes. We're at 18.

5 MR. GEIGER: This will be Defense
6 Exhibit 18.

7 THE COURT: Defense 18. Okay.

8 MR. GEIGER: It will be a selection of
9 Dr. Chen's maps.

10 THE COURT: Perfect.

11 Q. (By Mr. Geiger) As I flip through these,
12 Dr. Barber, I'll ask if -- you just to explain if
13 you notice anything.

14 A. Yeah, so the colors are arbitrary, but
15 what I notice is that you're getting what that
16 earlier map showed, which is you're getting a
17 northern Salt Lake County District, and it's just
18 always there. It's -- you know, the orientation of
19 the other districts moves around it. It
20 occasionally shifts a little bit here and there.
21 None of them are identical, but the fact that
22 they're not identical is not the most important
23 part.

24 The important part is that the general
25 geographic location of that district, it just never

1 moves. It's always present, which is exactly what
2 you saw in that first map, where it was really dark
3 red at the top. It was saying that, you know, 90
4 percent of the time, the district is located in that
5 area. And that's what these maps are showing, is
6 that we're -- you know, we're 70 maps in, and we're
7 seeing the same district, more or less, appear over
8 and over and over and over.

9 Q. What kind of partisan data did Dr. Chen
10 report about that northern Salt Lake County-based
11 district?

12 A. So that's the district that's heavily
13 Democratic. That's that district that sits at the
14 bottom of that figure and has a big 25-point gap
15 from the next district. And so his algorithm is
16 almost always producing a very Democratic district
17 located in the northern half of Salt Lake County.

18 Q. Based on your expertise and work in this
19 case, did Dr. Chen's algorithm produce a
20 representative sample of congressional districting
21 plans in Utah?

22 A. No. I think there's two -- two ways to
23 answer that. I think the first is just what we're
24 seeing here. I don't think anyone with a -- needs a
25 degree in statistics to say, like, there are

1 obviously other ways to create maps in Utah.

2 Like, this is not the only option.

3 Beyond that, there is a lot of statistical
4 baggage that you might bring to this question, and,
5 you know, the Redist program has all that
6 peer-reviewed literature behind it, and that's not
7 the case in -- with Dr. Chen's algorithm. You asked
8 him yesterday if his algorithm produced a
9 representative sample of maps, and he did not say
10 yes to that question, and that's because I don't --
11 as far as I'm aware, there's -- there are no
12 statistical guarantees that this algorithm produces
13 a representative sample of maps.

14 Q. I'll pause there for now.

15 Didn't Dr. Chen say that your algorithm
16 produces duplicate maps?

17 A. Yes.

18 Q. And how do you respond to that criticism?

19 A. Yeah, it's really an apples-to-oranges
20 issue here. So as I said, none of the 208 maps that
21 we just looked at are identical, but functionally,
22 they're doing exactly the same thing. That's very
23 different than the presence of duplicate maps in an
24 SMC algorithm.

25 So an SMC algorithm is drawing a

1 representative sample, and so the analogy is akin to
2 like a survey researcher. Survey researchers don't
3 call every person in the country when they do a
4 poll. They call a thousand people, and then
5 different people are given more or less weight in
6 that survey as a way to make that survey
7 representative of the broader population.

8 So when you conduct a survey, you'll give
9 a person -- you'll say, you know, based on your
10 demographics and your responses, we're going to
11 weight you, you know, 5, 6, or, I don't know, maybe
12 even 10 times more than the rest of the survey
13 population.

14 That's essentially what an SMC algorithm
15 does. It has what's called a resampling component.
16 And so it says, you know, these maps, these -- this
17 group of maps, they're good, they're really good,
18 they meet these criteria, we like them, we're going
19 to sample them more frequently than the other maps
20 that are not as good based on the criteria. And so
21 you're always going to have duplicate maps in the
22 SMC algorithm. That's -- it's actually essential.
23 You wouldn't want to not have them.

24 Every -- every case I've been involved in,
25 every application of the SMC algorithm, the scholars

1 using them know that there will be duplicate maps
2 present in the set of maps that are produced. So I
3 was -- I was somewhat surprised that Dr. Chen did
4 not seem to know that that was the case.

5 Q. You referenced SMC algorithm. We've heard
6 it discussed yesterday and maybe a little bit today.
7 Could you remind us what that stands for?

8 A. Sorry. That stands for Sequential Monte
9 Carlo.

10 Q. Did you hear Dr. Chen testify yesterday
11 that his algorithm is a Sequential Monte Carlo?

12 A. I don't recall the exact testimony, but I
13 think along those lines, yes.

14 Q. In his most recent report, did he report
15 that any of his 10,000 maps are duplicates?

16 A. Yes. He said that there are no
17 duplicates.

18 MR. GEIGER: All right. I'll pass the
19 witness.

20 MR. GABER: If you'll give me one moment
21 to get set up, please. I'm a little less organized
22 than I was earlier today.

23 THE COURT: All right. Mr. Gaber, cross.

24 ***

25 ***

1 CROSS-EXAMINATION

2 BY MR. GABER:

3 Q. Good afternoon, Dr. Barber. My name is
4 Mark Gaber. I don't think we've had the pleasure of
5 meeting before. It's nice to meet you.

6 A. It's nice to meet you.

7 Q. Okay, I would like to start with your
8 report on page 14. And I'll pull it up on the
9 screen for you. Do you have a copy in front of you
10 as well?

11 A. I do, yes.

12 Q. Okay. And I want to draw your attention
13 to the last paragraph on page 14, where you say:
14 "No single metric is perfect, especially in Utah.
15 Every test carries assumptions that can misfire in a
16 four-seat, lopsided state. Assigned symmetry
17 implementations, in parentheses, partisan bias,
18 mean-median, can generate well-known paradoxes when
19 the statewide vote is not near 50/50."

20 Do you see that?

21 A. I do, yes.

22 Q. Did you -- well, first of all, when were
23 you retained in this case?

24 A. The exact date, I'm not totally certain
25 of. I have only done -- I guess I could say I've

1 only done work in the case since, like, the late
2 summer. I think I may have signed a retention
3 document before that but didn't do anything for
4 quite a while.

5 Q. When did you first start doing work?

6 A. It was sometime in the late summer, in
7 August, because I was -- I know I was out of town in
8 early August.

9 Q. Did you provide any comments or
10 consultation to the legislature about SB 1011?

11 A. No.

12 Q. Not either as a constituent or as a
13 retained expert?

14 A. No.

15 Q. I gather from the sentence that we just
16 read from your report that your view is that we
17 should take a look at all available metrics and have
18 caution in interpreting those that we know could
19 have a paradoxical result in a state like Utah; is
20 that fair?

21 A. I think that -- so in my report, I -- I
22 tried to take an expansive approach.

23 Q. And is -- that's what you think should be
24 done, right?

25 A. Well, in an expert report, yes.

1 Q. And I guess my question is, in evaluating
2 whether there's partisan favoritism or disfavoritism
3 in a plan, you think that we should take an
4 expansive approach and look at all available metrics
5 and data and glean what we can from them in the
6 context of their usefulness for a particular
7 situation. Do you agree with that?

8 A. I -- I think -- yes, I agree, and that's,
9 as I said, what my report tries to do.

10 Q. You would not think it was the best
11 approach to mandate one particular metric in any
12 case, right?

13 A. A single particular metric I would
14 probably say is -- is not ideal. I don't want to --
15 like, I'm not a legislator, and there's a lot that
16 might, you know, go into the bartering that happens
17 in the legislative process, but, again, I think that
18 a variety of metrics can give you more information.

19 Q. And so as you note, there's well-known
20 paradoxes -- I don't know how you say the plural of
21 that word -- paradoxes? -- to the partisan bias and
22 the mean-median test in a state like Utah where the
23 statewide vote is not near 50/50, correct?

24 A. Yes, as the -- yeah, I agree with what I
25 wrote in the report.

1 Q. And so I gather that you would agree that
2 the best approach would not be to sort of blindly
3 follow the answer of a test, knowing that it gives
4 paradoxical results. That's not how you would
5 conduct your political science assessment, correct?

6 A. I'm not -- I guess I don't fully
7 understand what you mean by "blindly follow the
8 test."

9 Q. So I guess you wouldn't -- in your
10 academic work assessing partisan favoritism or
11 disfavoritism, you wouldn't -- knowing that you were
12 getting a paradoxical result from a particular
13 metric, you wouldn't say, "I'm just going to do what
14 it says. I'm going to ignore the fact that I know
15 it's paradoxical."

16 You wouldn't do that, would you?

17 A. I think that you could -- you can look at
18 the results of the test if it does produce something
19 that you may not expect or is perhaps paradoxical.
20 That's not to say it doesn't provide value or
21 valuable information. You could then look at it and
22 say, "Well, why are we getting that result?"

23 Q. And you might give it the weight that it's
24 due, given what you know about how it operates in a
25 particular situation?

1 A. "The weight that it is due" I suppose is
2 a -- you know, that's a subjective question -- or a
3 subjective measure. I would give it --

4 Q. I mean, is it? I mean, all I'm asking is,
5 wouldn't you take your knowledge about the potential
6 paradoxes that are arising from a particular metric,
7 look at the result that it tells you, and then use
8 your knowledge of that to weigh how much weight
9 you're going to put on it?

10 A. Oh.

11 Q. Do you agree with that?

12 A. I agree with that. I'm simply -- I was
13 simply saying that different people might weigh
14 these things differently.

15 Q. Okay. And you would agree that if one
16 were to mandate that a particular metric be used,
17 knowing its paradoxical nature in a particular
18 state, that that could cause an impairment to a
19 prohibition or a rule regarding partisan
20 gerrymandering, if you were to mandate that one
21 result, knowing it to be paradoxical?

22 A. I don't necessarily agree with that. I
23 think that even if the particular test that you're
24 describing were to be mandated, you could still --
25 you would know -- you know that it has particular

1 traits or behaviors. You could then run the test,
2 see the results, and then explain why you get the
3 results that you do.

4 You know, these tests, some of them are
5 complicated; some of them are not terribly
6 complicated. And so it's not incredibly difficult
7 to know, okay, here's the outcome of the test.
8 Why does it look this way? Well, it looks this way
9 because of this, that, and the other.

10 Q. Right. And so it would be fine to run it,
11 explain it, and give it whatever, you know,
12 attention it's due, given its features. But
13 following its result and not considering the weight
14 it's due, you wouldn't -- you wouldn't do that?

15 A. Follow -- so you're asking me, following
16 its result without giving it the weight that it is
17 due. I suppose I would simply say you would look at
18 the -- you would look at the outcome of the test,
19 you would then explain why the outcome appeared the
20 way that it did, and --

21 Q. You would --

22 A. -- reasonable people would then decide
23 what to do with that.

24 Q. Right. You might not conclude that the
25 answer you get is something that should be accorded

1 great weight, knowing that it's paradoxical.

2 MR. GEIGER: Objection, Your Honor. Asked
3 and answered at this point.

4 THE COURT: Overruled for this last
5 question and this last answer.

6 THE WITNESS: Sorry, could you repeat your
7 question?

8 Q. (By Mr. Gaber) I'm not sure. I'll --
9 I'll move on. I think I got the answer that I was
10 looking for.

11 And have you ever -- in one of your
12 ensemble analyses, have you ever culled the set of
13 maps for a particular partisan metric before?

14 A. For a particular partisan metric? No, I
15 don't recall doing that.

16 Q. This is -- this is the first time you've
17 ever done that before?

18 A. So you're -- I think you're asking about
19 culling based on the results of the partisan bias
20 test.

21 Q. That's right.

22 A. So insofar as that uses partisan data to
23 calculate the results of the test, no. The other
24 example I gave was culling based on, you know,
25 statute regarding county splits.

1 Q. County splits.

2 In your report -- I think page 18,
3 perhaps -- you talk about how the -- the -- metrics
4 like the efficiency gap and others also contain a
5 counterfactual because they rely on past election
6 results to make future predictions; is that right?

7 A. Yes, that's correct.

8 Q. That's quite different, wouldn't you
9 agree, from the counterfactual of assuming a
10 hypothetical 50/50 election. We're using actual
11 election results, right?

12 A. I see the point you're making. I don't
13 know that the difference is that enormous. In --

14 Q. Looking at actual election results is not
15 counter --

16 MR. GEIGER: Objection. He's interrupting
17 the witness.

18 MR. GABER: This is cross-examination.
19 I -- I don't know that objection.

20 THE COURT: Well, I would just ask, let
21 the witness finish before you begin your next
22 question.

23 MR. GABER: Yes, Your Honor.

24 THE WITNESS: All I was going to say is --
25 so, you know, imagine that you -- to very -- to

1 simplify this dramatically, imagine that you looked
2 at the presidential election results and used those
3 to forecast the congressional election results
4 in 2026. There could be really big differences
5 there. And, in fact, we know that's the case. I
6 don't see that as being orders of magnitude
7 different from saying, "What if the election were
8 50/50?"

9 Q. (By Mr. Gaber) Are you aware of an
10 election -- a statewide election in Utah that was in
11 the range of 50/50? Can you identify the last time
12 there was an election in Utah at the statewide level
13 that was close to 50/50?

14 A. I think that Mike Lee's most recent
15 election against Evan McMullin, I think he won
16 with -- I believe it was like 53 percent of the
17 vote.

18 Q. To 43 percent?

19 A. To -- I think it was right -- somewhere in
20 the 40s.

21 Q. Okay. Any -- anywhere the Democratic
22 candidate got over 45 percent of the vote?

23 A. In a statewide race? I'm not -- I'm not
24 aware of that.

25 Q. Okay. Now, I want to go to your

1 supplemental report and -- page 7, and ask you --
2 and this is the figure where you compare Dr. Chen's
3 and your simulations.

4 Do you see that?

5 A. I do, yes.

6 Q. And I want to draw your attention to the
7 Dr. Chen one at the top. You talk a bit in your
8 report about packing and cracking and I think
9 suggest that Dr. Chen's simulated maps pack
10 Republican voters; does that sound right?

11 A. I guess I would say there's a big gap, and
12 so what that suggests to me is that you're kind of
13 bifurcating that least Republican district from the
14 remaining three.

15 Q. And I guess what I want to draw your
16 attention to is in the upper right, for the most
17 Republican district in each plan, you see that the
18 enacted plan is in the red?

19 A. Oh, in the -- I'm sorry. Yes --

20 Q. CD4 --

21 A. -- I see it's labeled red.

22 Q. CD4, and then CD3 is Plaintiffs' Plan 1.
23 Do you see that? That's the most Republican
24 district in Plaintiffs' Plan 1, the purple --

25 A. Yes.

1 Q. -- triangle?

2 A. Yes, I see that.

3 Q. Do you think that CD4 in the enacted plan
4 is packed for Republican voters?

5 A. It falls -- you know, I -- I'm sorry, I'm
6 trying to look and talk into the microphone.

7 Oh, I'm sorry. I thought that the numbers
8 on the right were reporting percentiles.

9 I guess I can see that it falls to the
10 kind of upper edge of the -- that cloud of simulated
11 dots. Aside from that, I'd just want to -- probably
12 want to know the percentiles, and then we could, you
13 know, make -- we could basically just use the
14 percentiles as our measure.

15 Q. Do you think -- so CD4 -- do you know
16 where CD4 is in the enacted map?

17 A. You know, I -- I don't, actually.

18 Q. So there's --

19 A. I would need to know -- I would need to
20 see it to know the numbers.

21 Q. I'm showing you on the screen on this
22 Dave's link now. It's the -- the light blue
23 district.

24 Do you see that?

25 A. Oh, I'm sorry, I think the screen froze

1 again.

2 Q. Do you see the light blue district in the
3 southwestern kind of quadrant of Utah?

4 A. I do, yes.

5 Q. Do you recognize that this is an area that
6 has a substantial number of Republican voters?

7 A. I live in this district, and --

8 Q. Okay.

9 A. -- I do recognize that.

10 Q. Do you think it's packed with Republicans?

11 A. I think it's -- it's a very -- it's
12 just -- it's going to be a very Republican district.

13 Q. So this concept of packing, you know, it's
14 used a lot, but it really has meaning when it's
15 denying -- when the voters in that district are
16 being denied sort of a district that one might think
17 that they ought to have the opportunity to elect in,
18 right?

19 Like, just because a district has a large
20 number of one group doesn't mean it's necessarily
21 packed?

22 MR. GEIGER: Objection. Counsel's
23 testifying.

24 MR. GABER: That was a question. Or it
25 was endeavored to be.

1 THE COURT: Overruled.

2 THE WITNESS: I don't -- I don't believe
3 that I agree with that. I think that packing can
4 simply refer to a descriptive -- it could just be a
5 descriptive term.

6 Q. (By Mr. Gaber) Okay. So that's how you
7 use it, to just describe a large number of one
8 group, whether it -- you know, in this case, a
9 political group in a district, that's packing?

10 A. It's one way that that word could be used.
11 The -- yeah, I would -- I would say it's one of the
12 ways that -- those words, "packing" and "cracking,"
13 are used a lot, and they're used in a variety of
14 contexts, and they're not the most technically
15 rigorous terms, and so you might find different
16 people with different interpretations.

17 Q. Now I want to go back to your -- let's see
18 if this will do this. Yes -- back to your
19 supplemental report, I believe, and take you to
20 page 16.

21 Now, do you see in the -- this is one of
22 your criticisms of Dr. Chen, and the second -- or
23 this -- yes, the second paragraph, you note that:
24 "There are vanishingly few occasions of a Salt Lake
25 County-based district extending into Tooele," and

1 you have the number "1" after that.

2 Do you see that?

3 A. I do, yes.

4 Q. How did you calculate that?

5 A. So I looked first for the districts that
6 met the criteria that we're talking about here,
7 which is that they are almost entirely within Salt
8 Lake County. And so I set the threshold at 95
9 percent of the population was contained within Salt
10 Lake County.

11 And then beyond that, I'm looking here at
12 how -- the number of times in which that district
13 contains population from Salt Lake County and
14 Tooele, and then I'm looking at the number of times
15 that that district contains population from Salt
16 Lake County and Utah County.

17 So basically, you have a district in Salt
18 Lake County, ninety -- at least 95 percent of its
19 population is in Salt Lake County, and then where is
20 it getting that additional 5 percent -- you know, 5
21 percent or so of its population from. And it does
22 it about 7,000 times with Davis County, it does it
23 once with Tooele, and it doesn't do it ever with
24 Utah County, and it does it once with Summit County.

25 MR. GABER: Your Honor, may I approach

1 with an exhibit?

2 THE COURT: Yes.

3 MR. GABER: This will be Plaintiffs'
4 Exhibit 20.

5 THE COURT: Thank you.

6 THE WITNESS: Thank you.

7 Q. (By Mr. Gaber) And, Dr. Barber, I have
8 this on the screen as well, and you'll see "Chen
9 simulated map number 458" on the screen.

10 A. Yes, I see it.

11 Q. Now, from what I understand, you -- your
12 description just now, you -- you were only reporting
13 is when 95 percent of the district was in Salt Lake
14 County, and your point was that you found one map
15 where 95 percent of the district is in Salt Lake
16 County, and then it goes into Tooele County. Is
17 that my understanding of your testimony?

18 A. It's not -- it's not just 95 percent. It
19 was at least 95 percent.

20 So the reason for this whole exploration
21 was that I was noticing, as I looked at the maps,
22 that -- I was -- initially I was surprised at how
23 infrequently his algorithm creates a district wholly
24 within Salt Lake County. I expected that to occur
25 more often, and it only occurs about 9 percent of

1 the time. But then I also simultaneously knew that
2 there was this district that was occurring like 95
3 percent of the time at the northern end of Salt Lake
4 County.

5 So I knew, putting those two pieces of
6 information together, that, well, it must then be
7 the case that it's grabbing a small portion of its
8 population from outside of Salt Lake County.

9 Q. You didn't explain that in your report,
10 right? You just said that there's one map where
11 Salt Lake County and Tooele County are combined?

12 A. Well, I think in the report I say that I'm
13 looking at a Salt Lake County -- well, actually, I
14 think maybe the footnote right here. "I looked at
15 the number of maps that include both Salt Lake and
16 Davis County but had 95 percent or more of their
17 population in Salt Lake County. There are 7,140
18 occurrences of this district configuration."

19 Q. So that's with respect to the piece that's
20 in Davis County to equalize population, but that's
21 different than your comment in the main text about
22 Tooele County.

23 A. Well, I don't -- I mean, I disagree with
24 you. It follows immediately from that footnote.

25 Q. Well, take a look at the map on the

1 screen. Does this -- is this an example of a map
2 that contains the western half of Salt Lake County
3 and goes into Tooele County in District 2?

4 A. It is. Knowing what we know about the
5 population of Tooele County, this would not -- this
6 is a different scenario. This map does not have 95
7 percent or more of its population in Salt Lake
8 County.

9 Q. Does -- this map doesn't create a northern
10 Salt Lake County district, right? It goes east to
11 west?

12 A. That's correct. Yes, it does that.

13 Q. So number 593 on the next page, this is
14 another example of a district here, District 4, that
15 goes from Salt Lake County into Tooele County?

16 A. Again, that --

17 Q. That was a yes or no.

18 A. Well, it includes the entirety of Tooele
19 County. It does not include 95 percent of its
20 population in Salt Lake County.

21 Q. And 635, on the next page, that's also a
22 District 1 that has Salt Lake County and Tooele
23 County?

24 A. They are -- they are joined in that
25 district. Again, not -- we're just looking at a

1 different thing than what I was talking about,
2 but --

3 Q. Okay. So what --

4 A. -- that's fine. We can -- we can look at
5 these.

6 Q. So -- but you would agree with me that
7 there's not one map in Dr. Chen's set that only --
8 that not only one map that combines Tooele County
9 with the Salt Lake County-based district, correct?

10 A. Well, I would -- again, I was defining
11 "Salt Lake County-based" using a very restrictive
12 threshold, which was I wanted to look at the cases
13 in which the district was entirely contained or
14 nearly entirely contained within Salt Lake County,
15 because the whole purpose of that investigation was:
16 Where are all of these very Democratic districts
17 coming from? Well, we know from the political
18 geography of the state that they're going to come
19 from Salt Lake County.

20 Q. I want to draw your attention to your
21 rebuttal -- so you issued a rebuttal report -- well,
22 you issued a report on Friday the 17th, then you
23 issued a supplemental or a response report after
24 that, right?

25 A. Yes.

1 Q. And then you issued another rebuttal
2 report on the 22nd; is that right?

3 A. That's correct.

4 Q. Okay. So I want to draw your attention to
5 the rebuttal report and to page 4. And the second
6 paragraph -- and you talked on direct about this --
7 you say, quote: "Duplication in this context is
8 therefore a feature, not a flaw. It means the
9 algorithm has identified some maps as especially
10 representative of how districts are likely to form
11 under the neutral criteria, and it gives those maps
12 more weight to reflect that importance."

13 Did I read that correctly?

14 A. Yes.

15 Q. Now, at the end of your direct
16 examination, you were asked whether Dr. Chen's maps
17 had -- simulations had duplicates, and they don't,
18 correct?

19 A. Correct.

20 Q. And it was sort of tied to the Sequential
21 Monte Carlo definition. Have you read the
22 definition of Sequential Monte Carlo in SB 1011?

23 A. Yes.

24 Q. Did you see in there anywhere a
25 requirement that it produce duplicate maps?

1 A. No, I don't believe that it gets that
2 specific.

3 MR. GABER: If I could mark Plaintiffs'
4 Exhibit 21.

5 And may I approach, Your Honor?

6 THE COURT: Yes.

7 MR. GABER: And I have this on the screen
8 as well.

9 Q. (By Mr. Gaber) Do you see this as
10 Dr. Barber's simulated map 174 of 50,000 on the
11 first page?

12 A. Yes.

13 Q. And this is a 50-page exhibit, and I'm
14 just going to scroll through a little bit, if you
15 could watch on the screen and tell me what you
16 observe.

17 Does it appear to you that the same map is
18 appearing over and over in this PDF?

19 A. It does, yes.

20 Q. So you would agree that this is one of
21 your examples of duplicate maps in your set of
22 simulations, correct?

23 A. Yes.

24 Q. Now, if we could just take a look at this,
25 do you think, looking at this map, that this is an

1 example of one of the maps that the -- that Redist
2 identified is really narrowing in on Prop 4's
3 criteria, a good map that should be repeated and
4 sampled over and over and over 50 times?

5 A. I would probably want to know more about
6 the various criteria or the various metrics.

7 Q. Well, let's start with compactness for
8 District 3.

9 A. Sure.

10 Q. Does that look -- does District 3 in this
11 map look to you to be like it's complying with
12 Prop 4's compactness requirement?

13 A. My estimation would be that it is the
14 least compact district of the four. I suppose, at
15 the top of the page, we could look at the specific
16 scores.

17 So it would have a Polsby-Popper score of
18 .255 and a Reock score of .534.

19 Q. And that Reock score of .534, we talked
20 about this -- it might have been in your report or
21 Dr. Trende's report, that the Reock score can be
22 sort of misleading when you have a situation
23 probably just about what we're looking at here --
24 right? -- where there's a big district following a
25 square here, and then there's a protrusion into the

1 middle of it, the Reock score is still going to be
2 high, right?

3 A. The Reock score is measuring the area
4 compactness, and so the -- it is capturing one
5 aspect of compactness. The Polsby-Popper score,
6 which here is much lower, is capturing the perimeter
7 aspect of compactness. And so I don't know that I
8 would say one is misleading. I would say that the
9 two tests are complementary in helping to evaluate
10 different aspects of compactness.

11 Q. But in your -- in your view, would you say
12 that the configuration of District 3 in this map,
13 going from Tooele County, stretching through, I
14 guess, maybe Magna and then Salt Lake City, before
15 jumping over to Morgan County, Summit County, and
16 then sweeping across the east and then to the --
17 back to the southwest, does that look to you like a
18 district that is in -- was one that would be
19 designed under Proposition 4's criteria?

20 A. I -- it's certainly not a district that I
21 would personally choose to draw.

22 Q. And I want to zoom in to its configuration
23 in Salt Lake County. We were talking about Draper
24 and Bluffdale and Herriman and Riverton earlier. Do
25 you see that -- in your simulated map here, that, it

1 looks to me, like Bluffdale and Draper are in
2 District 4, and Herriman and perhaps Riverton would
3 be in District 2?

4 A. I -- I could certainly take your word for
5 it. I don't know if you, you know, specifically
6 looked. I can see that there's a division there.
7 Without knowing the particular boundaries well
8 enough without them being overlaid, I -- I would
9 want a little wiggle room and say it looks like that
10 could be the case, but I'd probably want to look
11 more carefully.

12 Q. How many times is Salt Lake County split
13 in this map?

14 A. It is split three times.

15 Q. Into four districts?

16 A. Correct.

17 MR. GABER: If I could mark Plaintiffs'
18 Exhibit 22 and approach.

19 THE COURT: Yes. Thank you.

20 Q. (By Mr. Gaber) Do you see "This is
21 Dr. Barber's simulated map 4,244" on the first page?

22 A. Yes, I do.

23 Q. And this is a 15-page exhibit, and, again,
24 if you could watch as I scroll through on the
25 computer screen and tell me if it looks to you like

1 you're seeing the duplicated map appear in all of
2 these pages.

3 A. I do, yes.

4 Q. Looking at this map, would you assess that
5 this is one where the simulation identified a
6 configuration that was really hitting the
7 Proposition 4 criteria and ought to be elevated as
8 one that we would put in the set 15 times?

9 A. Again, it would really depend on the
10 various criteria. There are -- you know, there are
11 some portions of this map that are, you know, pretty
12 desirable. You have the -- District 3 that's
13 keeping a lot of these counties whole. District 1,
14 the same idea. District 4 is obviously Utah
15 County-based.

16 And so, you know, as the algorithm is
17 exploring various configurations and as it's looking
18 at various ways of orienting things, it might have
19 looked at this and said, hey, you know, three of
20 those four districts are pretty good in, you know,
21 most ways, and so we're going to slightly elevate
22 that map, you know, we're going to -- 15 out of
23 50,000 times, it's going to show up.

24 Q. Can you drive from Tooele to Box Elder
25 County?

1 A. If you're -- if you're using like a, you
2 know, Bonneville Speedway car, maybe.

3 Q. So that --

4 THE COURT: Is that a yes?

5 THE WITNESS: I mean, technically maybe
6 they race across the border, but --

7 Q. (By Mr. Gaber) Members of congress, do
8 you often see them driving from Tooele to Box Elder
9 County?

10 A. No.

11 Q. Okay. So that's -- that's a problem here,
12 right?

13 A. It -- it would be an issue that you would
14 probably want to address if you were to take this
15 map and alter it, if you wanted it to become a map
16 that you were going to put forward as a suggested
17 map. I'm -- I wouldn't put any of these 50,000 maps
18 forward. These are not designed to be, like,
19 submissions.

20 Q. So -- and let's just focus on Salt Lake
21 County for a second here. Do you think that this
22 map's configuration of districts in Salt Lake County
23 is compliant with Proposition 4?

24 A. It's obviously splitting the county three
25 ways, and so you might take -- you might interpret

1 that to say that's too often. It only splits Salt
2 Lake County, so you might say, well, that's actually
3 good and compliant. That's going to be, obviously,
4 an interpretation of Prop 4.

5 Beyond that, then I would want to know
6 more about the particular way in which it's grouping
7 municipalities within the county as well so that we
8 could get a measure of municipality treatment. But
9 I would say on the whole, it's -- you know, it's,
10 again, unusual in its shape and the fact that it
11 splits Salt Lake County three ways --

12 Q. The --

13 A. -- is going to raise some eyebrows among
14 people.

15 Q. The H -- does that look like an H to you?
16 I guess it's different than an H. An A? A capital
17 A, maybe?

18 A. I'm sorry, I don't -- I don't know -- I
19 don't follow.

20 Q. The second district -- I mean, I don't
21 know, what would you -- how would you describe the
22 second district?

23 A. Wholly contained within Salt Lake County
24 with other municipalities. I guess I would -- I
25 don't know. It's there.

1 Q. Okay. That's -- your description for that
2 is "wholly contained in Salt Lake County."

3 A. I'm not -- I mean, it is, and then there's
4 other municipalities that are now a part of it, and
5 I agree with you that it has a somewhat irregular
6 shape. I'm not sure what you're looking for beyond
7 that.

8 Q. Okay.

9 MR. GRABER: I want to mark, if I could,
10 Plaintiffs' Exhibit 23.

11 And may I approach, Your Honor?

12 THE COURT: Yes.

13 Q. (By Mr. Graber) And do you see I'm -- and
14 I have this on the screen as well. The first page
15 of this is "Dr. Barber's simulated map 25,770."

16 Do you see that?

17 A. Yes, I do.

18 Q. Dr. Barber, what, if anything, do you
19 observe about the treatment of Davis County in this
20 map?

21 A. So I see that Davis County is linked with
22 Tooele County.

23 Q. There's a problem with that, right?

24 A. It is connected via what we would say is
25 water contiguity.

1 Q. Okay. Did -- you didn't program your --
2 your algorithm to account for any of the -- for the
3 Great Salt Lake or for Utah Lake, correct?

4 A. Only insofar as those are contained within
5 county boundaries, but there's no -- there's no
6 additional criteria that treats those precincts or
7 those areas differently.

8 Q. Same for the Colorado River?

9 A. Yes, that's -- well, again, the Colorado
10 River is the county border for many of these
11 counties. So insofar as the Colorado River is a
12 county border, it's being accounted for, but there's
13 not a -- there's not an additional Colorado River
14 criteria.

15 Q. Looking on the screen at the map I have up
16 now, map 14,800, is this a map that you would say
17 complies with Proposition 4's criteria?

18 A. Again, I think I would want to have some
19 more time to look at it and understand what it
20 exactly is doing.

21 Q. What's your first impression?

22 A. I -- I don't know that I have an opinion
23 without more information.

24 Q. Do you think that District 3 is a
25 reasonably compact district?

1 A. It has a Reock score of .391. It has a
2 Polsby-Popper score of .208. So on one metric,
3 it's -- well, act- -- I guess it's -- it's not the
4 least compact district on either metric.

5 Q. And you'd have to swim across the -- or
6 take a boat, I suppose, from Tooele to Davis County
7 here?

8 A. You would obviously drive. I don't -- I
9 mean, I understand the point that you're making.
10 You would not swim across the Salt Lake.

11 Q. Yeah, bad idea.

12 And so you see in all of these that Tooele
13 County and Davis County are only connected in
14 district via the Great Salt Lake, correct?

15 A. I do see that.

16 Q. Now I want to go to page 23 of your
17 report. And do you see here that you say: "The
18 redistricting simulations are programmed to
19 incorporate Proposition 4's ranked criteria" -- this
20 is in the first -- bottom of the first paragraph;
21 I've highlighted it on the screen -- and those are,
22 quote, "strict population equality, geographic
23 contiguity, minimizing county and municipal splits,
24 geographic compactness, and no use of partisanship
25 at any stage."

1 Did I read that right?

2 A. Yes.

3 Q. You didn't actually program your code to
4 achieve strict population equality, correct?

5 A. I suppose that our -- we're just
6 interpreting that word differently. So when I
7 programmed it to have a .1 percent deviation, I --
8 to me, that means, in the context of these
9 redistricting algorithms, a strict population
10 equality, because there's -- other people have used
11 this algorithm and used larger population deviation,
12 so I suppose this is simply a, maybe,
13 misunderstanding between your read and my read of
14 that -- of that sentence, and I probably should have
15 been more clear and put a footnote that said I
16 allowed a 1 percent of 1 -- one-tenth of 1 percent
17 deviation.

18 Q. In fact, you didn't actually report the
19 population's figures for any of your simulated maps
20 in your report, correct?

21 A. So the particular parameter is in the
22 backup data, so it's certainly -- I reported it in
23 that -- like, I provided it to the plaintiffs. I
24 did not report, like, the population statistics of
25 the districts, because that -- really, as I said on

1 my direct testimony, it's not a meaningful --
2 there's just not a meaningful difference there. And
3 so having a -- you know, the partisanship of these
4 districts, which is what these ensembles are being
5 used to do, isn't going to change with a shift of
6 fewer than 800 people.

7 Q. Now, I want to talk a little bit about
8 that. To bring the population to zero, which is
9 what the congressional map is required to have, you
10 would have to introduce new municipal splits -- do
11 you agree with that? -- into the maps that you have.

12 A. No, not always.

13 Q. That would likely happen. You would agree
14 with that?

15 A. No, not always.

16 Q. Okay. Why not?

17 A. I -- you would have to do it on a
18 map-by-map basis. We know that the maps -- the
19 simulations are already having to split some number
20 of municipalities because they have -- they have to
21 meet the population criteria that I've given it,
22 which is .1 percent.

23 And so if you needed to then go through
24 and equalize the population, you could simply do it
25 within the existing split municipalities. There's

1 not a reason that you necessarily would have to
2 split a new municipality.

3 I suppose, moreover, you could equalize
4 within unincorporated areas as well, but -- but you
5 would need to do that on a map-by-map basis.

6 Q. And your reference to only 800 people,
7 if -- if you tried to move 800 people, it's possible
8 that you might introduce -- you might introduce a
9 new municipal split, correct?

10 A. I mean, I obviously can't rule that out as
11 a possibility. If you had a map that contained zero
12 municipal splits, I suppose even then, if it
13 happened to be the way the districts are oriented,
14 that that could be taken care of in unincorporated
15 portions of the district.

16 So I suppose I would say just without
17 seeing a particular map, you wouldn't know the
18 answer to that question. It would -- it would be
19 very context-specific.

20 Q. It's possible you may have to move
21 municipalities around. Say you need to get 800
22 people, and doing that, if you -- to make a
23 municipality whole, you get over the number, right?
24 It could cause you to go over deviation, and then
25 you might have to shift to another municipality and

1 take that one out. It's not just simply a matter of
2 moving 800 people, correct?

3 A. No, I don't -- I don't think I agree with
4 that. I think you said moving entire
5 municipalities. I don't -- I don't see why you
6 would do that. If the district was off by 50
7 people, you would simply go find a 50-person census
8 block and you would swap it.

9 Q. And it's your testimony that that would
10 happen for all four districts without introducing
11 any new municipality splits? That's what you think?

12 A. No, I don't think I said that. I said we
13 don't know the degree to which that would be
14 necessary without looking at the particular map in
15 question.

16 Q. Now I want to talk about the municipal
17 divisions and go to page 25 of your report. And you
18 talked about this on direct examination. The -- you
19 report that your ensemble set has a median municipal
20 splits of two.

21 Do you see that?

22 A. I do, yes.

23 Q. And you repeated that on direct
24 examination?

25 A. Yes.

1 Q. That's not correct, right?

2 A. So Dr. Chen says that with a different
3 municipality file, that those numbers change. And I
4 think we showed that histogram. And so the results
5 of the summary statistics, you could then go to that
6 histogram and calculate what those changes would be.
7 And I think I said that it was about a one-unit
8 shift, although I guess we could go back and look if
9 we wanted to be absolutely certain.

10 Q. And the file that you used was a file in
11 the Redist program that just assigns whichever
12 municipality has the greatest number of -- or
13 greatest proportion of a given precinct to it,
14 correct?

15 A. So it's -- not to be overly technical,
16 it's not a part of the Redist program. It's a
17 separate file. It's a file of precincts.
18 And so there are occasions, as I said, where a
19 precinct might span a municipality, and so the
20 algorithm just needs to know, like, what do I do
21 with this? Which municipality do I put it in?

22 Q. Were you aware that the parties had
23 entered into a stipulation in this case as to
24 specifically what data files should be used to
25 calculate municipal divisions?

1 A. No.

2 Q. Okay. And you didn't use that?

3 A. No.

4 Q. Going back to the -- I called it an H, but
5 you called it wholly contained in Salt Lake
6 County -- would -- you, on direct examination,
7 characterize Plaintiffs' Map 2 as having -- I wrote
8 down a quote, "oddly shaped treatment of
9 municipalities in Salt Lake County."

10 Do you -- would you characterize
11 District 2 in this map, which is Exhibit 21, with
12 those words as well?

13 A. Yeah, probably.

14 Q. Okay. Perhaps more oddly shaped than
15 Plaintiffs' Map 2?

16 A. I don't know that I would say that. I
17 think I'd want to, again, look specifically at
18 what's going on before I made any sort of definitive
19 call on that.

20 Q. Just looking at it, just looking at the
21 shape of District 2, is it your testimony that you
22 can't say whether or not that's more or less oddly
23 shaped than Plaintiffs' Map 2?

24 A. It's -- again, it's -- it's oddly shaped.
25 I don't know what more to say. It -- yeah, it has

1 the similar oddities.

2 THE COURT: And, Counsel, I believe this
3 is Plaintiffs' 22.

4 MR. GABER: Twenty-two. Thank you, Your
5 Honor. Unfortunately, I have nothing written down
6 with numbers.

7 Q. (By Mr. Gaber) Okay. With respect to
8 county divisions, now, you programmed your algorithm
9 to recognize and therefore seek not to divide the
10 boundaries of all but one of Utah's counties,
11 correct?

12 A. I gave the algorithm instructions about
13 the 28 counties that were not -- that were not Salt
14 Lake County, given the differences in how Salt Lake
15 has to be treated versus the other -- those other
16 counties.

17 Q. And what I wrote down is what you said on
18 direct examination, was that: "Because we are going
19 to be splitting Salt Lake County, please pay extra
20 attention to Salt Lake County municipalities."

21 Do you recall saying that?

22 A. Yes.

23 Q. Now, you're not actually paying extra
24 attention to Salt Lake County municipalities.
25 They're treated the same as any other municipality

1 in the state, right? It seeks not to divide them.

2 A. It seeks not to divide them, but it -- it
3 thinks -- it doesn't think, but it -- if it could
4 think, it thinks about them in a different way than
5 it does the municipalities that are in the other
6 parts of the state --

7 Q. And --

8 A. -- because it knows -- it recognizes that
9 these are municipalities in Salt Lake County versus
10 not in Salt Lake County.

11 Q. And, actually, what happens is you
12 redefine the municipalities as the county, correct?
13 A pseudo-county.

14 A. It -- right. So I give it a list, and the
15 list contains the 28 counties, and then the list of
16 municipalities contained within Salt Lake County.

17 Q. Does your algorithm preference seeking not
18 to divide municipalities first and then counties
19 second?

20 A. I think that it's treating them -- it's
21 giving different weight -- I guess I would have to
22 say I'm not exactly -- I can't say with each draw of
23 the algorithm that it is prioritizing one over the
24 other. It's simultaneously working to minimize both
25 of them.

1 Q. Okay. Now, you didn't disclose in your
2 initial report that you had excluded Salt Lake
3 County from the definition of county in your
4 algorithm, correct?

5 A. Again, you know, I gave it -- I gave all
6 that information with the backup data.

7 Q. But reading your expert report, one would
8 not know that you had excluded Salt Lake County from
9 the definition of "county" in your algorithm, right?

10 A. You wouldn't know the technical details of
11 the -- like that particular implementation from just
12 the text of the report.

13 Q. And then in your supplemental report, on
14 page 19 to 20, you offer an explanation of this,
15 right? And at the top of page 20, you say, quote:
16 "My simulations were explicitly designed with this
17 principle in mind. They prioritize the preservation
18 of municipal boundaries within Salt Lake County,"
19 and then they don't -- and I'm -- that's the end of
20 the quoting, but the idea here is that they don't
21 prioritize not splitting Salt Lake County, correct?

22 And we can -- if you'd maybe read the
23 paragraph above that to get the context, on page 19.

24 A. Okay. I -- yeah, I see where you -- I see
25 what you're -- I see the part of the paragraph

1 you're talking about.

2 Q. So this was an intentional design not to
3 respect the boundaries of Salt Lake County, correct?

4 A. It -- it was an intentional design because
5 of the way in which Salt Lake County is different
6 than the other counties. It -- because it has to be
7 split, then it is treated differently.

8 Q. And did you see anything in the text of
9 Proposition 4 that said "except Salt Lake County"
10 for the respecting -- dividing -- or attempting not
11 to divide counties?

12 A. No.

13 Q. You talked on direct examination about
14 the -- the incorrect calculation of the
15 Polsby-Popper compactness score in your report,
16 correct?

17 A. We discussed it, yes.

18 Q. And you agree that the Polsby-Popper
19 numbers that you report are not correct, right?

20 A. I agree that they are off by fractions of
21 percentages.

22 Q. And I just wanted to make sure that the
23 record's clear. What you didn't mean to say is that
24 your Polsby-Popper scores are on par with
25 Dr. Chen's, correct?

1 A. I -- I don't believe that I've said that.

2 Q. And they're not, right?

3 A. I don't believe that's the case.

4 Q. You believe they are similar?

5 A. No.

6 Q. You think they're not similar?

7 A. Correct.

8 Q. And Dr. Chen's -- and, indeed, Dr. Chen's
9 middle 95 percent range is entirely above your
10 middle 95 percent range for your simulations on the
11 Polsby-Popper score for compactness, correct?

12 A. I -- I will take your word for that.

13 Q. It's -- just going back quickly to the
14 population deviation, it's actually not possible to
15 code the Redist algorithm to achieve a zero
16 population deviation -- correct? -- unless the
17 precincts all happen to work out to be zero?

18 A. I don't think the algorithm -- I think you
19 would -- it would return an error, is my estimation
20 of what would happen.

21 Q. Now, when you applied the partisan bias
22 culling to your set of simulations, they went from
23 being -- about half having a democratic-favoring
24 district and half having a -- not having that to, I
25 guess it would be, what, six point -- roughly 6.5

1 percent of your maps that still contained one
2 democratic district?

3 A. I'm -- I'm not sure of the number. You're
4 probably getting that from my report, but --

5 Q. I am.

6 A. -- I'll take your word for it.

7 Q. Well, I want to make sure we get it right.
8 So let's --

9 A. I don't -- I don't mean to belabor this.
10 I can totally trust that you've represented that
11 number correctly.

12 Q. And so you would agree that the partisan
13 bias culling all but eliminated any of the maps that
14 contained a district in which the Democrats would be
15 favored to win; is that right?

16 A. I think, as you said, it leaves about 6
17 percent, 7 percent of the -- of the maps.

18 Q. And you agree, don't you, that Salt Lake
19 County is the one county in Utah that has a sizable
20 population of Democratic voters, correct?

21 A. Yes.

22 Q. And that's the one county that could be
23 split up to -- into -- up to four districts in your
24 simulated set, correct?

25 A. It -- it could be.

1 Q. And you agree that it's about -- over 60
2 percent of your maps have four districts in Salt
3 Lake County, correct?

4 A. That is correct.

5 Q. And even in that set, you started off with
6 half that had one -- at least -- that had one
7 district that was favoring the Democrats, right?

8 A. Oh, sorry, I don't know that I'm following
9 you. So can you --

10 Q. Even with splitting Salt Lake County into
11 four districts and over 60 percent of the maps, you
12 still started off with half of them creating a
13 Democratic district.

14 A. Oh, I see what you're saying. Yes. And
15 that's -- you know, there's about half of the -- I
16 think, as I said on direct, about half of the
17 simulations create a district entirely within Salt
18 Lake County.

19 Q. And then culling happened, those went down
20 to 6 percent.

21 A. The districts that are Democratic-leaning?

22 Q. Right.

23 A. Correct.

24 Q. I want to go to page 6 of your -- and I'm
25 sorry that this isn't in any sort of sensible order

1 of topics, but I have a -- just a list of random
2 things I want to talk about. So I want to go to
3 page 6 of your report. And it's been a long day.

4 Now, this is where -- Table 1 on page 6 of
5 your original report. And do you see the line for
6 partisan bias, and you report: For the 2025 plan,
7 pass; for the Plaintiffs' Map 1, fail; and for
8 Plaintiffs' Map 2, mixed.

9 Do you see that?

10 A. Yes.

11 Q. Do you read SB 1011 as allowing for a
12 mixed answer to the partisan bias test?

13 A. I -- I don't think I have an opinion on
14 that.

15 Q. Have you read SB 1011?

16 A. Yes.

17 Q. And how does -- what are the possible
18 answers for the application of the partisan bias
19 test?

20 A. Well, I -- it's a pass/fail. Beyond that,
21 I -- you know, I'm -- here, I'm reporting what I
22 think is the more kind of fulsome explanation. I
23 suppose you could take like a really restrictive
24 approach and say like, "Well, it failed one, so it's
25 failed."

1 And so here, I thought I was presenting a
2 kind of more -- kind of a better picture of what's
3 going on with Map 2, which is that it passes in some
4 cases and it doesn't pass in other cases. And then
5 later, I think we see that it passes on the -- on
6 average.

7 Q. So I want to take that in two pieces. So
8 you think that having this sort of on/off, pass/fail
9 is not the best way to assess the partisan bias
10 metric, correct?

11 A. No, that wasn't what I was saying.

12 Q. Oh, okay. What were you saying?

13 A. I was just saying it passes or fails, and
14 then I was reporting all of the elections that were
15 tested and the results of those -- of those tests.

16 Q. So the correct answer, at least using SB
17 1011's method, is you should have written "pass"
18 here, correct?

19 A. The -- well, it passes the average, and
20 you can see that in the table --

21 Q. How did you calculate --

22 A. -- what -- I'm sorry.

23 Q. I'm sorry. I didn't meant to interrupt.

24 How did you calculate that Plaintiffs'
25 Map 1 failed or that the 2025 map passed? Did you

1 follow SB 1011's statute for how one does that?

2 A. Yes.

3 Q. Okay. And then you just didn't do that
4 for Plaintiffs' Map 2? You chose to do just a
5 different method that went election by election?

6 A. No, not at all. I went election by
7 election for every one of the maps with the
8 intention of -- because if you only report the
9 average, then you get up on the stand and somebody
10 says, "What about this election? What about this
11 election? What about this election?"

12 And so out of an abundance of caution, I
13 thought it would be much more systematic to also
14 then say, "Here are all the other elections."

15 Q. Okay. One of the criticisms that you have
16 against Dr. Chen's simulations -- and you talked
17 about it on direct examination -- is that many of
18 them create an order in Salt Lake County District
19 and that that favors Democrats; is that right?

20 A. My criticism is not that it favors
21 Democrats. I mean, that's just the way it is. My
22 criticism is the apparent bias in always wanting to
23 create a district in one particular part of the
24 state.

25 Q. What --

1 A. That criticism would hold if the -- if the
2 algorithm had, for some reason, always created a
3 district in northern Utah County. That -- you know,
4 the criticism is not the particular partisan
5 geography.

6 Q. People -- I guess let's start with you.
7 You're -- you're familiar with Utah political
8 geography, right?

9 A. Yes.

10 Q. You came into this case aware that there
11 were a sizable population of Democratic voters in
12 northern Salt Lake County?

13 A. Yes.

14 Q. Would you expect that the legislature
15 would know that as well?

16 A. I would assume so.

17 Q. Yeah.

18 Now, you referenced in your direct
19 examination that there was, quote, "A bunch of
20 partisan data in the UIRC comments," end quote.

21 Do I -- did I hear that correctly?

22 A. Yes.

23 Q. And I gather you deduced that from
24 listening to defense counsel having Dr. Chen read
25 some comments?

1 A. Yes.

2 Q. Did you hear any election results in those
3 comments?

4 A. I did not.

5 Q. Did you hear any voter registration data
6 provided in the comments?

7 A. I think there was one that talked about,
8 like, 60/30 Democrat/Republican, but --

9 Q. We could look at the comment and find out
10 if that were the case.

11 A. I -- yeah, I don't think that it was
12 like -- I don't think they were citing voter
13 registration data or anything like that.

14 Q. Yeah. And did you hear that most of them
15 were referencing that in regards to a municipality?

16 A. Again, I don't -- I don't recall super
17 specifically. I think some of them were probably
18 talking about municipalities. It sounded like some
19 of them were talking about neighborhoods. It
20 sounded like some of them were talking about social
21 groups.

22 Q. There were, I think, 580 or 590 total
23 comments that the UIRC collected; does that sound
24 right?

25 A. That sounds about right.

1 Q. You didn't hear a sizable portion of those
2 read aloud about partisan data, did you?

3 A. I did not.

4 Q. You were here for Dr. Trende's testimony?

5 A. I was, yes.

6 Q. So you know that the actual map that's
7 been enacted was drawn with partisan data shown on
8 the screen?

9 A. I -- all I can say is I heard the --

10 Q. You heard that.

11 A. -- testimony.

12 Q. Yeah.

13 A. I don't have any, like, additional
14 insights.

15 Q. Now, I want -- we talked a little bit
16 about your sisters, and I want -- are you related to
17 anyone in North Salt Lake?

18 A. The city of North Salt Lake?

19 Q. The city of North Salt Lake.

20 A. I have a cousin that lives there.

21 Q. All right.

22 A. We're everywhere.

23 Q. Well, I want to -- I'll put the -- so I'm
24 showing on the screen Utah Map C.

25 Do you see that?

1 A. I do, yes.

2 Q. And this is the Dave's link that the
3 parties have been using in the case for displaying
4 purposes.

5 Do you see how North Salt Lake is split
6 between Districts 1 and 3 in the enacted map?

7 A. Yes, I do.

8 Q. And I want to zoom in particular to this
9 area on the screen. Do you see the Edgewood Lofts
10 here?

11 A. Yes.

12 Q. And do you see how they're split in half
13 between Districts 3 and 1 in the enacted map?

14 A. Yes.

15 Q. Does that give you as much concern as I
16 suppose you do for -- did your cousin live in the
17 Edgewood Lofts?

18 A. I don't believe so.

19 Q. Okay. Does -- does that concern you, that
20 the Edgewood Lofts have been split in the enacted
21 map?

22 A. I would say it's not ideal.

23 Q. And sometimes these things happen for
24 population equality reasons, and that's the number
25 one criteria that's listed?

1 A. Yeah, I think everybody who drew a map,
2 both Dr. Oskooii and Dr. Trende, would agree that
3 the most onerous part of the map-drawing is that
4 final zeroing-out portion. Yeah, I think there'd
5 be, like, universal agreement that that's an
6 unpleasant -- an unpleasant task.

7 Q. Now, you talk -- I think in your report
8 you talk about drive times. Do I have that right?

9 A. There's -- yes, there's one reference to
10 that in the -- in the report.

11 Q. And you were criticizing, I believe,
12 Plaintiffs' Map 1 because of the -- you would either
13 have to go -- or you could go into Arizona to get
14 from San Juan to, say, Washington County, or you
15 could take a -- you'd have to take a highway that
16 went through District 4; is that right?

17 A. Yes.

18 Q. Okay. How do you drive from San Juan
19 County to Uintah County?

20 A. You would go up -- I don't know the
21 highway name, but you'd go up through Moab, and then
22 you would get to I-70, where Green River is located,
23 then you take -- oh, goodness, the name of the
24 highway is escaping me, but it's like through the
25 Book Cliffs, and they're building a railroad on

1 that -- in that canyon, but the name of the canyon
2 is escaping me at the moment, and then that drops
3 you into Duchenne.

4 Q. Okay. That's how you would do that?

5 A. That's how I would -- yeah, that's how I
6 would do it.

7 Q. So let's -- you have Google Maps in your
8 report, right?

9 A. I do, yes.

10 Q. So let's just see how -- the fastest way
11 to drive from Monticello, Utah, and we'll get
12 directions to Vernal. That's the -- that's the city
13 in --

14 A. My uncle lives there. I spent every
15 summer of my childhood in Vernal.

16 Q. Well, then you might have driven into
17 Colorado.

18 A. Well, we did often drive to Colorado.

19 Q. Do you see here that in the enacted map,
20 the fastest way to get from San Juan County to
21 Vernal is to -- a four-and-a-half-hour drive that
22 takes you through Colorado?

23 A. Yeah, I do see that. I mean, this is
24 Google Maps. I don't want to dispute the algorithm
25 that Google Maps is using. My personal preference

1 would be to go the other route. But...

2 Q. And -- okay. So what about if you -- so
3 let's zoom back out. This is -- we have Utah Map C
4 on the screen.

5 And what if you wanted to drive from
6 Monticello to Salt Lake City, which are all -- which
7 are both in District 3? How would you do that?

8 A. Again, you would go up to I-70, you would
9 take I-70 to Price, and then you would take Spanish
10 Fork Canyon. That would drop you down into Utah
11 Valley, and then you would take I-15 North.

12 Q. And that would take you through Provo,
13 through Orem, right?

14 A. Yeah, it would take you through Spanish
15 Fork Canyon, and then you'd drive I-15 North.

16 Q. And so that would -- that trip would take
17 you from -- through District 3 -- or I'm sorry,
18 through District -- yes, 3 -- into District 4, and
19 then back into District 3, correct?

20 A. Yeah, so the portion that you're driving
21 in Utah County, you'd be in District 3.

22 Q. Okay.

23 A. Or District 4. Sorry.

24 Q. And you spoke on direct examination about
25 Plaintiffs' Map 2 and driving from Herriman to West

1 Valley City; is that right?

2 A. Yeah. So we spoke about this map -- I --
3 my -- my discussion of this is not, like, the fact
4 that you drive through South Jordan and West Jordan.
5 Like, that's a five -- I mean, it's a five-minute
6 drive.

7 My -- my discussion there is more about
8 kind of these communities are just not, like,
9 naturally partners with these northern communities.
10 Like, it -- to me, it just seems like the southwest
11 corner of the county, they tend to have -- like,
12 they're just -- they have more in common.

13 Q. Does Salt Lake City have more in common
14 with San Juan County or with South Salt Lake?

15 A. Well, I certainly think that just
16 geographically it has more in common with South Salt
17 Lake.

18 Q. Same is true for West Valley City?

19 A. Yes.

20 Q. Murray?

21 A. Yes.

22 Q. Taylorsville?

23 A. I'll stipulate to all of the
24 municipalities in Salt Lake County.

25 Q. Okay. The -- when you were -- did you

1 examine the legislature's community of interest
2 criteria -- identifications before you wrote your
3 report?

4 A. No.

5 Q. So you weren't aware that they had
6 identified particular communities of interest?

7 A. I was aware that they had -- I was aware
8 of some discussion that particular legislators might
9 have mentioned. I was not aware of a -- like a
10 stipulated list or something like that.

11 Q. Okay. So you didn't -- then those weren't
12 included in your algorithm either?

13 A. Correct.

14 Q. And you didn't assess any of the map's
15 performance against those communities of interest?

16 A. No.

17 Q. Did you ask whether there were communities
18 of interest that had been particularly identified
19 before you wrote your report about communities of
20 interest?

21 A. In making the algorithm, I did not
22 incorporate, like, additional -- I didn't ask for a
23 list or a criteria in terms of incorporating
24 particular communities of interest.

25 MR. GABER: If I could just have one

1 moment, please.

2 Q. (By Mr. Gaber) Dr. Barber, you would
3 agree that you've -- your testimony has been
4 rejected by courts before, correct?

5 A. I don't recall the specifics, but I
6 imagine we're about to learn about the specifics.

7 Q. Well, did you -- I'm not going to go into
8 detail, but did you read the Jacobson versus
9 Lee case from the Northern District of Florida?

10 A. I am familiar with that case, yes.

11 Q. Okay. And now, ultimately, the -- to be
12 fair, the Eleventh Circuit vacated that on standing
13 grounds. Are you familiar with that?

14 A. I know it was overturned, but beyond that,
15 I -- I don't know, like, the legal -- I'll leave
16 that to the -- to you.

17 Q. Okay. You're aware that the court said in
18 that case that they found your testimony
19 emphatically not credible and that the opinions
20 offered were unreliable?

21 A. I am pointedly aware of that particular
22 judge and his penchant for -- for very colorful
23 language.

24 Q. And one of the things he criticized was
25 your labored responses to questioning by counsel

1 and -- that only served to provide unconvincing
2 equivocations?

3 A. As I said, I'm -- I'm very aware of his
4 particular words.

5 Q. Okay. Thank you, Dr. Barber. I have no
6 further questions.

7 THE COURT: Redirect?

8 MR. GEIGER: No redirect.

9 THE COURT: Okay.

10 MR. GEIGER: May the witness be excused?

11 THE COURT: Yes.

12 Anything else before we excuse Dr. Barber?

13 MR. GABER: Oh, no, Dr. Barber may be
14 excused.

15 And good luck getting back to Provo.

16 THE COURT: Yeah.

17 THE WITNESS: Thank you.

18 THE COURT: Thank you very much for your
19 time and testimony.

20 THE WITNESS: Thank you.

21 THE COURT: You're excused.

22 Mr. Green.

23 MR. GREEN: Thank you, Your Honor. I
24 don't -- we have no further exhibits, but just as an
25 evidentiary matter, some cleanup I think from

1 yesterday that we neglected to get around to.

2 THE COURT: Okay.

3 MR. GREEN: Our day 1 exhibits we have all
4 compiled into a single binder, which is
5 Defendants' 1 through 11. I think the Court has a
6 copy of that. We've given a copy to plaintiffs'
7 counsel.

8 THE COURT: Okay.

9 MR. GREEN: So just to make sure the
10 record is clear, we would move the admission of
11 what's been marked as Defendants' 1 through 11.

12 THE COURT: And is there any objection?

13 MR. GABER: Yes, Your Honor.

14 THE COURT: Okay.

15 MR. GABER: So with respect to Exhibit, I
16 think, 1, which is testimony from the League of
17 Women Voters of -- versus Pennsylvania, we have a
18 hearsay objection to that.

19 Would you like me just to list the
20 objections?

21 THE COURT: Well, yeah, can we do -- we
22 should do them one document at a time.

23 MR. GABER: Yeah.

24 THE COURT: So let's -- let's start with
25 that objection. Is -- I'm assuming it's hearsay to

1 the entire exhibit?

2 MR. GABER: Yes.

3 MR. GREEN: This was testimony that
4 Dr. Chen gave in the Pennsylvania case about the
5 type of algorithm that he used there, and the
6 purpose of it was not necessarily for the truth of
7 it but was to show when -- how he was characterizing
8 his algorithm there eight years ago versus now,
9 today.

10 MR. GABER: That sounds to me like for the
11 truth of the matter asserted, but my understanding
12 of the way this was used during the examination was
13 an attempt at impeachment, and that's not typically
14 an admission of a transcript -- a trial transcript
15 from another case.

16 THE COURT: Would it make a difference to
17 plaintiffs if we -- if we limited it to just the
18 page or two that was actually read into the record?

19 MR. GABER: Perhaps, if it's not admitted
20 for the truth of the matter asserted.

21 MR. GREEN: That's fine.

22 THE COURT: All right. Then --

23 MR. GABER: Plain -- Defendants' --

24 THE COURT: -- Defendants' 1 will be
25 admitted, but not for the truth of the matter, and

1 the Court will determine what weight to give to it.

2 (Defendants' Exhibit 1 received.)

3 MR. GABER: With respect to Defendants'
4 Exhibit 2, this is an article by Professor Duchin,
5 we object to that as hearsay and authentication --
6 or I guess hearsay. I don't need -- we'll withdraw
7 the authentication.

8 MR. GREEN: This was also a criticism
9 by -- or at least commentary on Dr. Chen's
10 algorithmic model, and I think it goes to his
11 reliability, the reliability of his methodology.
12 And we've already seen admitted a number of articles
13 in this case, and I don't think this one's out of
14 the ordinary.

15 MR. GABER: I think the articles that have
16 been admitted were by Dr. Katz, who testified in
17 this case, and we don't object to the articles that
18 Dr. Katz had wrote -- written. But Dr. Duchin was
19 not a witness in this case, she wasn't called as a
20 witness in this case. The description that I just
21 heard is seeking to admit them for their truth --
22 the statements for their truth, and I don't see a
23 hearsay objection that could apply.

24 MR. GREEN: No, I don't think it's for the
25 truth, I think it's to show that in the academic

1 community, there is disagreement about the
2 reliability of Dr. Chen's methods. Not -- it's not
3 being offered for necessarily the truth of what
4 Dr. Duchin and her coauthors are saying, it's to
5 show that there is some disagreement and questioning
6 about the methodology.

7 THE COURT: I'll overrule the objection.
8 I'll allow it. Given that there's representation
9 that it's not being offered for the truth of the
10 matter, then the Court will consider what amount of
11 weight to it.

12 (Defendants' Exhibit 2 received.)

13 MR. GABER: I have the same objection to
14 Exhibit -- Defendants' Exhibit 3, 8, 9. And perhaps
15 the Court can just -- would your ruling be the same
16 with respect to --

17 THE COURT: May I just ask, 3, 8, 9,
18 and 10, were they cited by any of the other experts
19 in their expert reports?

20 MR. GREEN: I can speak best to 3, and
21 this was cited in Dr. Barber's supplemental report,
22 I believe, on the first or second page, but it's for
23 the same purpose as Defendants' Exhibit 2. It's a
24 more recent criticism of some of the methodologies
25 that Dr. Duchin has used in that case, in the New

1 Mexico case.

2 THE COURT: But 8, 9, and 10 were not
3 cited or relied upon by any of the other experts?

4 MR. GREEN: I'm personally not aware. My
5 colleague found those articles. I'll let her look
6 at them real quick, if that's okay.

7 THE COURT: Okay.

8 MS. ROGERS: Sorry. Eight, 9, and 10? Is
9 that what we're looking at?

10 THE COURT: Yeah.

11 MS. ROGERS: I believe that 8 was cited.
12 Certainly 9 was referenced in, I believe,
13 Dr. Warshaw's list of references at the end of his
14 report.

15 Ten, I think we've already discussed.
16 This is the Katz, King, Rosenblatt article, correct.

17 MR. GABER: Yeah, we don't object to --

18 MS. ROGERS: Oh, sorry.

19 MR. GABER: -- to 10.

20 MS. ROGERS: Sorry.

21 MR. GABER: Yeah.

22 THE COURT: Okay.

23 MR. GABER: He was here.

24 THE COURT: Just 3, 8, 9.

25 MR. GABER: Right.

1 MS. ROGERS: Oh, 3, 8, and 9. I'm sorry.

2 THE COURT: Yeah.

3 MS. ROGERS: Eight, I'm not sure if anyone
4 cited it. I could double-check that. But, again,
5 not offered for the truth of the matter, just to
6 show that there's disagreement within the community
7 about the methods that were used to judge partisan
8 symmetry.

9 THE COURT: So I'll treat the objections
10 similarly on 3, 8, and 9. And I'll just note
11 there's no objection to 10. So all four are
12 admitted. Three, 8, and 9, I'll determine what
13 weight to get to them.

14 MR. GABER: And then --

15 THE COURT: And I'll just note that
16 they're not being offered for the truth of the
17 matter.

18 MR. GABER: Thank you.

19 (Defendants' Exhibits 3, 8, 9, and 10
20 received.)

21 MR. GABER: With respect to the
22 Defendants' Exhibit 7, we have the same objection as
23 with respect to Exhibit 1. This is testimony from
24 another case, and it was used, I believe, for an
25 attempt to impeachment.

1 MS. ROGERS: I'm sorry. So hearsay
2 objection?

3 MR. GABER: Yes.

4 MS. ROGERS: Same thing, Your Honor. It's
5 not offered for the truth of the matter, just to
6 show that Dr. Warshaw has in past cases said, you
7 know, "This is what I think about the efficiency gap
8 versus what I think here in this case."

9 THE COURT: And I'll just ask the same
10 question. Do we need to admit the entire
11 transcript? Can we limit it to just the pages that
12 were actually --

13 MS. ROGERS: Certainly.

14 THE COURT: -- read into the record?

15 MS. ROGERS: Certainly, Your Honor.

16 THE COURT: All right. Let's do that.
17 And with that, I'll -- let's see. That was
18 Exhibit 7. So 1 and 7, let's just limit to the
19 pages that were actually admitted --

20 MS. ROGERS: Sure.

21 THE COURT: -- or read into the record.
22 Okay?

23 MS. ROGERS: Sure.

24 (Defendants' Exhibit 7 received.)

25 MR. GABER: And then finally, for Defense

1 Exhibit 11, the PlanScore models, we would object to
2 hearsay and authenticity and note that Dr. Warshaw
3 testify -- it was just shown this chart and
4 testified that, you know, he couldn't know for
5 certain what he was looking at.

6 THE COURT: Yeah.

7 MS. ROGERS: Your Honor, I believe he
8 authenticized it or said that he recognized what
9 these charts were in his testimony.

10 THE COURT: But who prepared them?
11 Where did they come from? I don't --

12 MS. ROGERS: They come from the -- the
13 PlanScore website itself.

14 THE COURT: The -- which website?

15 MS. ROGERS: PlanScore, which is --
16 Dr. Warshaw's a part -- I don't know if he's a
17 developer or what's the official title, but -- but
18 he's listed on their website.

19 THE COURT: You know, I'll be honest, I
20 don't -- I don't even know where they actually came
21 from, so I don't know that there was enough
22 foundation to -- that was laid to determine -- for
23 me to even evaluate this is authentic. I know he
24 said that he recognized it, but just based on what's
25 here, I -- I'm going to sustain the objection. So

1 Exhibit 11 will not be admitted.

2 MR. GABER: And then I think Mr. Reymann
3 was going to do some moving.

4 THE COURT: Okay. Did we go through all
5 of these? Did we actually discuss Number 6?

6 MR. GABER: We have no objection --

7 THE COURT: Four, 5, 6 --

8 MR. GABER: -- to 4, 5, 6, or 10.

9 THE COURT: Okay. Then those are all
10 admitted.

11 (Defendants' Exhibits 4, 5, and 6
12 received.)

13 MR. GREEN: And did we -- sorry, one more
14 cleanup. I think we had a couple from today. Was
15 it 17 and 18?

16 MS. ROGERS: Yes.

17 MR. GEIGER: Seventeen was admitted.

18 MR. GREEN: Seventeen and 18 were both
19 admitted?

20 MR. GEIGER: Eighteen, I don't have noted.
21 Seventeen was.

22 MR. GREEN: Seventeen was admitted?
23 Eighteen -- oh, 18 was a flash drive.

24 THE COURT: Oh.

25 MR. GREEN: Eighteen was the -- is the

1 maps. So 18 is the collection of maps from --

2 MR. GABER: Those were taken from the --

3 MR. GREEN: From his -- from his report.

4 THE COURT: Report.

5 MR. GABER: Yeah, no objection.

6 THE COURT: Okay. And then 18, no

7 objection as well?

8 MR. GABER: I thought that's what you were
9 describing.

10 MR. GREEN: That's what -- yeah.

11 THE COURT: Oh, okay. Perfect.

12 MR. GABER: Yeah, no objection.

13 THE COURT: Okay. Perfect. That's
14 admitted.

15 (Defendants' Exhibit 18 received.)

16 THE COURT: With regard to those two
17 transcripts, will you guys just substitute what I
18 have and give me the pages --

19 MR. GREEN: Yes.

20 THE COURT: -- that were read in? Okay.
21 Perfect. Okay.

22 MR. REYMANN: Okay.

23 THE COURT: Mr. Reymann.

24 MR. REYMANN: So these are additional
25 exhibits that we introduced today. The first set

1 are from Dr. Trende's testimony, Plaintiffs'
2 Exhibit 12, which is -- which were the summary
3 evaluation sheets of the maps that he prepared that
4 he testified about, and Plaintiffs' 13, which was a
5 printout from the Dave's map program that we'd all
6 been looking at, but that one, we excerpted and
7 printed out. That was the one that I think Your
8 Honor marked as Exhibit 13.

9 THE COURT: Yeah. So 12 and 13?

10 MR. REYMANN: I'm just starting with
11 those. There's -- there's a handful more, but,
12 yeah.

13 THE COURT: Is there any objection to 12
14 and 13?

15 MR. GREEN: No objection.

16 THE COURT: Okay. Then Plaintiffs' 12
17 and 13 are admitted.

18 (Plaintiffs' Exhibits 12 and 13 received.)

19 MR. REYMANN: Okay. The next three --
20 there are some gaps here because we didn't end up
21 using ones that had been premarked, but the next
22 three are 16, 17, and 19. They are the three video
23 clips that were shown to Dr. Trende when he was on
24 the stand.

25 Just to be -- so the record's clear, we're

1 just seeking to admit the clips. We've provided the
2 Court and counsel with the link to the entire
3 hearing, but that's not what we're seeking to admit.
4 And we have the clips. They're -- they're too large
5 to email --

6 THE COURT: Okay.

7 MR. REYMANN: -- but we're -- when we're
8 done -- it may not be until tomorrow, but we're --
9 we'll give the Court a link to a Google Drive that
10 contains electronic versions of all of the exhibits
11 that we've introduced, and that will -- you're
12 shaking your head. Is that --

13 THE COURT: I know.

14 MR. REYMANN: -- not what you want?

15 THE COURT: Well, we have -- for the
16 record, it has to be something tangible, so I'd
17 probably --

18 MR. REYMANN: Okay.

19 THE COURT: -- need it on a drive.

20 MR. REYMANN: Okay. We will get you a
21 flash drive of just those -- of all the electronic
22 exhibits.

23 THE CLERK: (Inaudible) Google Drive for
24 you to reference, but when you submit it to the
25 actual records room --

1 MR. REYMANN: Oh, gotcha.

2 THE CLERK: -- (inaudible).

3 MR. REYMANN: Okay. So the --

4 THE COURT: And I assume for any appeal,
5 we'll have to have the full --

6 MR. REYMANN: Understood.

7 THE COURT: Okay.

8 MR. REYMANN: So those are the next three.

9 THE COURT: Okay. And just to make sure,
10 this is Defendants' 17, right?

11 MS. ROGERS: Yes.

12 THE COURT: Okay. And --

13 MR. GREEN: That's right.

14 THE COURT: Perfect.

15 MR. GEIGER: Yes, that's right.

16 MR. GABER: Oh, I thought that was 18 that
17 was the collection of maps that we --

18 THE COURT: There's another collection of
19 maps.

20 MR. GABER: Oh, gotcha.

21 MR. GEIGER: That's a different one.

22 MR. GABER: Okay.

23 THE COURT: This is a different one.

24 MR. GREEN: That's the three pages?

25 THE COURT: Yeah.

1 Okay. So then those are admitted.

2 There's no objection; is that correct?

3 MR. GREEN: No.

4 THE COURT: Okay.

5 (Plaintiffs' Exhibits 16, 17, and 19
6 received.)

7 MR. REYMANN: Okay. Then the last four
8 are from Dr. Barber's testimony. That's Plaintiffs'
9 20, 21, 22, and 23. They were all sort of excerpts
10 of sample simulated maps from their respective
11 reports.

12 MR. GREEN: No objection.

13 THE COURT: All right. Then Plaintiffs'
14 20, 21, 22, and 23 are admitted.

15 (Plaintiffs' Exhibits 20, 21, 22, and 23
16 received.)

17 MR. REYMANN: Yeah. And I think that's
18 it.

19 THE COURT: Okay. Did we get all of the
20 exhibits?

21 MR. GREEN: I believe so.

22 THE COURT: Okay. Does -- do the
23 defendants have any additional exhibits, witnesses?

24 MR. GREEN: We do not, Your Honor.

25 THE COURT: Okay.

1 Rebuttal?

2 MR. GABER: No, Your Honor.

3 THE COURT: Okay. Let me ask, do you want
4 to make a closing statement, or are you just
5 planning on submitting your proposed findings and
6 conclusions to the Court and that will be your
7 written submissions?

8 MR. GREEN: Yeah, we had, I thought,
9 reached a stipulation that we would just do the
10 written findings.

11 THE COURT: Okay.

12 MR. GREEN: Or proposed findings.

13 THE COURT: And will you remind me when
14 those are due? Is it --

15 MR. REYMANN: Tuesday.

16 MR. GABER: Tuesday.

17 THE COURT: This coming Tuesday?

18 MR. GABER: Yeah.

19 THE COURT: All right. Does that still
20 work for all of you?

21 MR. GREEN: Have you ever asked a lawyer
22 if they want more time?

23 THE COURT: I know. I -- well, I'm -- I'm
24 being sympathetic right now. There's a lot for all
25 of you to do.

1 MR. GREEN: Can we ask till Wednesday?

2 THE COURT: Yeah, if you want till
3 Wednesday, that's fine.

4 MR. GABER: That's fine.

5 THE COURT: Okay.

6 MR. GREEN: Great.

7 THE COURT: All right. Then we'll just
8 extend it, midnight on Wednesday. How about that?

9 MR. GREEN: 11:59 p.m. on Wednesday?

10 THE COURT: 11:59 Mountain Time. How
11 about that?

12 MR. REYMANN: Your Honor, just -- I can't
13 remember if we discussed this. Do you want those in
14 a particular form? Is it easier if they're in rich
15 text or a Word document or something like that?

16 THE COURT: That's a good question. You
17 know what? Why don't you just file them in the case
18 and then send me a Word document.

19 MR. REYMANN: Okay.

20 THE COURT: That would be helpful.

21 MR. GREEN: Great.

22 MR. GABER: Yes.

23 THE COURT: Okay.

24 MR. GABER: I think there's one --

25 THE COURT: Yeah?

1 MR. GABER: Sorry. One more issue, the
2 potential --

3 MR. WOLF: Yeah, I'd like the Court's
4 attention, Your Honor. At the close of yesterday,
5 we set a hearing for November 5th to consider the PI
6 motion which would enjoin the lieutenant governor
7 and --

8 THE COURT: Right.

9 MR. WOLF: -- (inaudible) on the indirect
10 initiative. Just this afternoon -- in fact, about
11 an hour ago, maybe less -- that indirect initiative
12 was withdrawn --

13 THE COURT: Oh.

14 MR. WOLF: -- so that's -- we can take
15 that off your calendar, from my perspective.

16 THE COURT: Okay.

17 MR. GABER: And I think -- I just learned
18 this as well. I'm sure that's -- if I could just
19 look at it --

20 THE COURT: Okay.

21 MR. GABER: -- look at some document
22 before we --

23 THE COURT: Officially --

24 MR. GABER: -- dismiss that, but I'm sure
25 that that's --

1 MR. WOLF: I can send it to you. It's on
2 my phone.

3 MR. GABER: Okay.

4 THE COURT: Okay. I'll keep it on the
5 schedule for now, and then once you officially
6 handle it however you'd like to handle it, then
7 we'll address it. How about that?

8 MR. GABER: Thank you.

9 THE COURT: Okay. Great.

10 We did not get to Count 8.

11 MR. GREEN: Is there any chance -- I don't
12 know if it matters schedule-wise, but could we
13 potentially push that and discuss it at the same
14 time as the other PI hearing that I think is still
15 on the --

16 THE COURT: On the 4th?

17 MR. GREEN: -- 4th?

18 MR. GABER: Yes.

19 THE COURT: We can do that.

20 MR. GREEN: Thank you.

21 THE COURT: Okay. All right.

22 MR. GREEN: Has that -- I'm sorry, has
23 that been -- did we set a time for that?

24 THE COURT: Oh, we didn't, but I think --
25 I've got something in the afternoon that day, so it

1 will have to be in the morning. Let me just
2 double-check.

3 MR. REYMANN: Tyler, you're not saying
4 argue it at the same time, you're saying just
5 discuss scheduling at the time we already have the
6 hearing set?

7 MR. GREEN: Sorry, one more time, David.

8 MR. REYMANN: You're not saying we're
9 arguing both at the upcoming hearing? Are you
10 saying we're going to discuss scheduling? Or we're
11 going to argue both --

12 MR. GREEN: I think maybe -- I don't know
13 if there's a chance that by that point it could be
14 overtaken by events. I mean, I'm just --

15 MR. REYMANN: Okay.

16 MR. GREEN: -- trying to anticipate if --
17 yeah, I don't know that we would come fully prepared
18 to argue it unless --

19 MR. REYMANN: Well, that -- that's why I'm
20 asking for --

21 MR. GREEN: Yeah.

22 MR. REYMANN: -- clarification whether
23 you're asking to argue it then or whether you're
24 just saying you want to discuss it then.

25 MR. GREEN: Probably discuss it, unless

1 you have a different -- you think we should argue
2 it, but I --

3 MR. GABER: We're talking about Count 8?

4 MR. REYMANN: Yeah.

5 MR. GABER: I feel like we could --

6 THE COURT: I just have --

7 MR. GABER: -- argue it --

8 THE COURT: -- a couple questions --

9 MR. GREEN: Okay.

10 THE COURT: -- probably mainly for
11 plaintiffs on that one --

12 MR. GREEN: Okay.

13 THE COURT: -- so maybe be prepared to
14 argue it.

15 MR. GREEN: Okay.

16 THE COURT: And if -- if -- I don't know,
17 I'm pretty flexible. If we need to find another
18 time to do that, we can do that as well.

19 MR. GREEN: Okay. Great.

20 THE COURT: But it is Election Day, so
21 we -- I will need to schedule it any time before
22 1:00. I have the morning open, I just have
23 something that goes from 1:00 to 5:00 that
24 afternoon.

25 MR. GABER: Could I suggest that since we

1 have a hearing scheduled for the 5th that I think
2 there's a good chance it doesn't need to happen on
3 the issue in which it was scheduled, will you be
4 back here on the 5th?

5 MR. GREEN: No, but I could still do it
6 remotely on the 5th.

7 MR. GABER: Okay.

8 MR. GREEN: Yeah.

9 MR. GABER: Maybe -- if that's not
10 Election Day, maybe that might work better.

11 THE COURT: Oh, it doesn't matter.

12 MR. GABER: It doesn't matter?

13 THE COURT: We're open.

14 MR. GABER: Oh, okay.

15 THE COURT: Yeah.

16 MR. GABER: All right.

17 THE COURT: I was just noting that it's
18 Election Day. So --

19 MR. GABER: Okay.

20 THE COURT: Do you want from 9:00 to noon
21 that day? Would that be enough time?

22 MR. GABER: I think so, yes.

23 THE COURT: Okay.

24 MR. GREEN: I think -- yeah, that's fine.

25 THE COURT: All right. So 9:00 to noon on

1 the 4th, and we'll provide you with a Webex link --

2 MR. GREEN: Okay.

3 THE COURT: -- and anyone else.

4 It will likely be the same one that we've
5 been using today, do you think?

6 THE CLERK: Yeah, we can use the same one.

7 THE COURT: Okay. So, yeah, same Webex
8 link we're using today, we'll use for the hearing on
9 the 4th.

10 All right. Anything else?

11 MR. GABER: No, Your Honor. Thank you.

12 THE COURT: Okay. My only request is I
13 think -- what -- if there's any cleanup on getting
14 the corrected documents to us, just send those to
15 us. We just need one copy, really, for the official
16 record.

17 MR. GREEN: Okay.

18 THE COURT: Okay.

19 MR. REYMANN: You mean physical copy?

20 THE COURT: One physical copy --

21 MR. REYMANN: Okay.

22 THE COURT: -- for the official record.

23 MR. REYMANN: Okay.

24 THE COURT: Okay? All right.

25 MR. GREEN: Thank you.

1 THE COURT: Okay. Thank you.

2 MR. GABER: Thank you, Your Honor.

3 THE COURT: All right. Court is

4 adjourned.

5 (Court adjourned at 5:30 p.m.)

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REPORTER'S CERTIFICATE

STATE OF UTAH)
) ss.
COUNTY OF SALT LAKE)

I, Lindsay Payeur, Registered Professional
Reporter, do hereby certify:

That on October 24, 2025, I transcribed an
electronic recording at the request of
David Reymann;

That the testimony of all speakers was
reported by me in stenotype and thereafter
transcribed, and that a full, true, and correct
transcription of said testimony is set forth in the
preceding pages, according to my ability to hear and
understand the tape provided;

I further certify that I am not kin or
otherwise associated with any of the parties to said
cause of action, and that I am not interested in the
outcome thereof.

WITNESS MY HAND AND OFFICIAL SEAL
this 24th day of October 2025.



Lindsay Payeur, RPR, CSR, CCR

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<hr/> <p style="text-align: center;">1</p> <hr/>	<p>1 16:3,17,18,19 28:4 87:6,11 100:12,19,24 102:16,17,20,22,23 103:11 105:8 108:16 124:14,22 125:5 132:4,5,7,23 160:2 175:20,21,23 180:14 184:17 185:13 189:19,24,25 194:10 202:2 204:19 208:16 209:4,5 229:10,16,18,20,23 230:10,19 231:6 258:6 269:3 271:4 273:24 280:15 290:20 291:11 292:15,16,17 296:19 297:2 298:2 300:6 302:12,15 304:17 312:18,19 349:22,24 353:1 356:22 363:13 369:7,16 370:22 382:4,7 383:25 388:6,13 389:12 396:3,5,11,16 397:24 398:2 401:23 402:18</p> <p>1.2 109:3</p> <p>1.271 109:6</p> <p>1.45 273:24</p> <p>10 13:4 30:6 51:25 67:14 73:1,5,6 130:24 133:4 323:6 329:12 330:13 338:12 399:18 400:2,8,19 401:11,19 404:8</p> <p>10,000 127:1 324:9 339:15</p> <p>100 77:5 108:3 130:24 132:4,6 330:8,21,22</p> <p>100,000 117:19 125:2 135:3 154:11 279:11</p> <p>1011 37:12 38:25 39:9 41:18 42:6 48:5 50:10 60:25 61:7 120:1 131:9 133:8 141:23 210:21,24 214:7 223:8 253:13 341:10 358:22 382:11,15</p>	<p>2 42:7 100:10,15 101:1 102:14 103:9,13 105:3,6,10 108:22,23 124:17 125:22 140:8 150:10 175:20,22,23 180:14 184:17 185:1,12 186:13,21 189:18,24,25 191:16 192:1,6,25 193:7,12 194:10,20 202:2 229:17</p>	<hr/> <p style="text-align: center;">3</p> <hr/> <p>3 55:3 57:17,18 100:12,18 102:19 103:10 105:8 140:8 175:21,22,23 180:14 185:23 189:19,24,25 191:15 194:11 202:3 205:8 242:22 245:1,4,7 256:24 272:24 308:13 323:5 360:8,10 361:12 363:12 367:24 388:6,13 391:7,17,18,19,21 399:14,17,20 400:24 401:1,10,19</p> <p>3,000 124:18</p> <p>30 30:1 108:9,23 209:21 211:15 329:8,10</p> <p>30-minute 207:7</p> <p>300 150:10</p> <p>32 188:7,13</p> <p>32,259 136:4</p> <p>328 102:20,23 159:18</p> <p>329 57:15 60:2,9 63:19,22</p> <p>33 101:5 189:8 191:14</p> <p>330 44:19</p> <p>34 101:8 213:15 227:12</p> <p>35 51:16</p>
<hr/> <p style="text-align: center;">2</p> <hr/>	<p>2 42:7 100:10,15 101:1 102:14 103:9,13 105:3,6,10 108:22,23 124:17 125:22 140:8 150:10 175:20,22,23 180:14 184:17 185:1,12 186:13,21 189:18,24,25 191:16 192:1,6,25 193:7,12 194:10,20 202:2 229:17</p>		

350,000 102:15**35th** 299:3**36** 108:24 228:13**37** 125:8 231:14 250:8,9**38** 135:20 156:1**39** 155:20,21 227:13**391** 368:1

4

4 33:14 34:2,9,19,24 35:23
 36:10,19 37:2,5,9 71:19
 82:13,15 83:10,19 84:14
 85:24 92:9 94:16 97:18
 100:11,15,16 103:1,3,14
 105:10 107:10 108:21
 109:9 111:23 112:1 115:6
 124:5 137:9,22 175:21,22,
 23 180:14 185:22 189:1,4,
 19,24 190:1 194:11,19
 198:25 200:25 202:10
 215:12 218:21 219:8
 220:15 231:10 235:3
 239:19,22 243:17,23
 244:3,21 245:4,7,15
 256:24 272:24 280:4
 284:14 318:4 321:15
 324:11 356:14 358:5 362:2
 363:7,14 364:23 365:4
 378:9 389:16 391:18,23
 404:8,11

4's 188:20 242:11 243:11
 244:7 280:7 286:25 321:11
 323:19 360:2,12 361:19
 367:17 368:19

4,000 120:12**4,244** 362:21**4-specific** 302:3**40** 30:4 108:25 118:7 186:9
329:8**40,085** 242:10**40s** 348:20**42nd** 296:18**43** 213:15 348:18**45** 191:12 229:25 348:22**45-degree** 29:8**458** 354:9**46** 256:24**47** 253:21 255:18**48** 118:5 216:24**4:00** 206:1 308:3**4C** 200:21**4th** 413:16,17 417:1,9

5

5 31:2 125:18 168:22 288:4
 289:20 338:11 353:20
 404:7,8,11

5.82 273:25

50 19:2 22:4 41:21 49:16
 51:18 61:12 65:2,4 69:7
 75:15 141:10,20 150:18
 174:4 181:12 225:18
 256:24 270:5,6 294:10,12,
 17 295:6 360:4 372:6

50,000 279:2,13 286:25
 288:17 289:12 290:2,22
 291:1 298:16 313:13
 359:10 363:23 364:17

50-page 359:13**50-person** 372:7**50-plus** 24:14

50/50 41:20 49:4,10,13,21
 50:7,9,13 61:8 63:2 141:9
 212:2,16,25 213:2 227:8,
 15,16 340:19 342:23
 347:10 348:8,11,13

500,000 310:2**51** 224:23**52** 118:7 168:17**53** 348:16**534** 360:18,19

55 14:3 17:19,22,24 213:14
 252:10 258:11

55.7 16:21**56** 213:15**580** 386:22**585** 216:24**590** 386:22**593** 356:13**5:00** 308:4 415:23**5:30** 418:5**5th** 412:5 416:1,4,6

6

6 123:23 258:11 294:23
 326:5 338:11 380:16
 381:20,24 382:3,4 404:5,7,
 8,11

6,000 135:2 289:9**6.2** 316:20**6.5** 379:25

60 17:20,23 118:6 327:7
 381:1,11

60/30 386:8**60s** 118:25**614** 247:9**62** 108:20,21**635** 356:21**65** 252:11**66** 225:12**66th** 291:9**689,862** 209:11**6th** 38:17

7

7 108:13,14 208:16 228:15
 258:11 312:18,19 349:1
 380:17 401:22 402:18,24

7,000 353:22**7,140** 355:17**7.1** 135:21**70** 30:2 325:24 327:8 336:6**71** 216:25**72** 216:25**72nd** 296:19**75** 48:14,16**77th** 297:1**79th** 299:2

8

8 54:19 57:8 72:25 73:5,6
 101:6 127:7,12 316:19
 318:1 399:14,17 400:2,11,
 24 401:1,10,12,19 413:10
 415:3

80 325:24

800 315:24 370:6 371:6,7,
 21 372:2

800,000 124:17**800,000-person** 316:2**800-person** 316:1**817,904** 209:12**81st** 290:20**83.2** 136:4**83rd** 290:19**84** 108:16**84.3** 209:8,14**86th** 296:20

9

9 44:12,14 57:10,12,14
 60:3,10 63:18,23 69:14,19
 70:1 73:1,5,6 323:3 325:23
 354:25 399:14,17 400:2,8,

12,24 401:1,10,12,19

9/18 179:10,15**9/18/2025** 174:12 176:10

90 330:8,21,23 331:15
 336:3

90s 48:19**92** 316:20**94.255** 136:2

95 10:25 131:10,20,21
 132:7,11 133:1 168:23
 169:16 232:2,3 288:12,17
 325:25 326:21 327:2
 353:8,18 354:13,15,18,19
 355:2,16 356:6,19 379:9,
 10

963 27:22,24**99th** 291:10,11 297:3**9:00** 416:20,25

A

A's 237:7**Aaron** 88:12

ability 204:4 210:5 215:6
 310:25

above- 320:5**above-average** 318:9,13**absolute** 300:5

absolutely 72:17 96:3
 117:7 134:6 161:5 162:11
 335:1 373:9

abstract 39:13**abundance** 384:12**academia** 45:10

academic 12:14 23:22
 24:5 34:16 39:5 45:14
 48:12 214:16 215:14
 219:19 221:7 239:2,5
 264:14 273:8 343:10
 398:25

academics 216:1 221:12,
 14

academy 219:9,21 220:4**accept** 144:23 172:24

acceptable 132:9 143:18
 243:13

acceptance 153:18,21
 154:23

accepted 12:7 57:23
 119:5 147:9

accompanied 178:25**accompanying** 188:16**accomplishment** 277:23**accord** 172:19

accorded 345:25	10,17,19,22 405:14 406:17 409:1,14	275:1,3 276:21 277:20 278:1,2,24 279:1 280:21, 23 281:2,5,7,23 282:8,15 283:8,18 285:20 287:13,18 310:11,20,24 311:9,11,22 312:6,12 314:11,22 316:24 325:10,13 326:2,10 327:9 329:15 330:1,8,17,19 331:5,9,10,17,24 332:21 333:2 336:15,19 337:7,8, 12,15,24,25 338:14,22,25 339:5,11 354:23 358:9 363:16 367:2 369:11 373:20 375:8,12 376:17,23 377:4,9 379:15,18 385:2 390:24 393:12,21 397:5,8	analogy 289:13 338:1 analyses 64:17 266:24 299:22 324:15 346:12 analysis 32:22 43:17,18 81:23,24 93:20 117:23 119:9,10,13 120:1,2,5,10, 14 121:3,14 125:1 127:24 133:12 134:13 168:7,15 179:4,6 212:7,20 221:17, 22,25 224:6 239:2 248:18 249:17 250:3 261:13 263:23 266:10,11 267:8 274:8,9,12 293:9 298:10 299:12 323:18 329:21 analyst 75:2 analyze 211:5 263:14 268:23 269:3 analyzed 223:9 240:23 269:9 Andrew 48:17 49:8 annotations 313:14,16 annual 261:20 answering 53:2 answers 134:11 253:4 278:18 286:4 382:18 anticipate 414:16 anymore 108:22 194:9 anytime 306:16 Apache 233:1 apologies 57:13 59:17 67:2,7 252:21 apologize 270:19 302:1 app 180:19 181:5 256:18 apparent 384:22 appeal 70:3 408:4 appearance 248:18 appearances 7:16 appeared 12:16 14:17 182:15 345:19 appearing 314:18 359:18 appears 141:5 appendages 100:20 appendices 8:18 54:4 appendix 53:14,25 54:20 55:5 241:15 333:21 334:16 apples-to-oranges 337:19 applicability 39:21 40:2,7, 12 41:12 application 257:10 272:17 338:25 382:18 applications 315:5 applied 35:1 74:23 103:22 112:14 200:11 268:14 270:24 281:18 379:21
account 232:6 367:2	adopt 96:19		
accounted 367:12	adopted 45:23 82:8 200:11		
accurate 14:13 43:10 52:2 318:2	advance 222:22		
accurately 73:25 250:4 286:25	advanced 263:12		
achieve 92:23 369:4 379:15	advances 36:14		
achieves 231:2	adversaries 57:24		
acknowledge 52:15	advice 321:18		
acknowledgment 46:18 47:2	advisor 264:3		
act 78:7 80:13 83:13,15 249:22 306:22	advisors 264:2		
act- 368:3	advisory 95:24		
acting 117:13	affect 95:1 124:18 152:22 227:5		
Action 247:16	affected 150:14 252:15		
active 208:24	afraid 77:7		
actual 18:19 26:18 179:1 227:8 281:14 347:10,14 387:6 407:25	afternoon 261:3,4 340:3 412:10 413:25 415:24		
adapted 166:18	afterward 313:14		
add 31:8 102:8 120:7,8 131:2 227:19 232:15 266:24	age 183:15 184:8 246:13		
added 113:14 141:17 223:4,6,11 313:14,15	agencies 11:7		
addendum 112:10	agenda 210:4		
adding 119:25 128:13 228:8 238:3	aggressively 281:5		
addition 12:13 232:16	agree 36:11 42:11 46:3,5 47:7 56:17 147:22 149:5 158:6 204:7 215:11,25 232:1 235:20 238:13,14 240:4 243:10,22 244:5 245:23 248:5,22 249:25 250:7 253:11 255:2 342:7, 8,24 343:1 344:11,12,15, 22 347:9 352:3 357:6 359:20 366:5 370:11,13 372:3 378:18,20 380:12,18 381:1 389:2 394:3		
additional 238:4,8 266:24 274:2 284:19 285:7 292:19 308:14 323:17 353:20 367:6,13 387:13 393:22 405:24 409:23	agreed 170:24 187:4		
address 8:8 55:9 364:14 413:7	agreement 95:7 106:15 148:14 389:5		
adherence 83:11 285:1	agrees 240:10		
adjacencies 127:18 252:1	ahead 44:11 72:12 101:18 163:6 260:9 327:13		
adjourned 418:4,5	aiding 109:18,19 116:6		
adjust 284:3	akin 338:1		
adjusted 319:16	Alabama 246:22 265:8 266:3		
administer 260:8	alarm 120:22 126:25 127:5,10,25 128:21 135:6 166:17,20 167:25 168:1 172:22,25 198:3,18,24 199:5,7,13,17,20 202:8 203:6,11,15 204:9,11,12 205:5 229:3 276:11,14 289:6,7		
administrative 11:19	algorithm 122:1,4,7,9 161:22 197:20 231:1 233:7		
administrator 247:21			
admission 8:15 72:25 163:9 396:10 397:14			
admit 398:21 402:10 407:1,3			
admitted 8:14,22 73:5 334:16 397:19,25 398:12, 16 401:12 402:19 404:1,			

<p>applies 58:25 59:2 210:25 214:9,11 254:9 319:12</p> <p>apply 35:15,19 39:15 41:6,13 53:18 63:14 64:24 65:9,14 70:20 71:22 112:11 131:24 132:9 138:5 200:12,16 210:21 214:7 287:19 398:23</p> <p>applying 35:24 52:18 69:8 325:10</p> <p>appointed 79:14,17,23 80:1 301:16</p> <p>appreciably 125:1</p> <p>approach 44:15 126:1 129:8 133:2 156:10 173:5 202:19 341:22 342:4,11 343:2 353:25 359:5 362:18 366:11 382:24</p> <p>approached 99:7 125:7</p> <p>approaches 93:3 113:16 117:9 119:16</p> <p>arbitrary 308:21 335:14</p> <p>Ardoin 249:13</p> <p>area 34:3 90:9 91:8 195:11,13 236:18 256:1 301:20 308:8 309:24 319:10 326:4 336:5 351:5 361:3 388:9</p> <p>areas 84:19 96:4 104:19 233:15 332:23 367:7 371:4</p> <p>argue 414:4,11,18,23 415:1,7,14</p> <p>arguing 414:9</p> <p>argument 216:5 219:7,12</p> <p>arguments 97:14</p> <p>arise 235:18 315:17</p> <p>arising 344:6</p> <p>Arizona 389:13</p> <p>arms 87:20,24 89:15 91:4,5,7</p> <p>arrange 314:12</p> <p>array 230:18</p> <p>arrive 12:4 285:11</p> <p>arrived 325:4</p> <p>artery 194:2</p> <p>article 13:16 43:21,22,24 44:1,5,19,21,22 45:5 50:16,17 51:2,8 52:4 53:13,15,22 54:21 57:21 125:17 130:3,6 138:22 143:3 149:3 156:14 214:16 215:1,10,14,15,22 219:19 221:7 239:1,6 398:4 400:16</p> <p>articles 23:22 75:11 143:11 398:12,15,17 400:5</p> <p>articulate 60:21</p>	<p>articulated 266:21</p> <p>Aseem 7:20 32:13</p> <p>aspect 86:9 90:6 111:24 216:8 361:5,7</p> <p>aspects 12:19 152:22 361:10</p> <p>assemble 326:13,19 330:18</p> <p>assembling 283:9</p> <p>Assembly 265:23</p> <p>asserted 397:11,20</p> <p>assess 37:18 70:16 75:7 242:10 255:6 363:4 383:9 393:14</p> <p>assessing 116:18 164:13 343:10</p> <p>assessment 231:10 343:5</p> <p>assign 193:13</p> <p>assigned 327:1,6 340:16</p> <p>assignment 144:13 145:1 178:9</p> <p>assigns 373:11</p> <p>assistants 121:1</p> <p>Association 264:18</p> <p>assume 50:12 51:5 65:10 179:13 385:16 408:4</p> <p>assumes 61:18</p> <p>assuming 263:10 347:9 396:25</p> <p>assumption 14:6,10 25:19,23 51:10 52:6,7,8,9,15,16 53:8,12 56:22 60:13,14 61:2 62:5 64:18 211:18,25 212:3,9,11,23</p> <p>assumptions 13:19 51:20 319:4 340:15</p> <p>asymmetric 25:9</p> <p>asymmetries 20:6</p> <p>asymmetry 20:5 22:9 217:17</p> <p>atoms 277:5</p> <p>attached 130:3 178:11</p> <p>attempt 397:13 401:25</p> <p>attempted 64:9 231:6 309:18</p> <p>attempting 297:17 378:10</p> <p>attended 222:23</p> <p>attention 43:20 44:19 45:4 47:11 55:3 57:15,16 67:6,9 68:20,25 111:21 152:21 208:15 216:20,25 217:13 220:7 229:24 256:7 282:18,20,23 326:14 340:12 345:12 349:6,16 357:20 358:4 375:20,24</p>	<p>412:4</p> <p>attest 40:4</p> <p>attributable 254:23</p> <p>audience 264:1</p> <p>audio 9:12 73:21 256:25 258:4,16,21 260:13</p> <p>August 167:6,11 200:19 341:7,8</p> <p>authentic 403:23</p> <p>authentication 398:5,7</p> <p>authenticity 403:2</p> <p>authenticized 403:8</p> <p>authors 25:11 48:10 88:9</p> <p>average 12:11 16:4 18:14,18,21 19:15 20:19 23:6 30:5,7,21 92:6 114:3,5,15 130:14,18 131:3,5 140:9 226:18,19 227:1,17 271:1,22 273:19 290:6,8 294:10 296:6,7 313:7 317:25 320:11,22 321:24 323:11,15 324:4 383:6,19 384:9</p> <p>averaged 15:23 293:17</p> <p>averages 227:19 273:22</p> <p>avoid 45:15 245:20 281:25 282:3 286:22 308:2,14</p> <p>avoids 283:13</p> <p>award 17:4 264:23,25</p> <p>awarded 264:15,23</p> <p>awards 264:13</p> <p>aware 33:14 35:23 37:12,17,21 41:22 42:5 46:21 49:25 50:9,15,17 84:8 141:21 224:2 234:22 280:4 337:11 348:9,24 373:22 385:10 393:5,7,9 394:17,21 395:3 400:4</p> <p>axis 28:21 29:1 100:5,8 195:13</p>	<p>262:3,9</p> <p>backing 276:19 277:17 283:2</p> <p>backup 369:22 377:6</p> <p>backwards 203:21</p> <p>bad 18:20 31:7 89:19 90:12,14 92:7 100:21 115:24,25 142:18 146:25 173:20 191:10 252:24 368:11</p> <p>badly 100:22</p> <p>bag 300:7</p> <p>baggage 337:4</p> <p>BAILIFF 7:3</p> <p>Baker 79:19</p> <p>balanced 176:18</p> <p>ball 76:5 202:11</p> <p>ballot 138:15</p> <p>band 88:5</p> <p>Barber 8:17 46:14,17 121:22 260:4,11,20 261:3 266:9 300:23 301:11 307:24 310:5 335:12 340:3 354:7 366:18 394:2 395:5,12,13</p> <p>Barber's 46:16 359:10 362:21 366:15 399:21 409:8</p> <p>barely 136:23</p> <p>bartering 342:16</p> <p>base 107:24 108:2,5 115:14 127:25 128:21 136:1,6,9,10,12,13,20,23 156:25 157:2,8 159:7 170:21 176:9,13,14 187:21 196:1 234:18 241:23 242:4 244:6 288:25 289:2</p> <p>based 12:5 23:23 45:24 82:15 95:13 103:15 128:4 142:7 151:9 152:2 153:10 196:6 293:9 294:4 318:9 320:5,10 323:10,14 336:18 338:9,20 346:19,24 403:24</p> <p>baseline 167:4 229:4</p> <p>basic 14:6 61:13 180:11 255:8</p> <p>basically 12:1,9 16:2 25:19 26:7 27:3 49:12 56:6 61:18,19 90:7 103:2 109:19 183:12 194:16 201:3 263:10 305:1 317:24 324:25 327:25 328:5,14 332:3 334:3 350:13 353:17</p> <p>basics 101:10</p> <p>basis 148:20 168:12 218:7 240:7 370:18 371:5</p>
---	--	--	--

B

bachelor's 74:20 262:4

back 11:3 15:8 17:2 18:1 38:18 48:2,14 57:7,11,13 63:17 69:11 72:22 77:3 85:22 107:4 118:24 130:7 143:20 147:5 159:7 163:4 177:24 183:18 201:6 203:7 208:5 221:16 238:23 242:2 255:1 256:7 259:6,10 261:24 278:17 288:1 301:6 307:8 308:7 309:17 317:21 352:17,18 361:17 373:8 374:4 379:13 391:3,19 395:15 416:4

background 10:20 74:19

be-all 152:19 beach 303:1,3 bear 250:19 251:24 beautiful 158:18 beauty 117:15 begin 53:4 274:24 310:1 347:21 beginning 29:22 82:11 143:10 283:9 311:23 317:22 begins 220:16 behaviors 345:1 beholder 235:13 belabor 380:9 Belize 79:18 belonging 317:17 below-average 318:10,15 320:6 Ben 7:20 146:4 bench 305:21 306:10 327:23 benchmark 253:13 benefit 181:10 benefits 75:20,21 Benjamin 276:6 Bernie 52:4 79:24 141:4 beta 28:24 bias 14:1 15:19,20,22 17:8, 17,18,21,25 18:5,25 19:2, 19 20:3 22:4,15,18 23:18 26:5,19,23 27:1 28:2,7,23 29:3,7 35:19 37:18 39:4,9, 20 41:19 42:17 43:18 47:22 48:4,10,11,13,25 49:1,20 52:19 59:7 60:23 61:3 62:12,17,20 63:2,14 65:4,17 71:22,24 114:1 133:20 136:2 138:24 139:25 140:11,13,23 141:23 142:6,8,14,18,24 144:2,25 145:10,20 174:4, 7 179:23 198:15 209:17 211:7,14,16 213:25 214:8, 11 218:18 219:20 220:23 221:15 222:13 224:4,8,14 225:10,14 226:22,25 227:21 228:6,11 239:14 240:4 241:21 267:5,16 268:19 269:15,16 270:23 274:11 291:2 294:20 300:3,6 340:17 342:21 346:19 379:21 380:13 382:6,12,18 383:9 384:22 biased 20:20 24:13 331:9 biasing 299:23 bifurcating 349:13	big 23:7 90:18 97:22 120:24 227:23 246:14,17 273:6 277:22 279:8 283:10 298:18,23 313:23 314:5,17 315:9 318:17 320:8,9 323:12 336:14 348:4 349:11 360:24 bigger 28:10 130:19 240:9 277:5 bill 129:13 165:5 binder 80:16 270:16 396:4 binders 270:17 bipartisan 148:14 bit 14:20 15:20 17:7 24:6 47:9 83:3 85:2 96:1 105:4 113:1 124:12 129:14 134:20 147:12 149:16 160:1 164:10 173:14 174:13 176:20 205:2,4 209:15 219:6 222:4 226:22 230:13 231:21 240:22 252:21 263:3 283:19 312:22 326:1 328:8 335:20 339:6 349:7 359:14 370:7 387:15 blame 249:12 blatantly 25:22 blind 111:20 115:21 116:1 117:11 118:13 132:1 184:21 blindly 343:2,7 block 150:21 178:9 283:17 284:4 372:8 blocked 57:3 blocks 87:7 93:21 102:7 150:4 blow 108:7 blue 184:17 185:14,16 302:21 305:24 329:10,12 332:15 350:22 351:2 Bluffdale 84:2 233:8 236:12 237:22 238:2 305:16 307:9 308:8,10,13, 15,17 309:3,5 329:11 330:11 331:23 333:9 361:24 362:1 Bluffdale's 307:12 Bluffdale-draper 309:8 Bluffs 241:14 bluish 318:12 blur 172:9 board 11:5 155:24 246:8 285:14 boat 368:6 body 210:4,15,21 bone 86:4	Bonneville 306:21,25 364:2 book 75:23 76:1,12 389:25 books 75:22 76:6 border 309:4 327:19 332:2 364:6 367:10,12 borders 238:20 bore 134:4 251:22 born 261:16,17 bother 158:15 bottle 32:1,5 bottleneck 250:23 281:9 bottlenecks 281:6 bottom 188:13 191:13 200:1,4 226:5 250:9 271:1 273:6,10,18 291:5 292:1 295:2 306:9 307:5 309:12 313:11 327:20 328:1,3 329:4,6 330:5 336:14 368:20 bottom-line 299:13,14 boundaries 91:10,18 94:3,6,18 95:3,10,12 98:11 101:17 102:3 106:13 127:17 150:3 151:16,20 153:2,7 187:15 195:8 202:4 228:25 229:5 234:5 237:6 284:16,18,22,25 285:9 301:19 302:14,15 319:5 328:16 362:7 367:5 375:10 377:18 378:3 boundary 84:1 89:16 91:10,17 95:7 98:14 101:13 106:15 153:1 156:13 160:20 233:16 236:22 237:1 238:11,12 251:13 304:16 309:8 330:6 332:12 333:3 bounding 86:20 87:2 bounds 169:13 Bountiful 332:25 333:20 Box 363:24 364:8 boys 132:17,20,23 branched 262:20 Brandice 264:4 break 72:16 162:15 205:18 206:16,18 207:7 251:17 283:16 292:8 300:20 breaking 87:14 breakneck 113:4 breaks 252:7 bridge 106:2,23 briefly 10:19 13:15 53:7 262:2 271:20,21 288:7 289:16 296:2	Brigham 262:5 bright 272:5 bright-line 42:12,22 45:9, 24 272:12 bring 159:3 337:4 370:8 broad 273:13 broader 45:18 169:21 338:7 broadly 82:19 147:23 262:12,25 274:22 311:17 326:13 brought 148:12 Brown 7:18 Buffalo 265:15,16,22,25 building 389:25 built 96:22 122:15 191:1 232:10 bulldozers 309:16 bullseye 328:15 bunch 21:6 64:14 114:4 118:16 252:1 286:19 326:19 332:10 385:19 BYU 261:6,8,22,23,25 264:25
C			
cage 138:18 calculate 13:25 22:5 104:21 129:17 135:17 222:13 224:4 248:23 289:25 290:1 296:9 298:14 319:13 346:23 353:4 373:6,25 383:21,24 calculated 27:24 28:1 273:5 293:14 321:9 calculation 273:11 298:16 314:1 378:14 calculations 21:8 241:4 246:13,18 274:14 calendar 412:15 California 10:13 call 9:1,4 19:23 22:2 51:11 72:12 73:11 82:8,9 83:10 114:18 127:21 175:19 241:11 260:3 281:6 303:4 338:3,4 374:19 called 9:22 14:1,6,8 34:2 37:18 55:21 59:3 74:8 76:1 88:25 122:17 129:7 130:6 137:6 139:1 146:19 148:25 149:1 153:18 260:21 281:17 303:1 324:11 338:15 374:4,5 398:19 calls 98:4,8 106:17 Caltech 10:14,24 32:15			

campaign 7:19 262:15	cases 11:2,10 28:11 35:12 40:22,24 56:24 78:13,16, 25 89:3 97:9,10,12 109:16 121:23,24 151:1 214:24 247:1 264:11 265:2,12,21 271:3,7,10,11 274:21 275:14,15 283:10 291:16 317:15 357:12 383:4 402:6	chart 292:1 319:23 403:3	circles 88:4
Cancel 81:19	catch 175:4 307:24,25	charts 154:24 155:13 403:9	Circuit 394:12
candidate 227:8,13 294:3 348:22	category 226:12	Chatgpt 157:16	circular 87:5
candidates 114:15 293:22,23	causality 263:15	check 38:19 250:11 251:15 280:22 281:18,21, 22	circumstances 40:10 56:15 58:13
Canes-wrone 264:4	caused 51:21	checked 40:23 128:14 251:16	citation 125:16
canonical 48:20 86:10	causing 259:20 315:17	checking 251:12	cited 43:22,24 399:18,21 400:3,11 401:4
canyon 233:21,23 306:1, 11 390:1 391:10,15	caution 53:3 341:18 384:12	checks 281:1	cities 83:25 98:10,23 101:18 151:19 174:2,3 187:15 229:5 235:4,6 237:21 238:24 241:13 304:1 305:8,17 329:6
canyons 233:12,13,20 305:22 306:8 307:2	caveat 47:7 294:7	cheese 150:2	citing 54:6 386:12
capital 365:16	CD3 349:22	Chen 89:24 90:11 93:12 122:4,5,6 125:17 126:7,13 140:19 151:8 152:1,12 156:20 157:9 161:16,22 229:19 232:11 239:1 240:23 244:10 288:24 315:22 316:12 318:23 319:17 322:1 323:20 333:25 336:9 337:15 339:3,10 349:7 352:22 354:8 373:2 385:24 397:4	citizen 246:13
capturing 361:4,6	CD4 349:20,22 350:3,15,16	Chen's 121:25 149:11,12 152:24 153:9 154:24 155:12,13 156:4 231:1 232:1 241:16 253:1,12 310:5,10,20,24 312:5 313:9,11 315:4 316:19,21, 24 317:12 318:1 320:18 323:2 325:6,21 329:22 330:8 331:16 334:4 335:9 336:19 337:7 349:2,9 357:7 358:16 378:25 379:8 384:16 398:9 399:2	city 82:21 84:1,2 98:13 100:5,22,24 101:11,13 102:2 103:9 138:18 150:3, 6,7,8,10 175:13 180:12 183:1 187:14,15,22,23 188:16 190:12,13 191:14, 20,25 192:4,8,14,21 193:18 194:7 195:9 236:12 237:6,11 238:11 265:15, 22,24 266:1 302:15 305:22,23 306:5 308:10, 23,24 326:9 332:1 361:14 387:18,19 390:12 391:6 392:1,13,18
car 364:2	center 7:19 327:17 328:15, 21	cherry-pick 160:13	civilization 303:25
care 26:5 30:25 139:14 286:10 319:15 371:14	centering 194:1	Cheylynn 7:18	claim 25:11,22 265:14,16
career 10:18 264:25	central 51:11	Chief 217:7	claims 11:10 79:1 265:12 272:19
careful 134:8	chagrin 263:4	childhood 390:15	clarification 316:15 320:14 414:22
carefully 33:18 362:11	Chain 119:18 156:5,9	choice 136:8 142:2,6 191:23 192:4 225:5 285:19 304:9	clarified 51:3
Carlo 119:10,12,17,18,22 123:2 130:4 134:23 156:5, 9,10,17 157:12,19 339:9, 11 358:21,22	challenge 218:6	choices 286:7	clarify 32:21 36:25 60:23 90:24 119:25 292:7 316:11 320:13
Carolina 143:22 212:6 246:7 265:8,17 291:18,19, 24	challenged 80:12 266:6	choose 77:24 102:25 183:9 361:21	clarifying 193:6
Carr 79:19	challenges 80:8	chops 303:6	class 77:21,22 78:5 121:18
carried 110:25	chance 58:5 72:15 131:25 132:4,5,18,23 413:11 414:13 416:2	chosed 190:25 191:14 276:14 384:4	classes 77:15,19 121:13, 18 261:10,11 263:2
carries 340:15	change 26:12 30:7 76:2 124:16,25 128:20 150:23 183:7 185:8 201:18 212:25 224:10 226:14 227:2,17,22 228:9,22 251:5 252:15,16, 17 299:1 306:21 323:13 370:5 373:3	chosen 276:15	classified 226:11 227:25
cars 289:14,15	changed 13:12 52:3 68:5 108:2 122:8 128:15 205:3	Christopher 126:24 170:4,17 276:5	cleanup 395:25 404:14 417:13
case 7:15 9:11 11:12,23 31:1 32:22,25 33:7 35:3, 10,20 38:11,13 40:20,21 41:4 43:16 52:2 57:2 65:23 66:1,4,19,20,21,24 69:9 70:15 79:5,8,12,13 80:19 84:20,25 97:23 125:22 126:3,8 135:16 143:16,21, 22 146:19 148:4,8 151:6 161:16,20,23,25 164:19 165:2 191:19 200:18 208:7 212:5,6 213:25 214:10 216:17 237:24 239:9 246:2,8,22,23 247:17,23 248:13,15,16 249:1,8,14, 16 265:13,18,24 266:3,15 270:10 274:16 275:19 277:14,23 284:21 291:19 293:21 297:19 299:24 300:1 301:13,17 302:10 310:6,15 311:14 331:8 336:19 337:7 338:24 339:4 340:23 341:1 342:12 348:5 352:8 355:7 362:10 373:23 379:3 385:10 386:10 388:3 394:9,10,18 397:4,15 398:13,17,19,20 399:25 400:1 401:24 402:8 411:17	chapter 76:22	chunk 108:8,9 111:12 185:12,13 195:2	click 181:12,18 182:9 279:24
	chapters 76:4,7	chunky 298:22,24	
	characteristics 168:8 183:25 240:24 253:15	circle 86:17,20,21,23 87:2, 15,17,22 119:19	
	characterization 43:11 61:16		
	characterize 21:19 374:7, 10		
	characterized 113:25 233:22 249:17		
	characterizing 397:7		

clicked 182:16 183:5	Columbus 75:18	104:22,23 105:12 111:15	composite 183:17 184:8
Cliffs 389:25	column 209:10 271:5	131:16 152:2,20,22	222:16 225:11 226:18,19
climb 227:7,15	combination 26:20 27:2	155:13,23 231:22 249:21,	227:12 228:4,5 259:6,9
clip 213:6	29:1 102:7,21 154:8 160:3	24 250:2 253:7 254:3,7	composition 250:13
clips 406:23 407:1,4	combinations 190:2	255:17 287:10 315:16	320:10
clockwise 175:20	combine 189:11 190:17,	318:23,24 319:7,24 320:3,	computation 64:7
close 22:13 87:11 103:18	20	6,12 324:4 360:7,12 361:4,	computational 266:9
140:15 145:17 146:16	combined 184:16 187:13	5,7,10 368:24 378:15	computationally 279:22
176:23 223:2 230:4 280:13	189:19 190:11 355:11	379:11	computer 81:3 85:4 117:7,
284:2 348:13 412:4	combines 357:8	company 75:14,15,21	10,12,25 118:16 121:11
closely 137:8 210:6 307:4	comfortable 198:23 199:3	comparatively 272:21	123:3,6 153:18 157:13,17
closer 329:3	comma 220:18	comparator 275:19	163:21 170:7 197:18
closing 410:4	comment 126:22 160:6	compare 22:8 23:6 68:7	222:12 236:4 247:5 275:4
cloud 318:12,14 350:10	355:21 386:9	136:22 144:17 155:10	277:7 279:19 287:23
clouds 314:2	commentary 398:9	230:21 231:22 242:4	334:3,5 362:25
co-author 76:9	comments 286:17 341:9	253:13 255:4 275:10,12	computer's 258:16
coalitions 76:2	385:20,25 386:3,6,23	296:10 349:2	computer-generated
Coast 77:3	commission 80:6 81:9	compared 105:7 129:5	166:17
coauthor 48:17,18	104:1,5 151:15,25 152:8	155:9 241:20 290:22 291:6	computer-simulated
coauthors 399:4	188:25 199:9 200:11,16	295:11 296:21,22 324:15	191:6
code 124:7,11 128:19	266:4 285:16 286:16	compares 287:5	computers 157:14
129:2 198:2 200:8 201:15	Commission's 160:16	comparing 155:13 275:18	con- 66:10
228:21 229:15,22 233:7,	commissions 11:8	comparison 203:16	conceive 47:4
11,25 234:4 247:5,8	committee 86:5 145:8	267:13 287:12 325:1 331:1	concept 48:11 322:13
252:14 278:13,16 311:2	160:24 179:12 213:14	comparisons 275:20	351:13
369:3 379:15	258:6 264:7	277:9 324:23,24	conception 149:1
coded 127:11 129:18	committees 210:5	competitive 51:6 52:6,17	concepts 75:12 263:25
145:21	common 23:10 24:12 25:8	58:4,25 270:9	321:25
codified 38:24,25 39:9	32:18 114:19 133:2 278:2	competitiveness 75:8	conceptualization
48:5 60:24	279:17 299:9 312:24	competitor 119:17	158:24
codify 51:10	392:12,13,16	compiled 396:4	conceptualizations
coding 223:25	common-sense 87:19	complaint 218:8	115:14 232:9
coherent 23:14	commonalities 93:21	complaints 273:3,12	Conceptually 314:10
coherently 63:24	commonly 279:4	293:5	concern 51:12 53:8 233:4
cohesive 303:11	commonplace 125:25	complementary 361:9	257:14 311:16 388:15,19
coin 133:3	communicate 263:25	complete 43:17	concerned 51:12 220:10
cold 295:12 297:4	295:8 299:6,7	completed 281:2	concerns 18:8 47:18
colleague 400:5	communicated 210:16	completely 21:18,20,22	conclude 42:24 345:24
collect 93:11 263:14	communicates 295:13	36:7 103:3 116:1 194:17	concluded 248:17
collected 386:23	communities 92:22 93:4,	248:22 249:19,25 252:3	conclusion 134:16 150:24
collection 181:13 405:1	5,11 106:9 232:7,9 234:10,	325:22	217:8
408:17,18	15 235:7,12,18,22 285:23,	compliance 291:23	conclusions 12:4 42:13
college 77:15	25 286:3,12,15,20 306:9,	compliant 189:4 364:23	45:15 65:15 112:15 150:14
colleges 94:4	10 307:4 327:23 328:2	365:3	250:6 273:13 299:13,14,
colloquially 10:14 324:11	330:10,12 332:17 392:8,9	complicated 66:5 311:6	20,21 325:5 331:1 410:6
color 184:21 185:4 332:15	393:6,15,17,19,24	345:5,6	concrete 51:15
Colorado 91:11 106:23	community 93:15 96:15	complied 79:21	conditions 12:14 27:4
152:25 153:4 204:14	233:9 393:1 399:1 401:6	complies 242:11 367:17	conduct 168:7 179:4
367:8,9,11,13 390:17,18,	compact 85:2 86:1,11	comply 71:19 97:5 107:9	338:8 343:5
22	87:9 88:17,20 96:11 254:8,	229:6	conducted 64:3,12 239:1
colorful 394:22	12 255:20 282:25 360:14	complying 360:11	conducting 64:17 299:22
colors 184:18,24 318:11,	367:25 368:4	component 15:25 56:18	Conference 246:22
12 335:14	compactness 82:21	58:18 209:1 338:15	256:22
	85:25 86:3,6,8,10 88:23	components 13:17	conferences 264:20
	89:9,21,25 90:5,6,10,14	composing 283:8	
	95:1 96:13,14 100:13,21		

confidence 131:10,21 132:11 133:1	constraints 16:17 109:10, 13,15 117:12,17 123:5,7 128:5,14 129:3 137:7 158:20 202:10 253:19 275:3 310:25	Convex 86:12 88:3	73:8 178:10 187:5 205:18 213:17 222:17 240:16 257:8 375:2 385:24 394:25 396:7 407:2
confident 58:11 311:7	constrict 153:17	convey 173:17	Counsel's 53:1 351:22
configuration 160:1 186:1 187:19 190:21,24 192:10 355:18 361:12,22 363:6 364:22	constricted 153:5	copies 163:8,9	count 30:8 97:24 98:14,24 174:1 236:15,23 413:10 415:3
configurations 363:17	constricting 152:13	copy 180:24 181:19 188:4 203:1 208:11 340:9 396:6 417:15,19,20	counter 347:15
configured 159:20 194:24	construct 61:8	core 107:19,21 108:3,11, 12,15,20,21,23 201:2,9,12 208:20,25 209:6	counterclockwise 160:20
confirm 116:12 274:10	constructing 205:4	cores 200:22	counterfactual 14:1 21:3, 9 22:16 29:13,14,19,23 49:12 50:13 61:4,9 347:5,9
confirms 329:14	construction 239:20	corner 303:7,24 392:11	counties 93:8 94:9,14 96:5 103:12 151:20 173:24 204:23 228:15,23,24 232:10,21,25 235:25 238:16 243:8,13 245:8 282:7,9,12 291:21,22 315:14 320:24 321:1,4,6, 10,12,22 322:8 363:13 367:11 375:10,13,16 376:15,18 378:6,11
conflicting 104:3	consultant 11:8	corners 86:18	counties' 106:10
conform 127:16 128:12 137:8 234:1,4	consultation 341:10	correct 11:24 33:3,4,8,25 35:3,18,21 36:10,17 37:11 39:1 40:18 41:24 43:22 45:2,12,19,20 46:2,11,12 47:19,20 48:6,9 49:23 53:15,16,20 54:1 55:2,7, 11,12,18,19,22,23 58:3,7, 8,15,16 59:4,5 61:1 62:1,2, 9 63:5 64:1,5,6,21 65:24 66:4,13,17 70:8,10,11,21, 22 73:13,14 163:12 164:7, 16 167:23 174:15 176:7 177:4 180:19 197:20 200:13 208:21 215:16,23 216:3 218:3 220:19,25 228:19 229:12,13,17 230:7,22,24 231:3,4 232:4 233:24 234:3,6,7,16 235:15 237:24 238:8,13,18 241:1 244:1 246:3 247:3, 18 248:1,21 249:19 257:13 320:16 342:23 343:5 347:7 356:12 357:9 358:3,18,19 359:22 362:16 367:3 368:14 369:4,20 371:9 372:2 373:1,14 375:11 376:12 377:4,21 378:3,16, 19,25 379:7,11,16 380:20, 24 381:3,4,23 383:10,16, 18 391:19 393:13 394:4 400:16 409:2	country 75:17 119:4 277:12 338:3
confused 202:2 242:1 251:21	contact 165:7	corrected 26:1,2,3 27:25 28:1,5,20 29:2 318:1 417:14	country's 79:18
congress 16:14 64:13 145:17 306:22 364:7	contacted 38:11,20	correctly 97:8 358:13 380:11 385:21	county 83:21,22,23 84:1,5, 7,10,12 85:1,20 91:10,18 93:9 96:10 97:23,25 98:10, 13,14,16,18,21,24 99:24 100:10,11 102:11,15,18 103:4 104:8 106:3,22 123:23 149:20 151:3,7,9, 13,18,20 153:1 154:25 159:18 160:8,9,19,21 161:10 173:25 175:18 176:1 177:3,12 179:20,21, 22 182:24 183:5 184:15 185:17,23,24 186:1 187:12 188:15 189:4 191:16 192:17 193:18 194:6,7,17, 19 195:1,3,7,12,13,17,21, 22 198:16 228:22,25 229:1,5 232:16 233:2,12, 13 234:1 236:12,13,23 237:1,6,11,13,14,17 238:3, 4,5,8,10,20 243:8 244:20, 24 245:3,6,10,12 251:6,18 254:15 266:4 282:3,10,12, 19,20,21 284:21,24 285:9, 16 287:10 302:14,24 303:17 304:5,19 305:11,12 307:9,13,20 308:8,9,14,18, 22 309:20,23 310:4 312:15 320:17,19,23 321:3,6,10, 23 322:2,8,15,16,20,25 323:11,15 324:3,6 325:15, 16,18,22,25 326:1,3,8,15, 18,22,25 327:2,10,13,17 328:7,20,22,24 329:8 330:2,18,20 331:6,18,24
congressional 41:18,21 42:6 63:7,15 64:12 65:11 70:17 80:3 83:14 84:11 95:12 148:10 180:25 182:15 196:1 210:9,13,25 214:9 239:9 248:15 267:23 293:10,22 336:20 348:3 370:9	contained 246:3 288:15 322:14,20 325:15,17,19 353:9 357:13,14 365:23 366:2 367:4 371:11 374:5 376:16 380:1,14	correlation 26:8 29:5	
connected 256:6 303:25 307:4 366:24 368:13	contemplates 36:19	correspondence 115:4	
connection 304:25	contention 86:4	corridor 103:8,15	
connections 261:14	contest 117:15	corridors 105:23,25	
consideration 81:5 166:22 167:19 170:2 179:12	contested 27:21	Cory 276:4	
considerations 235:23	context 91:24 140:5,12 179:16 210:3,14 237:10 267:25 275:16 342:6 358:7 369:8 377:23	Cottonwood 241:10,14	
considered 166:13 236:4 257:4	context-specific 371:19	council 234:1 265:24 266:1 285:16	
considers 257:11	contexts 262:24 352:14	counsel 7:16 31:25 32:14, 25 38:19,23 44:17 47:23 53:3 60:6 71:16,21 72:12	
consistent 36:5 243:11	contiguities 149:18 241:6		
consistently 147:25	contiguity 92:11,16 149:13,25 151:4 240:23 366:25 368:23		
constant 25:15,23	contiguous 106:6 231:17 240:25 241:7		
constituent 341:12	continued 266:23		
constitute 64:19	continuing 193:22		
constitution 11:16 83:12 291:25	contorted 104:18		
constitutional 124:7 196:4 218:6	contrasts 197:23		
constitutions 58:1	contributor 185:7		
constrain 155:6 230:12 255:9 281:4 284:5	control 40:14 122:14 161:11 201:4 210:4		
constrained 201:9 230:3 250:15,21 251:8	control-enter 111:12		
constraining 251:23 253:22	controlling 55:15		
constrains 238:21	controversial 134:3 147:18 149:6		
	converged 280:24		
	convergence 284:7		
	conversation 253:2		

332:1,2,3,12,14,15,16,22 333:3,4,6,12,15,16 335:17 336:17 346:25 347:1 353:8,10,13,16,18,19,22, 24 354:14,16,24 355:4,8, 11,13,16,17,20,22 356:2,3, 5,8,10,15,19,20,22,23 357:8,14,19 361:13,15,23 362:12 363:25 364:9,21, 22,24 365:2,7,11,23 366:2, 19,21,22 367:5,10,12 368:6,13,23 374:6,9 375:8, 14,19,20,24 376:9,10,12, 16 377:3,8,9,18,21 378:3, 5,9 380:19,22 381:3,10,18 384:18 385:3,12 389:14,19 390:20 391:21 392:11,14, 24 County-based 327:3,7,12 330:7,15 332:19 336:10 352:25 357:9,11 363:15 couple 74:25 82:25 99:5 117:9 121:18 127:1 145:7 147:11 149:10 152:7 167:2 260:12 269:14 300:16,17 302:13 404:14 415:8 couple-of-sentence 129:24 court 7:4,7,13,23 8:5,12, 19,21,25 9:3,6,10,17 11:17 14:25 15:2 18:11 19:6 21:10 28:3,11 31:23 32:2, 5,8 33:16 37:20 41:10 43:2 44:13,16 46:8,9 52:24 53:3 54:7 60:6,11 67:4 68:4,8 71:5 72:3,5,8,12,17,18,22 73:2,4,8,12,15,20 74:3 79:6,17,18 80:2 81:17,25 82:2 86:14 89:3 96:19 97:21 98:2 104:3 117:3 120:19 125:4 143:16,20, 23,25 162:2,6,9,12,16,19, 21,25 163:2,4,11,14,18 173:6 187:2,3,6 202:20 205:17 206:18,20,23 207:4,6,12,16,21,24 208:2, 4 213:17,19,22 216:12,24 217:25 218:12,25 240:18 247:19,24 248:14,16,17,22 249:10,16 250:3 257:19, 22,25 258:13,15,17,20 259:13,17,22,24 260:1,5,7, 11,18 266:13 272:9 286:14 300:12,14,17,20,23 301:2, 4,6 307:22,25 308:3 334:11,13,18,20,21,25 335:7,10 339:23 346:4 347:20 352:1 354:2,5 359:6 362:19 364:4 366:12 375:2 394:17 395:7,9,11, 16,18,21 396:2,5,8,12,14, 21,24 397:16,22,24 398:1 399:7,10,15,17 400:2,7,10, 22,24 401:2,9,15 402:9,14, 16,21 403:6,10,14,19 404:4,7,9,24 405:4,6,11, 13,16,20,23 406:9,13,16 407:2,6,9,13,15,19 408:4, 7,9,12,14,18,23,25 409:4, 13,19,22,25 410:3,6,11,13, 17,19,23 411:2,5,7,10,16, 20,23,25 412:8,13,16,20, 23 413:4,9,16,19,21,24 415:6,8,10,13,16,20 416:11,13,15,17,20,23,25 417:3,7,12,18,20,22,24 418:1,3,5 Court's 84:23 96:19 129:23 163:2 167:7 181:10 187:1 301:4 316:15 412:3 courtroom 37:23 140:18 courts 45:10,24 46:20 47:15 49:23 50:2 84:19 119:3,4 216:1 217:17 247:14 394:4 cousin 387:20 388:16 cover 310:18 covered 310:19 covers 76:14 94:13 263:9 COVID 113:6,7 cracking 70:10,12,16,24, 25 297:10 349:8 352:12 crank 123:25 create 91:9 111:25 122:16 134:25 135:5,12 190:19 196:23 250:23 255:3 312:14 322:24 326:20 327:11 334:4 337:1 356:9 381:17 384:18,23 created 119:9 121:4 134:22 199:8 252:17 310:2 329:20 334:1 385:2 creates 319:6 325:24 329:17 354:23 creating 274:18 298:5 331:5 381:12 creative 276:13 credential 196:9 credible 394:19 credit 162:2 Creek 305:23 criteria 92:8,15 94:20 95:14 96:24 97:14 99:2 122:20 123:20 124:1,2 127:8 155:7 188:20 198:25 199:2,5,9 200:10,13,15,25 239:16,20,22 242:12 244:8 254:10 255:4,6 275:9 280:1,5,8 284:14 285:2,5, 7,22,23 286:7,23 287:1,7, 8,19,20 295:23 302:4 315:6 318:20 323:16,19, 21,25 324:10 325:11 338:18,20 353:6 358:11 360:3,6 361:19 363:7,10 367:6,14,17 368:19 370:21 388:25 393:2,23 criterion 103:22 critical 309:25 criticism 253:12 322:3 337:18 384:20,22 385:1,4 398:8 399:24 criticisms 18:4 145:5 149:12,14 253:1 310:21 352:22 384:15 criticized 150:25 247:25 394:24 criticizing 389:11 critique 44:3 148:24 151:8 152:1 159:7 317:15 319:20 critiques 142:17 147:20, 22 151:12 152:6 153:9 322:1 cross 31:23 98:10 106:1 182:2 197:22 236:12 238:20 251:20 307:13 332:12 333:7 339:23 cross-examination 32:11 164:1 340:1 347:18 crosses 98:13 225:17 237:6 crossing 251:4 308:10 333:3 crystal 62:15 76:5 109:25 cull 134:5,6 215:6,8 239:13,15 240:1,3,7 291:12,13 culled 134:10 136:4,9 174:6 198:17 219:21 290:24 291:15,22 292:11 294:19 296:21,22 346:12 culling 133:9,12,15 239:24 240:3,6,13 346:19,24 379:22 380:13 381:19 cumbersome 178:12 curiosity 33:13 current 75:1 164:19 211:5 cursor 308:9 curve 13:22 15:11,17,21 16:2 17:10 19:17,18 20:4, 10 23:15 26:4,10 30:11 43:19 49:11 56:6,12 58:21 62:12,16,21,24 63:4,7,24 64:8 65:18 curves 50:5 cut 47:23 86:19 97:16 cut-off 89:8,9 cutoff 132:8 144:22 cuts 195:12 CV 78:21 cycle 146:17 cynical 93:18	<hr/> D <hr/> D.C. 75:16 dark 336:2 data 27:15,16 28:22 31:14 35:24 36:9 37:4,6 43:12 51:13 111:7,17 112:8 113:10 115:18 127:10 134:9,10 183:9 197:19,25 198:3 201:15 203:8,14 220:17 221:19,21 229:3 239:25 247:25 248:6 251:22,24 256:17 257:3,10 258:24 259:3 261:13 262:23 263:13,14,16,21 271:15 286:19 336:9 342:5 346:22 369:22 373:24 377:6 385:20 386:5,13 387:2,7 database 120:22 date 164:25 167:4,16 257:22 340:24 dates 172:10 Dave's 78:9 149:24 180:19 181:4,11 182:3,4 183:16 185:3 196:8,17 197:7,24 256:8,17 302:13 304:12 350:22 388:2 406:5 David 7:18 414:7 Davis 102:15 159:18 228:23 326:1,2 332:22 333:4 353:22 355:16,20 366:19,21 368:6,13 day 37:16 113:18 118:2 141:21 157:14 158:2 234:13 240:19 258:7 275:17 311:2 382:3 396:3 413:25 415:20 416:10,18, 21 days 145:7 147:11 158:3 223:10 258:1 267:4 269:15 302:14 311:5 deadlocked 80:7 deal 238:24 dealing 319:18 debate 92:18 321:15 decade 148:1 decent-looking 155:21, 22 decide 78:1 171:16 189:20 272:10 345:22 decided 107:2 169:18 189:11 248:14 decides 176:23
--	---

decision 77:23 99:10 169:20 196:5 216:12 283:15 304:18 305:4,19 decision-makers 59:19 decision-making 189:15 decisions 77:25 189:10 285:12 286:22 deck 161:8,10 declination 21:11 23:3,19, 20 deduced 385:23 deems 42:6 deep 18:9 default 183:17 259:6 defendants 7:25 8:2,4 9:4 11:23 14:21 38:23 44:8 73:10 80:15,19 81:14 164:19 165:9 246:25 250:1 260:3 266:8,15 409:23 defendants' 8:16,21,23 83:8 101:7 163:10,17 396:5,11 397:23,24 398:2, 3 399:12,14,23 401:19,22 402:24 404:11 405:15 408:10 defending 66:10 defense 13:3,4 66:4 161:17 163:14 213:17 335:5,7 385:24 402:25 defer 68:8 206:25 define 24:21 55:25 58:9 62:11 115:25 defined 41:19 63:24 94:21 142:19 defines 37:3 41:18 defining 357:10 definition 34:15 56:4 60:19,21 120:13 221:11 228:22 358:21,22 377:3,9 definitions 57:22 definitive 374:18 Deford 18:7 19:23 44:2,22 45:1,7 57:9 59:13,16 63:19 64:9 degree 10:21 74:20 262:5, 6 285:4 330:21 336:25 372:13 delegates 80:4 delegation 20:18 146:6 demands 195:18 Democracies 54:25 democracy 55:21 58:14 59:1,4,21,23 Democrat 18:22 78:2 114:1 226:19 227:4 228:1	Democrat/republican 386:8 democratic 23:7 28:8 30:1,2,4 51:16 114:19,20 116:5 140:3 145:10,12,13, 22 146:9,12,15 221:3 224:14 225:5,13,22,24,25 226:2,8,11,21 227:13 265:23 266:2 295:22 336:13,16 348:21 357:16 380:2,20 381:13 385:11 democratic-favoring 379:23 Democratic-leaning 199:24 226:9 298:5 381:21 Democrats 11:5,6 14:2 15:17 17:22 18:15,20,21, 24 19:2,8,15 20:17,21 22:7 51:18 111:1 114:11,25 124:24 145:17,23 146:4,16 161:4,7 212:19 224:22 226:6 266:6 297:22 380:14 381:7 384:19,21 Democrats' 134:4 149:1 151:2 227:11 demographic 93:21 demographics 338:10 demonstrably 25:16 demonstrative 83:15 Dems 23:7 30:8 31:2 denied 351:16 denying 351:15 department 121:19 261:7 depend 363:9 depending 46:18 174:1 275:11 depends 62:21 201:22 275:16 deployed 292:19 derive 23:17 derived 62:18 Desanto 7:20 describe 10:19 13:15 15:5 17:6 20:25 55:20 58:4 173:14 188:2,8 262:2,10 263:2 352:7 365:21 describing 344:24 405:9 description 86:15 93:17 211:13 354:12 366:1 398:20 descriptive 352:4,5 design 110:12,16 263:16 287:17 378:2,4 designed 361:19 364:18 377:16 designing 56:10	desirable 303:8 363:12 detail 14:20 147:24 268:18 394:8 detailed 117:9 details 14:9 16:23 29:20 183:15,21 290:5 377:10 detect 138:6 149:22 detecting 45:9 determination 116:21 determine 148:22 323:18 398:1 401:12 403:22 determining 241:21 Detroit 301:21 develop 330:19 developed 38:8 49:8,9 88:13 121:2 125:21 developer 403:17 development 302:23 303:1,11 304:15 deviate 96:13 deviation 22:23 124:14 129:14,16,19,25 130:3,8, 11 131:6,11,15,19 132:3, 10 134:13 135:18 137:20 138:3 146:20,23,24,25 173:22 229:10,16,17 230:15,20 231:7 239:3 267:8,9 268:21 280:15 289:18,25 290:12 291:6 292:3,12,24 296:1,4,6,9 297:8,25 315:22,23 324:16 369:7,11,17 371:24 379:14,16 deviations 15:18 17:16 62:19 125:19 131:1,2,8 230:10 devolve 139:19 diagnostic 280:25 281:1 diagnostics 122:15,19,25 154:13,18 250:25 281:22 Dianna 7:4 Diego 10:23 differ 86:15 273:13 difference 16:8 37:22 40:2 42:7 61:11 64:23,24 65:14, 20 69:9 136:25 227:24 242:24 256:14 271:19 272:1,3 273:7 281:15 295:9 312:11 313:17 315:2,17,18,20 316:1 317:10 318:17 320:8,23 323:22 325:6 347:13 370:2 397:16 differences 18:10 194:23 348:4 375:14 different-looking 201:8	differentiator 187:20 differently 20:11 123:17 282:11 293:23 344:14 367:7 369:6 378:7 difficult 23:20 75:11 105:24 263:25 345:6 digit 198:11 direct 10:1 62:13 67:5,9 74:11 93:13 111:21 164:13 188:12 198:22 209:16 214:14 221:18 231:16,20 236:2 238:25 239:12 241:23 250:10 252:25 253:8 261:1 358:6,15 370:1 372:18,23 374:6 375:18 378:13 381:16 384:17 385:18 391:24 directing 285:19 direction 26:25 28:8 42:8 252:3 directions 184:22 285:20 390:12 disagree 39:16 70:18 240:6 355:23 disagreed 250:3 disagreement 273:4 321:8 399:1,5 401:6 discard 133:21,23 disclose 37:9 39:11,13 377:1 disclosed 33:6 discontinuities 314:17 discontinuity 314:5 discredited 247:14 discrepancy 254:21 discretion 89:21 96:20,22 272:7 discuss 53:17 70:23,25 122:10 125:9,11 404:5 413:13 414:5,10,24,25 discussed 40:25 43:21 48:7 68:23 107:22 114:14 154:16 157:9 231:16 284:15 302:20 339:6 378:17 400:15 411:13 discussing 35:16 60:18 discussion 50:14 69:22 82:7 275:24 286:14 392:3, 7 393:8 disease 154:22 disfavoring 34:10 112:23 disfavoritism 342:2 343:11 disfavors 33:22 disguise 107:17
---	---	---	---

disliked 147:25	271:25 280:15 282:13	369:25 370:4 371:13	22 80:2 86:2 96:3 97:5
dismiss 412:24	285:3 293:11,14 294:6,11	372:10 380:23 381:2,11,21	108:18 109:17,18 116:1,3,
displayed 197:25	297:11,22,23 298:3,5	388:6,13	13 117:14,20,24 118:16
displaying 388:3	301:19 302:22 303:19,20	districts' 326:17	123:14 132:1 133:18
displeasure 97:20	304:16,22 305:24 307:6	divergent 325:11	152:16 153:19 154:9
dispute 241:3 390:24	308:13 312:14 313:1,2,3,	diverse 202:6	155:22 170:1,4 171:2
disqualifying 257:4,12	24 316:2 322:17,19,24	diversity 153:25 251:10,	181:5 196:10 198:8 216:20
disruptive 309:19	324:5 325:14,21,25 326:20	23 281:12	217:12 220:3 229:24
dissertation 93:4 262:13	327:1,7,12,15,18 328:11,	divide 76:13 101:10 190:8	230:3,10 236:17 243:25
264:6,15,16	25 329:2,3 330:2,7,15,19,	318:8 375:9 376:1,2,18	244:2 245:12 254:8,12
distance 130:21,22 140:9,	21 331:6,17 332:19,23	378:11	256:7 276:23 277:9 281:16
16 227:7,14 296:6	333:12,14 335:17,25	divided 101:6 179:19	301:12 331:1 340:12
distended 86:23	336:4,7,11,12,13,15,16	243:8,12 245:7 320:4	349:6,15 357:20 358:4
distinct 94:3 229:1	349:13,17,24 350:23	divides 101:9 177:3	361:21 376:22
distinction 226:3 322:12	351:2,7,12,15,16,19 352:9,	dividing 33:20 175:17	drawer 89:22 116:21
distorting 19:17	25 353:12,15,17 354:13,	323:9 378:10	118:18,20 191:3,7 197:1
distraction 319:2	15,23 355:2,18 356:3,10,	division 362:6	drawing 45:15 81:2,22
distribution 25:9 65:6	14,22,25 357:9,13 360:8,	divisions 79:20 243:8	84:24 85:18 89:6 90:22
287:12 290:9 291:8 294:21	10,14,24 361:12,18,20	316:9,23,25 321:12 372:17	92:1 109:11,21 110:1,4,8,
295:7 296:23,25 298:17	362:2,3 363:12,13,14	373:25 375:8	12,16 111:18,20 115:21
299:10 316:8,23 323:23	365:20,22 367:24,25	divvied 76:16	117:13,16 118:13 119:19,
325:3	368:4,14 371:15 372:6	document 67:24 69:12,13	22 123:13,18,23 132:1
distributions 317:6	374:11,21 379:24 380:2,14	341:3 396:22 411:15,18	145:10 151:15 152:9,21
district 7:3 16:6,11 17:4	381:7,13,17 384:18,23	412:21	155:5,18 158:20,24 159:1
18:15,17,18 25:1,3,6,20,21	385:3 389:16 391:7,17,18,	documents 417:14	171:17 172:5 180:8,13
30:6,11 31:8,9 56:11	19,21,23 394:9	domestic 79:23	182:3,20 196:20 197:16,18
61:11,24,25 83:14 84:11	district's 224:20 225:6	dominant 65:1 69:6	198:23 200:20 216:25
85:11,13 86:17,18,19,21,	293:19 295:10	Donald 222:5	243:12,18 245:10,20
22,24 87:1,3,5,10,13,16,	district-based 54:25	donations 262:16	253:19 254:18 255:16,21
17,18,20,22 88:5,6 90:8,9	114:25	donut 204:22,25	257:2 258:24 259:3 314:14
91:6,14 96:11 98:24	district-level 14:14	doors 207:21	337:25
100:10,11,12,15,16,18,19,	districting 336:20	dot 29:1	drawn 96:9 105:16,22
24 101:19,22 102:1,4,14,	districts 22:7 23:8 24:14,	dots 350:11	106:18 116:18 117:11
16,17,19,20,22,23 103:1,3,	17,19,25 25:10,16,24	dotted 290:14	123:16 129:3 132:13
9,10,11,13,14,17 106:22	27:20 30:8,14 31:5 33:20	double-check 247:2	133:17 139:13 157:13
107:2,24,25 108:2,4,7,9,	63:8,25 64:4,18 65:11	287:22 300:9 401:4 414:2	168:9 170:7 176:14 198:25
10,16,18,21,22,23 113:2,	66:11 69:17 70:6 79:15	double-checked 247:4	229:9 234:25 238:22
25 114:12,16,18,19,22	83:15,16 85:14,16 86:1	doubt 61:15 68:11	242:17 243:15 257:5 277:4
116:5 124:17 129:10,11	87:24 92:2 95:11 99:20	doubted 218:4	387:7
130:12,14,17 135:22,25	100:7 103:19,23 104:6	downloadable 121:4	draws 86:17 123:3
136:3 140:16 145:11,16	105:8,10,21 106:5,21	downloaded 121:8	drew 81:3 82:8,12 92:24
146:7,11,12,15 150:23	107:4,5 108:15,20 110:6,	downside 211:16	96:25 99:3 103:20 111:6
160:2 168:17 179:21,22	10,13,17,21,25 111:8,11	downstream 151:19	112:20 129:2 160:9 168:4
183:14,25 184:13,14,17	114:6 115:2 124:5 125:2,	dozens 86:6 127:19	170:21 172:13,18 174:15
185:1,12,13,16,20,22,23	19 137:21 139:12,13	drafted 138:17	179:18 181:2,17 186:11,14
187:23,24,25 189:20	140:8,15 141:9,10 145:14,	drafting 142:20	187:9 191:19 192:19
190:7,8,19 191:15,16,21	24 146:1,14,23 147:1	dramatically 348:1	193:7,10 194:4 253:20
192:1,6,14,16,24 193:23	148:10,16 149:19 150:7,9	Draper 84:2 101:21 236:12	389:1
194:5,25 195:2,12,16	151:1,15 152:2 155:1,15	237:21 238:2 309:6 328:3	dried 97:16
199:24 201:7 204:18,19,22	156:21 158:22 160:3,11,13	329:9 330:11 331:23	drill 126:20
205:8 208:23,24 209:4,5,	177:13 183:4 186:4 189:18	333:8,15,16 361:23 362:1	drive 255:24 256:5 308:24
12 210:6 212:4 222:2	200:22 201:5,8 213:3,4	draw 42:13 44:18 47:11	363:24 368:8 389:8,18
224:14,16,17,18,22,24	214:4 222:11 225:15	65:14 75:19 78:10 79:14,	390:11,18,21 391:5,15
225:12,14,22,24,25 226:2,	226:4,5,10,24 227:5,18		392:4,6 404:23 407:9,19,
13,21 227:3,25 228:9	230:4 234:1,2 238:12,22		21,23
234:5 236:19,21 237:1,14	239:6,10 245:4,7 249:23		driven 77:10 390:16
238:3 241:8 242:18,22,23	254:8 266:5 275:1,2		driving 281:8 289:14
243:23,25 244:3 245:1	280:11 282:25 283:8		364:8 391:20,25
247:24 249:23 251:11,23	285:5,13,14,15,16,17		drop 138:2 227:1 391:10
252:10 254:12 267:23	294:8,9 295:5,22 296:9		dropped 128:9,10
	297:9,14,21 298:7,23		drops 390:2
	308:16 313:3,8 314:7,12,		
	14 322:14 326:13 335:19		
	353:5 357:16 358:10		
	362:15 363:20 364:22		

<p>drove 77:3</p> <p>Drs 8:17</p> <p>dubious 25:21 149:2</p> <p>Duchenne 390:3</p> <p>Duchesne 94:8,13 232:20 234:23 235:24</p> <p>Duchin 156:14 398:4,18 399:4,25</p> <p>due 75:24 241:5 343:24 344:1 345:12,14,17 410:14</p> <p>Duke 74:21</p> <p>duly 9:22 74:8 260:21</p> <p>duplicate 154:19,21 182:11,16 337:16,23 338:21 339:1 358:25 359:21</p> <p>duplicated 153:10,12 363:1</p> <p>duplicates 154:15 339:15, 17 358:17</p> <p>Duplication 358:7</p> <hr/> <p style="text-align: center;">E</p> <hr/> <p>E17 241:16 242:9</p> <p>E18 243:5</p> <p>earlier 31:6 97:8 107:12,23 109:9 115:5 137:13,14 144:14 147:12 154:17 179:14 193:3 197:18 245:14 263:1 289:1 325:23 332:22 335:16 339:22 361:24</p> <p>earliest 178:10,16</p> <p>early 7:22 48:19 264:24 276:6 341:8</p> <p>earn 270:4,5</p> <p>ease 92:12,17 105:20</p> <p>easier 17:15 411:14</p> <p>easiest 32:6</p> <p>easily 97:5 173:23</p> <p>east 179:19 189:12 190:18 305:20,21 306:10 327:21, 23 328:6 356:10 361:16</p> <p>east-to-west 181:3 184:12</p> <p>east-west 100:4 101:10 175:10,15,22 178:4 179:18 180:9 190:7,8,21 195:12</p> <p>eastern 100:18 101:22 187:24 192:14,16 195:16</p> <p>easy 49:10 117:7 127:18 247:8</p> <p>economic 93:20</p>	<p>edge 109:23 299:16 350:10</p> <p>edges 201:17,23,25 299:25 328:19</p> <p>Edgewater 303:1</p> <p>Edgewood 388:9,17,20</p> <p>educational 10:20 74:18 262:3,8</p> <p>Edward 17:2</p> <p>effect 93:13 109:4,17,19 112:2,23 115:23 133:17 134:1 150:22 243:17 255:7</p> <p>effective 148:5</p> <p>effects 64:11 112:22 113:1 115:22 116:2,3 139:5,15, 17 147:6,7</p> <p>effects-based 115:7,11 138:11,12 139:23</p> <p>efficient 27:25</p> <p>efficiency 21:12 23:4 24:5,7,8 26:16,22 27:3,7, 10,25 28:1,5,20 29:3 40:7, 10 79:6 113:23,24 142:25 143:1,5,6,9,11 147:11,15, 25 148:4,7,15,21 149:7 212:10,14,19 217:14,16,23 218:2,5,14 219:2 227:23, 24 267:11 268:6 293:1 298:8,10,14,21 324:21 347:4 402:7</p> <p>efficient 279:22</p> <p>Eighteen 404:20,23,25</p> <p>elbows 91:5</p> <p>Elder 251:4 363:24 364:8</p> <p>elect 351:17</p> <p>elected 146:15</p> <p>electing 16:14</p> <p>election 14:3 18:19 27:17 29:2 30:3,21,25 31:2,3,6, 17,18 42:17,19 50:17 53:9 55:16 110:10 183:9,17 184:9 197:24 224:15 226:16 247:20 273:17 294:3 347:5,10,11,14 348:2,3,7,10,12,15 384:5, 6,7,10,11 386:2 415:20 416:10,18</p> <p>elections 14:12 27:19,23, 24 30:20 48:21 51:6 52:6, 17 58:7 75:2 76:6,15 145:18 211:17,22 222:16 224:19 228:4 246:8 266:1 270:8,25 271:2 273:19 293:15,16 294:1 383:14 384:14</p> <p>electoral 12:3,19 21:17 44:25 45:14 53:20 55:9 57:22 58:4,10 59:1,3,22</p>	<p>electronic 68:2 407:10,21</p> <p>element 47:13</p> <p>elevate 363:21</p> <p>elevated 363:7</p> <p>Eleventh 394:12</p> <p>eliminated 380:13</p> <p>Elizabeth 12:6</p> <p>elongated 87:3</p> <p>email 407:5</p> <p>embarrassing 149:15 231:19</p> <p>emphatically 394:19</p> <p>Empirical 54:24</p> <p>employ 45:24</p> <p>employed 46:1 47:13,15 289:17</p> <p>employs 274:9</p> <p>empty 55:17</p> <p>enacted 35:6 66:16 82:9, 12 96:25 99:4,8,9 103:22 104:9,21,23 105:6,17,20 106:5,6,8 107:13,16 108:6 110:1,4,8 111:6 112:15 117:15 123:10,13,14,16 130:13,14 134:14 135:18 138:6,12 141:22 144:3,8 145:24 155:6,8,9 166:16 176:6 180:4 199:20 209:5 253:6,14,15 255:5 349:18 350:3,16 387:7 388:6,13, 20 390:19</p> <p>encapsulates 133:2</p> <p>encounter 280:17</p> <p>encountered 122:3 125:12</p> <p>encourages 77:24</p> <p>end 47:11 81:2,6 103:14,15 108:24 109:21 111:14 112:3 113:18 116:2 118:2, 11 123:8 124:3 127:15 131:4 139:23 143:24 151:17 156:5,11,18 157:14 187:13 188:9 198:17 228:14 248:18 249:19 275:17 284:25 327:25 328:4,10,11 330:10 333:6, 12,18 355:3 358:15 377:19 385:20 400:13 406:20</p> <p>end-all 152:20</p> <p>endeavored 351:25</p> <p>ended 27:22 99:7 102:9 113:14,18 116:5 133:20 155:25 202:5</p> <p>endorse 143:17</p> <p>ends 99:15</p> <p>energy-producing 94:10</p>	<p>engagement 164:11,13</p> <p>engagements 180:22</p> <p>engaging 277:19</p> <p>enhances 140:6,14</p> <p>enjoin 412:6</p> <p>enjoined 196:4</p> <p>enormous 276:18,21 317:23 347:13</p> <p>enormously 278:12</p> <p>ensemble 119:9 120:1,2, 5,10,14 126:16 128:4,15 129:6 131:6,24 133:11 134:13,22 135:1,12,17 145:20 153:10,12 200:3 221:3 233:6,25 234:4 239:20 254:22,23 255:2 267:7 268:21 274:8,12,15, 19 279:20 280:2 286:24 289:18 291:12,14 292:2, 11,20 294:19 295:11,12 299:22 312:5 324:15 346:12 372:19</p> <p>ensembles 118:10 120:6 121:3,7 127:23 130:15,18 136:12 239:14 240:13 267:17 274:14 275:13 291:15 370:4</p> <p>ensure 250:13</p> <p>Enter 279:24</p> <p>entered 44:8 373:23</p> <p>entire 15:21 17:15 63:25 65:18 79:25 204:18,20 245:22 253:25 322:17 372:4 397:1 402:10 407:2</p> <p>entirety 356:18</p> <p>entitled 248:20</p> <p>enumerate 268:17</p> <p>enumerated 268:6</p> <p>equal 26:18,19 83:17 103:23 104:1 124:6,8 230:4 231:2 283:4,11</p> <p>equality 280:11,12,14,19 368:22 369:4,10 388:24</p> <p>equalize 355:20 370:24 371:3</p> <p>equally 84:11 269:21 295:20,25</p> <p>equivalent 333:6</p> <p>equivocations 395:2</p> <p>error 31:11 175:2 236:5 247:11 316:3 319:19 379:19</p> <p>errors 245:24 246:3,4,12 247:3 250:25 251:9 284:8</p> <p>erupted 110:24</p> <p>Escamilla 148:11</p>
---	---	--	---

<p>escapes 84:3</p> <p>escaping 389:24 390:2</p> <p>essential 44:24 338:22</p> <p>essentially 269:24 283:19 290:5 298:4 330:12 338:14</p> <p>establish 67:13</p> <p>established 223:24</p> <p>estimate 13:22 29:13 31:8, 16 35:4 39:18 43:16 61:3 63:7 64:11 65:18</p> <p>estimated 28:22 71:23</p> <p>estimating 21:2</p> <p>estimation 13:24 14:2 21:3,9 22:16 29:19,23 30:13 52:8,9 61:4 62:24 64:8 360:13 379:19</p> <p>estimations 49:13</p> <p>et al 7:14 18:7 19:23 44:3 45:1 59:16 64:2</p> <p>evaluate 13:9,23 14:16 43:6 46:10 48:21,23 65:11 79:20 80:23 95:24 107:19 138:12 155:5 210:12 224:24 266:19 361:9 403:23</p> <p>evaluated 43:18 61:10 111:11 113:11 174:11 176:10 180:16 186:9 212:13 270:3</p> <p>evaluates 212:9</p> <p>evaluating 44:25 47:16 81:6 342:1</p> <p>evaluation 35:14 47:14,17 173:12 254:21 406:3</p> <p>Evaluations 54:24</p> <p>Evan 146:4 348:15</p> <p>evened 101:20</p> <p>event 193:16</p> <p>events 414:14</p> <p>eventuality 56:23</p> <p>eventually 49:22 53:9 55:15 155:8 283:16</p> <p>everybody's 278:12</p> <p>everything's 138:16</p> <p>evidence 8:15 27:13 45:16 47:9 112:21 330:16</p> <p>evidentiary 8:10 395:25</p> <p>evolutionary 216:8</p> <p>evolve 220:21</p> <p>exact 102:7 122:25 123:7,8 171:23 197:22 339:12 340:24</p> <p>examination 10:1 71:8 74:11 221:18 236:2 239:12 261:1 358:16 372:18,24</p>	<p>374:6 375:18 378:13 384:17 385:19 391:24 397:12</p> <p>examine 393:1</p> <p>examined 9:23 62:4 74:9 260:22</p> <p>examples 18:13 90:25 157:9 159:8,12 359:21</p> <p>exceed 229:10</p> <p>exception 235:23 282:9</p> <p>excerpted 406:6</p> <p>excerpts 409:9</p> <p>exchange 273:3</p> <p>exchanging 278:12</p> <p>exclude 160:10</p> <p>excluded 247:13,17 377:2,8</p> <p>excluding 124:3</p> <p>excuse 33:8 116:9 129:1 155:13 159:10 167:17 223:4 287:21 395:12</p> <p>excused 72:7,10 162:23 207:10 259:19 300:25 395:10,14,21</p> <p>exercise 118:2 152:15</p> <p>exhaustive 265:6</p> <p>exhibit 13:4 44:8,12,14 54:19 55:4 57:8,14 60:3,10 63:18,23 67:10,14 80:15 81:14,15 83:8 101:7 135:16 163:10,17 173:5,9 176:5 179:6 202:13,17,22 203:8 213:8 242:2 256:21 257:16,17 258:3 334:22 335:2,6 354:1,4 359:4,13 362:18,23 366:10 374:11 396:15 397:1 398:2,4 399:12,14,23 401:22,23 402:18,24 403:1 404:1 405:15 406:2,8</p> <p>exhibits 8:11,16,22,23 72:25 73:5,6 81:18 332:21 395:24 396:3 401:19 404:11 405:25 406:18 407:10,22 409:5,15,20,23</p> <p>exist 108:22 253:12</p> <p>existence 65:12</p> <p>existing 370:25</p> <p>expand 87:21,22</p> <p>expansive 341:22 342:4</p> <p>expect 18:17 131:6 287:20 314:11,15,16,17,22 329:15 343:19 385:14</p> <p>expected 12:10 15:13 354:24</p> <p>experience 84:19 89:20 94:19 97:12 105:17 247:20</p>	<p>272:16</p> <p>experiment 144:1</p> <p>expert 8:11,17 11:1 14:22 35:8 38:3 65:23,25 66:3,7 67:15 68:12 78:15,23 79:18,25 80:14,19 81:15, 22 97:9 121:22 125:20,21 135:15 161:7,8,17,19 162:2 180:22 188:1,5 208:12 216:16 239:17 246:11 265:1 266:9 341:13,25 377:7 399:19</p> <p>expertise 34:4 336:18</p> <p>experts 39:6 88:15 118:22 121:15 126:8 146:18 149:4 278:7 279:12 399:18 400:3</p> <p>explain 55:4 75:11 120:19 131:13 273:1 288:8 296:14 315:25 323:21 332:8,17 335:12 345:2,11,19 355:9</p> <p>explained 62:13</p> <p>explains 325:5</p> <p>explanation 191:13 312:22 316:4 317:8 331:16,21,23 332:5,7,20 377:14 382:22</p> <p>explicitly 377:16</p> <p>exploration 315:11 354:20</p> <p>explore 314:11 326:12 329:16</p> <p>explored 190:2 311:8</p> <p>explores 314:13</p> <p>exploring 314:23 327:10 330:17 363:17</p> <p>exposed 143:8</p> <p>express 36:8</p> <p>expressed 39:20 40:1,6 70:19</p> <p>expressing 36:18</p> <p>expressly 98:20</p> <p>extend 233:20 331:23 411:8</p> <p>extended 167:8 261:19</p> <p>extending 352:25</p> <p>extends 102:4</p> <p>extent 95:16,20 96:24 99:18 112:3 233:15,19 254:2,5,6,11</p> <p>extra 282:20 375:19,23</p> <p>extract 172:2</p> <p>extreme 325:13</p> <p>eyeball 88:25 89:3,6</p> <p>eyebrows 365:13</p> <p>eyes 235:12</p>	<p>F</p> <p>F"d 40:14</p> <p>face 306:12</p> <p>facing 305:10</p> <p>fact 14:12 18:23 25:12 28:6 41:5 42:9 52:1 112:11 176:14 228:21 234:13 235:19 236:10 237:17 238:19 254:23 306:23 311:16 317:10 335:21 343:14 348:5 365:10 369:18 392:3 412:10</p> <p>factor 46:2 93:20</p> <p>factors 196:6,7 312:17</p> <p>faculty 10:24</p> <p>fail 21:20,22 41:19 42:6 136:1 223:16 382:7</p> <p>failed 111:15 300:6 382:24,25 383:25</p> <p>fails 116:2 271:10 383:13</p> <p>fair 17:9,21 19:8,24,25 20:1,7,10 28:6 34:1 49:14 50:3 51:7 52:5 116:24 225:19 247:16 341:20 394:12</p> <p>fairly 211:18</p> <p>fairness 12:3,8,15 13:10 16:1 19:7 33:2 34:13,16 39:3,12 42:14 46:10 47:16, 18 54:25 55:6,9,21 56:9,18 57:5,23 58:19 79:22 83:1 99:16 113:11 139:2,7,9 143:19,25 214:3 221:25 271:13 274:3 299:11</p> <p>faith 231:9</p> <p>fall 43:8 114:6 131:16 169:12 225:7 232:24 261:9 267:7 272:9 299:25</p> <p>falls 42:7,22 92:12 129:11 132:2 153:21 158:23 290:19,20,21 291:8 296:18,19,20,25 317:17 325:2 330:4 350:5,9</p> <p>false 25:16,22 143:7 218:8</p> <p>familiar 77:12 109:15 147:19 148:3 216:11 221:4 246:8 268:16 301:22 302:6 385:7 394:10,13</p> <p>familiarity 305:7</p> <p>family 132:16,19,22 139:3, 5 261:18,19 267:6 303:23</p> <p>fancy 15:11 28:23</p> <p>fare 211:6 270:22 271:4</p> <p>fared 114:15</p> <p>farm 261:21</p>
---	--	--	--

faster 308:5 fastest 390:10,20 Faulkner 252:21 favor 20:21 24:13 110:13, 17 116:19 favorable 128:24 favored 380:15 favoring 34:10 112:23 381:7 favorite 78:13 favoritism 34:7,18 35:2 37:19 65:13 342:2 343:10 favours 33:21 59:21 112:16 138:7 384:19,20 feasible 53:10 feature 230:23 358:8 features 193:21 284:23 345:12 federal 83:12 124:7 143:25 217:17 262:17 306:15,17, 25 feed 305:22 feel 415:5 fellow 10:24 felt 198:23 fewer 85:1 150:22 295:5 370:6 fewest 96:10 238:14 field 118:22 309:15 fields 45:14 47:12 Fifield 276:6 Fifteen 67:11 78:19 Fifty 294:13 fight 133:22 139:19 247:16 249:20 fight 245:21 figure 28:4 101:6 149:22 241:16 242:9 243:5 289:20,22,23 291:5 294:23 295:2 312:18,19,20,21,23 313:8,10,11 314:21 316:7, 11,19,20 317:21 318:1,4,7, 16 319:24,25 320:2 323:5, 7,8,12 326:5,7 332:8 336:14 349:2 figured 99:25 100:23 325:9 figures 323:24 369:19 file 182:9 252:1 310:14 373:3,10,17 411:17 files 178:10 333:25 373:24 fill 86:21,24 87:18,23 88:6 filled 183:5	fills 87:1 filtered 198:13 final 14:15 78:11 88:8 95:5 127:20 128:2,25 202:7 283:14 292:25 298:8 389:4 finalists 81:5 finally 45:7 127:15 402:25 find 40:15 51:4 67:3 85:5 93:20 98:4 102:7 118:12 130:7,8 133:19 150:20 159:8 188:3 230:17 273:22 286:24 287:18 294:20 324:22,25 329:24,25 352:15 372:7 386:9 415:17 finding 244:12 246:24 findings 13:16 298:12 410:5,10,12 finds 154:7 230:18 fine 89:18 133:19 185:10 205:21 254:19 258:20 316:18 345:10 357:4 397:21 411:3,4 416:24 finger 128:18 finish 53:4 347:21 finished 266:3 fire 126:20 firm 164:23 firmament 75:10 first-past-the-post 16:11 17:3 fit 43:11,12 51:13 282:13 five-elevens 154:3 five-minute 392:5 five-nines 154:3 five-point 31:7 227:14 five-tens 154:3 fix 68:3 99:12,14 124:15 171:8 196:7 fixed 101:25 127:20 fixing 99:16 103:19 150:22 171:9 flagship 264:18 flash 404:23 407:21 flaw 358:8 flawed 249:18 flexibility 279:15 284:12 flexible 415:17 flight 81:19 205:25 259:20 307:23,25 flip 203:9 334:8 335:11 flipped 244:21 flipping 156:18 334:10	Florida 97:20,21 98:1 394:9 fly 308:6 focus 194:19 262:10,19 319:16 326:14 364:20 focused 246:12 focuses 77:22 folder 181:20 182:10 follow 82:17 91:10,17 95:15 96:23 106:12 107:7 118:1 123:6 152:25 153:1, 7 200:18 275:4 343:3,7 345:15 365:19 384:1 food 206:12,25 foolishly 213:10 footnote 57:17,18 355:14, 24 369:15 for- 236:17 force 84:19 237:16 238:8 forced 236:24 238:10 forces 96:18 98:15,17 236:13 forcing 96:4 forecast 51:14 348:3 forecasts 14:11,13 foremost 39:3,6 forever 176:22 forget 59:25 forgot 184:19 324:18 Fork 391:10,15 form 358:10 411:14 formal 16:12 56:4 formalized 52:5,7,14 formalizes 57:22 formally 21:18 22:4 23:13 164:22 formulation 25:15 forward 9:7 12:16 180:10 191:1 260:6 272:19 364:16,18 fought 125:3 found 84:21 150:13 251:2 296:15 354:14 394:18 400:5 foundation 403:22 foundational 125:17 Foundations 54:24 four-and-a-half-hour 390:21 four-district 18:13 four-person 20:17 four-seat 340:16	four-ten 154:4 four-way 99:25 188:15 fourth 92:8 130:13 297:22 fractions 378:20 fragment 108:7 framework 78:6 frankly 102:6 freeway 309:9 frequent 48:18 frequently 43:23 314:8 338:19 Friday 126:4 308:3 357:22 front 80:16 208:11 340:9 froze 294:24 307:18,21 350:25 frozen 300:9 full 11:14 45:5 69:1,21 70:1 134:4 139:17 213:17 290:22 295:11 329:16 408:5 full-blown 143:17 Full-time 75:5 fully 12:20 311:8 330:17 343:6 414:17 fulsome 382:22 fun 118:25 191:9 function 17:13 298:21 functional 28:24 functionally 337:21 functioning 276:22 functions 17:15 fundamentally 249:18 funding 305:12 funky 251:15 funny 110:22 157:22 255:15 fused 201:15 232:21 233:16 future 24:16 42:17,18 50:18 55:16 58:6 294:1,3 347:6
G			
Gaber 7:12,19 159:4 162:14,18,20 163:13,19,20 164:2 173:4,7 181:9,11 184:5 187:1,4,7,8 202:14, 16,21 205:15,20,24 206:16,19,22 207:2,5,20 208:1,3,8,9,10 213:11,21, 24 240:17,19,20 257:1,21, 24 258:1,18,22 259:12,19 266:12 339:20,23 340:2,4			

<p>346:8 347:18,23 348:9 351:24 352:6 353:25 354:3,7 359:3,7,9 362:17, 20 364:7 375:4,7 393:25 394:2 395:13 396:13,15,23 397:2,10,19,23 398:3,15 399:13 400:17,19,21,23,25 401:14,18,21 402:3,25 404:2,6,8 405:2,5,8,12 408:16,20,22 410:2,16,18 411:4,22,24 412:1,17,21, 24 413:3,8,18 415:3,5,7,25 416:7,9,12,14,16,19,22 417:11 418:2</p> <p>gap 21:12 23:4 24:5,7,8 26:16,22 27:3,7,10,25 28:1,5,21 29:3 40:10 79:7 113:23,24 114:7 142:25 143:1,5,6,9,11 147:11,15, 25 148:4,7,15,21 149:7 212:10,14,19 217:14,16,23 218:2,5,14 219:2 227:23, 24 267:11 293:1 298:9,10, 14,21 313:22,23 324:21 336:14 347:4 349:11 402:7</p> <p>gap's 40:7 268:7</p> <p>gaps 406:20</p> <p>garbled 248:10</p> <p>Gary 12:6 48:9,17 49:5,8 51:12,21,22 52:3 88:12 219:24 220:1</p> <p>Gary's 48:15</p> <p>gather 176:13 231:22 341:15 343:1 385:23</p> <p>gave 168:18,20 170:13,15 171:1 201:1 222:15 233:4 242:3 276:13 282:16 346:24 375:12 377:5 397:4</p> <p>Geiger 8:1 260:3 261:2 266:8,14 270:11,13 287:21 288:2,3 300:13,19,21 301:3,9,10,11 307:23 308:7 316:14,18 317:11 334:11,12,15,19,24 335:1, 5,8,11 339:18 346:2 347:16 351:22 395:8,10 404:17,20 408:15,21</p> <p>Gelman 48:18 49:9</p> <p>general 17:1 18:6 29:17 39:25 40:4 41:12 42:15 51:20 60:22 63:13 75:12 127:6 139:9 294:5 335:24</p> <p>generalization 14:8</p> <p>generalized 253:19</p> <p>generally 42:13 47:4 61:5 77:12 78:2 139:10 171:2 177:4 186:5 235:2 255:23 310:17</p> <p>generate 48:19 118:10 121:6 274:15 275:1 279:2 282:25 283:4 295:21</p>	<p>340:18</p> <p>generated 85:4 137:7 181:16 279:1 289:7 312:7</p> <p>geographic 94:17 106:12 274:25 284:16,17,22 312:13 319:2 335:25 368:22,24</p> <p>geographically 86:1 282:25 392:16</p> <p>geography 41:7 115:17 200:3 295:14 327:13 357:18 385:5,8</p> <p>geometric 255:4</p> <p>geometry 23:23</p> <p>gerrymander 42:25 43:7 47:6 66:16 69:15 70:5,10, 12,16 80:13 115:15 116:8 121:2 148:23</p> <p>gerrymandering 11:9 23:11 35:13 45:9 50:19 78:8 79:1 91:7 97:22 115:7,11,12 130:6,8,19,25 143:23 248:13 265:11,14, 16,18 275:15 291:19 301:17 344:20</p> <p>gerrymanders 28:10 70:24,25 79:10</p> <p>get all 24:17 133:3,4 409:19</p> <p>get-go 205:1</p> <p>Gibson 7:5</p> <p>Gill 79:5 143:16 148:7 212:5,7 216:11,23</p> <p>Gingles 80:1</p> <p>give 7:7 12:1 16:22 18:11, 12 86:14 90:25 118:25 123:2 129:23 131:4 167:4 169:8 173:20 181:24 203:1 204:11 242:15 258:13 270:19 278:18 282:17 284:19 285:6 294:5 300:15 327:4 338:8 339:20 342:18 343:23 344:3 345:11 376:14 388:15 398:1 405:18 407:9</p> <p>giving 169:9 283:18 293:18 345:16 376:21</p> <p>glad 193:6</p> <p>glass 31:25</p> <p>glean 342:5</p> <p>goal 45:8 64:11 123:9 150:20 156:15 158:16 253:18</p> <p>goals 93:16 99:19 253:5</p> <p>gobbledygook 217:11</p> <p>good 7:7,17,24 8:5 10:3,5 18:20 20:13 30:17 32:13 67:12 71:11 74:13 93:10,</p>	<p>15 94:1 99:17,21 105:18 122:20 141:18 146:24 147:8 148:20 153:23,24 154:11 164:3,5 185:8 202:11 212:9 235:25 240:3 245:11 248:4,25 249:2 253:7 261:3,4 300:19,21 338:17,20 340:3 360:3 363:20 365:3 395:15 411:16 416:2</p> <p>goodness 389:23</p> <p>Google 390:7,24,25 407:9, 23</p> <p>gosh 111:1 324:17</p> <p>gotcha 408:1,20</p> <p>govern 123:3</p> <p>governed 82:21</p> <p>governing 98:8</p> <p>governor 412:6</p> <p>governor's 225:1</p> <p>grab 87:25 91:8 326:3 333:7</p> <p>grabbing 355:7</p> <p>Graber 366:9,13</p> <p>grabs 333:4</p> <p>gradation 314:16</p> <p>graduate 261:24 276:7</p> <p>Grand 91:11 160:21 232:20 234:21,23 235:24</p> <p>grandparents' 261:21</p> <p>graph 28:4,19</p> <p>graphic 28:15</p> <p>graphs 296:13 299:5</p> <p>gray 290:9</p> <p>great 8:21 22:2 28:14 34:25 44:4 45:3 48:3 68:17 82:11 83:2 88:4 116:9 127:4 138:9,16 141:1 251:4 272:3 346:1 367:3 368:14 411:6,21 413:9 415:19</p> <p>greatest 95:16,19,20 96:24 254:6,11 285:4 373:12,13</p> <p>Greek 28:24</p> <p>green 7:24,25 8:9,13 38:19 72:14 73:10 74:5,12 81:12, 20 82:4,5 91:12 106:2 159:2,5,6 162:4,8,11,13 163:6,7 165:10 166:1,2 167:18 170:12 184:16,21 185:16 222:18 240:15 259:13,15 302:22 303:19, 20 389:22 395:22,23 396:3,9 397:3,21 398:8,24 399:20 400:4 404:13,18, 22,25 405:3,10,19 406:15</p>	<p>408:13,24 409:3,12,21,24 410:8,12,21 411:1,6,9,21 413:11,17,20,22 414:7,12, 16,21,25 415:9,12,15,19 416:5,8,24 417:2,17,25</p> <p>grew 80:25 164:15 178:12 261:18 266:22</p> <p>Grofman 50:21 52:4 79:24 141:4</p> <p>ground 99:13</p> <p>grounds 394:13</p> <p>group 120:22 183:16 184:17 202:6 265:24 276:8,11 338:17 351:20 352:8,9</p> <p>grouping 234:20 275:1 365:6</p> <p>groups 78:11 386:21</p> <p>Grove 104:13</p> <p>grow 86:24</p> <p>guarantees 280:22 337:12</p> <p>guess 37:8 78:19 80:5 85:24 98:18 103:8 104:17 106:22,23 107:4 129:7 133:21 134:11 146:24 170:11 173:3 174:23 176:15 177:18 195:15,23 205:7,11 218:10 271:14 283:2 293:5 294:15,22 309:9 319:11 340:25 342:1 343:6,9 349:11,15 350:9 361:14 365:16,24 368:3 373:8 376:21 379:25 385:6 398:6</p> <p>guidance 113:12 221:20 222:15,17</p> <p>guide 239:20</p> <p>guidelines 118:1</p> <p>guiding 123:13</p> <p>guy 191:12</p> <p>guys 126:24 207:24 220:4 405:17</p>
H			
<p>haircut 32:18</p> <p>half 18:25 19:19,20 22:15, 19,25 24:25 27:20 28:2,25 53:11 65:17 75:23 77:22 78:4 100:14,18 103:2 132:18 146:5 185:17 186:9 194:9 195:1 206:7,11,22 207:2,4 294:7,8,10 302:23 312:15 313:10 314:21 322:23 325:16 326:17 328:25 329:1,2 336:17 356:2 379:23,24 381:6,12, 15,16 388:12</p>			

halfway 327:20	236:3,10 241:19 253:4	Hochul 66:19 79:7	hypothesis 22:3
hand 31:25 174:15 260:9 297:17	263:18 267:3 269:18 274:23 275:24 276:11 286:14 290:3 291:3 298:9 309:17 339:5 387:9,10 398:21	hold 212:23 385:1	hypothetical 18:15 20:16 49:4,21 61:8 141:8 211:17 227:15 347:10
hand-drawn 174:24 177:9 178:1,15,23,24 179:5 180:9 181:2 191:2	hearing 33:11 140:4 151:3 188:23 210:17 222:23 223:2,21 255:23 258:2 407:3 412:5 413:14 414:6, 9 416:1 417:8	holds 62:5	
handed 202:21	hearsay 51:23 396:18,25 398:5,6,23 402:1 403:2	hole 204:22,25	I
handful 292:4,13 406:11	heavily 51:19 115:2 201:9 226:7 295:21 336:12	holes 119:24 150:3,5,7,9	I-15 103:11,15 309:4,12 327:24 391:11,15
handle 413:6	height 154:1	holistic 47:14	I-70 389:22 391:8,9
hands 272:9	held 188:25 215:7 287:11	home 81:16 181:7,11 262:1	I-80 103:8 193:22,23
happen 51:14,17 132:5 167:1 198:9 222:20 251:17 284:22 294:2 306:17 370:13 372:10 379:17,20 388:23 416:2	helpful 183:19 186:22 205:10 268:12 411:20	honest 263:24 403:19	I-KNOW-IT-WHEN-I-SEE-IT 86:13 88:10 105:12
happened 14:4 132:1 143:15 150:1 201:13 211:22 213:1 223:22 248:2 251:8 252:7 371:13 381:19	helping 116:13 361:9	honestly 166:23 180:15 186:6 194:12	ID 78:14
happening 132:5,19,24 155:25 333:25	helps 109:22	honeymoon 77:2	idea 15:8 16:8 29:23 30:13 48:13 86:17,22 87:2 99:17 109:2 117:6 120:1,6,8 124:13 127:4 130:10,16 133:15,24 137:12 146:22 158:17 165:22 166:3,6 169:11 170:1,3,10,13,18, 20 171:1,8,10,13,19 172:3, 6 173:16,17 180:17 221:4 229:4 239:13 255:8 263:22 269:20 274:24 277:14 296:8 320:2 363:14 368:11 377:20
happenstance 303:14	Herriman 233:8 304:25 305:17 328:3 330:12 332:16 361:24 362:2 391:25	Honor 7:12,17,24 8:10,20 9:2,16,19 13:3 14:21 15:1 28:16 31:24 53:6 60:8 67:2,23 71:6 72:4,11,24 73:10,14 74:2,5 81:12 162:4,14 163:1,20 173:4 184:4 205:16 207:15 208:9 240:15 259:15,23 260:3 266:8 346:2 347:23 353:25 359:5 366:11 375:5 395:23 396:13 402:4,15 403:7 406:8 409:24 410:2 411:12 412:4 417:11 418:2	ideal 75:25 158:18 209:12 318:11 342:14 388:22
happy 151:17 205:20	hey 170:4 284:8 363:19	Honorable 7:4	ideas 171:6,25 255:10
harbor 272:15	hiatus 10:17	honored 259:25	identical 194:17 242:22 304:17 335:21,22 337:21
hard 17:12 21:2 85:9 92:7 250:24 284:10 290:13 304:7	hide 259:2	hood 312:1	identically 287:16
harder 311:20	hieroglyphics 174:13	horizontal 28:21	identifications 393:2
Harkenrider 66:18 79:7, 12,13	high 108:17 127:7 248:14, 16 281:20 361:2	host 264:20 275:12	identified 137:10 198:7 234:15 235:18 247:2,10 331:7 358:9 360:2 363:5 393:6,18
Harris 226:17 227:2	higher 84:10 85:21 92:11 144:20 146:24 154:25 280:8 285:22 297:24	Hotmail 197:11	identifier 198:12
Harvard 10:24 120:23 128:4,9 135:2,5,7 264:7	higher-ranked 287:8	hotspot 181:25	identifies 37:5
hate 147:17 177:1	highest 108:23 209:5	hour 206:7,11,22 207:2,4 213:14,15 412:11	identify 263:15 315:11,18, 20 334:21 348:11
hay 146:2	Highland 304:1,7	hours 127:1,19 158:2 258:10,11	ignore 343:14
Hayman 7:18	highlight 111:12 216:21 230:2	House 64:4,9,18 75:8 80:3 95:11 256:22	illegal 107:6 109:23 180:4 240:5
hazy 178:20	highlighted 210:1 368:21	housekeeping 8:9	image 179:1,2
head 220:6 292:5,14 407:12	highway 389:15,21,24	houses 303:3,5	images 178:11
headache 252:12	Hills 304:2,8	housing 302:23 303:11 304:15	imagine 218:11 322:6 327:9 347:25 348:1 394:6
header 217:2	hinting 216:6	how'd 189:15	Imai 120:23 121:22 125:20 264:7,10 276:3 278:8
heading 135:21	histogram 296:17 373:4,6	huge 28:9 149:21	immediately 355:24
heads 133:3,5	histograms 289:24 298:14	huh-huh 73:25	Immigration 305:25
health 121:19	historical 76:15	huh-uh 260:16	impact 94:12 125:1 150:24 195:15 225:6 319:21
hear 90:11 121:25 140:18 151:8 152:1 153:9 155:12 156:4,20 161:15 288:24 289:6 317:11 331:16 339:10 385:21 386:2,5,14 387:1	history 48:12 74:20 76:21 79:16 114:24	Hull 86:12 88:3	
heard 9:11 21:9 33:25 37:20,23 41:23 42:9 97:7 116:24 120:21 129:22 139:4 140:22 142:16 145:6,25 147:10 149:11 164:12 168:3 198:23	hit 111:12 181:19	human 87:9	
	hitting 267:10 363:6	hundred 132:5	
	Hobbs 247:23	hundredths 319:18	
		Huntsville 304:15	
		hurt 245:11	
		hyper-literalist 96:8	

impacts 319:7,8 impairment 344:18 impeachment 397:13 401:25 implement 41:1 implementation 377:11 implementations 340:17 implemented 117:24 implications 45:19 implied 26:3 64:18 implies 23:25 imply 23:14 importance 358:12 important 19:5 30:16 109:24 127:14 128:7 139:14 226:3 273:14 286:3 306:11 322:12 335:22,24 imposes 109:10 impossible 145:9 impression 367:21 improves 105:13 inaccurate 246:19 inadvertently 109:22 inappropriate 156:2 inaudible 20:18 28:9 300:11 407:23 408:2 412:9 inclined 244:10 include 42:15 57:5 226:9 293:7 319:13 355:15 356:19 included 36:9 46:7,17 53:14 96:12 101:19 167:25 223:6 305:16 327:15 328:20,24 329:7,8,11 330:7,14 393:12 includes 42:24 47:4 58:18, 20 136:1 356:18 including 35:25 41:14 112:10 138:19 142:21 148:20 171:21 218:2,9 219:1 220:18 228:23 236:11 incoherent 23:25 incomplete 68:23 inconsequential 246:24 inconsistent 244:7 incorporate 168:14 263:16 368:19 393:22 incorporating 393:23 incorrect 378:14 increase 26:12,13 91:13, 20 incredibly 329:25 345:6	increments 212:18 incumbent 110:13,18 112:16 independent 11:7,8 80:4, 6 81:8 103:25 151:14,24 160:15 200:16 239:25 252:4 286:16 index 113:12,14,19,22 114:9 130:6,9,19,25 145:13,15 221:20 223:1,8, 20,24 225:3 226:8,18 293:15 294:10 313:7 indicator 297:10 indices 169:7 indirect 412:9,11 individual 229:2 individually 323:17 inducing 20:2 inefficiency 24:23,24 Inference 44:25 infinite 277:5 inflate 101:14 influence 91:1 262:15 information 31:5 64:15 168:22 169:4 173:18 319:2 342:18 343:21 355:6 367:23 377:6 infrequently 354:23 initial 80:22 113:10 133:17 270:14 289:21 298:12 310:6 316:21 377:2 initially 137:25 141:20 148:6 166:21 176:19 354:22 initiative 412:10,11 inlets 87:21,24 89:15 91:5 input 123:5 197:19 inside 67:25 insights 387:14 installations 94:4 instances 98:22 150:2 instantiation 63:1 Institute 10:13 instruct 233:21 274:25 275:3 285:2 instructed 279:2 282:8 instruction 171:11,14 284:20 instructions 123:2 165:24 282:17 285:7 375:12 intact 84:5 94:2 150:8 232:18 integer 16:21	intent 83:1 94:7 99:16 116:13,18 118:23 119:6 132:14 170:6 255:6 intent-based 115:7,10 116:10 intention 329:17 384:8 intentional 378:2,4 interact 295:15 interest 18:11 48:23 92:22 93:4,5,12 96:15 106:9 232:7,9 233:9 234:10,16 235:7,12,18,22 285:24,25 286:3,12,15 393:1,6,15,18, 20,24 interested 48:24 124:20 interesting 21:16 29:21 31:13 240:21 332:21 interestingly 28:3 interests 305:9 interior 201:16 intermediate 136:11 international 79:21 Internet 181:23 interpret 85:8 88:23 123:17 254:16 321:21 322:10 364:25 interpretation 84:17 87:19 96:8,18 98:3,12 220:13,15 221:5 254:24 321:21 365:4 interpretations 97:13 352:16 interpreted 96:21 interpreting 96:20 341:18 369:6 interrupt 49:18 302:2 383:23 interrupting 52:22 53:1 347:16 interstate 105:23 interval 131:10,21 interveners 66:8 interview 277:10 introduce 286:5 370:10 371:8 introduced 405:25 407:11 introducing 372:10 intrude 84:23 intuit 91:4 intuition 23:12 24:10 25:8 intuitive 70:2 invalid 41:13 investigation 357:15	involve 78:25 267:17 involved 35:11,12 40:22 79:4 126:12 174:5 276:4 338:24 involvement 39:1 involves 29:18 211:18 involving 214:24 IRC 85:7,19 90:20 96:6 123:18,22 124:3 160:8 243:12,17 245:9 ire 180:13 Iron 205:7 irregular 91:9 101:13 366:5 irrelevant 65:3 249:25 Isaac 7:20 issue 33:10 35:2,10,17 40:21 66:11 125:12 126:1 149:13 157:11 237:20 274:4 297:6 306:17 337:20 364:13 412:1 416:3 issued 357:21,22,23 358:1 issues 8:7 10:18 23:19 45:7 67:24 149:25 240:23 280:17 281:3,5,11,23 284:7 305:10 306:12,14 item 8:9
J			
Jackman 212:7,13,15 Jacobson 394:8 JD 74:21 jerks 128:17 job 75:4 93:10 join 100:4,7 joined 10:24 356:24 joint 10:17 Jonathan 9:5,21 10:8 14:21 Jordan 304:23,24 328:3,4 332:13 392:4 journal 50:17 264:23 journals 264:20 Juab 98:18 103:4 Juan 91:11 106:3,21 149:20 151:7 191:16 192:17 233:2 389:14,18 390:20 392:14 judge 7:4 246:23 248:3 394:22 401:7 judges 88:14 judging 222:1			

judgment 95:25 98:3,8
106:17
judicial 11:18 50:18
July 10:25
jump 314:3
jumped 151:7 204:14
jumping 361:15
jumps 100:1 106:22 153:4
304:23
June 218:1,12
jurisdiction 52:18 101:24
jurisdictions 51:5 53:19
265:4,20 278:9
Justice 217:7
justifications 235:14

K

Kane 106:22 205:8
Kansas 30:22
Kari 161:9
Katz 8:17 9:5,6,21 10:3,8,
11 14:22 27:14 31:21
32:13 36:25 43:21,25
44:18 54:16,17,18 64:2
67:1 68:11 71:3,10 72:9
138:22 140:19 143:2
214:17,25 215:9,15 219:24
220:2 259:22 398:16,18
400:16
Katz's 28:17 149:2
Kaufman 88:12
Kay 10:12
keeping 92:21 94:1 99:19,
20 106:10 235:6 303:10
363:13
Kennecott 305:1
Kenny 126:24 170:4,17
276:5
key 312:11 318:16
keys 227:4
kind 15:7 29:12 76:16 77:4,
22 78:6 80:25 81:5 87:2,8,
13,20,25 88:6 90:21 92:10
93:3,14,20 94:9 98:15
100:3 103:9 109:14
110:22,23 111:12 113:8
116:22 119:9,11,12,15
120:23 128:1,2,8 129:12
131:7 132:7 133:1 137:24
141:13 143:24 147:7
152:14 157:24 158:5,8
159:25 160:8 173:18 188:8
189:9 190:1 193:22 194:1,
15,20 196:18 212:10
216:5,7,8 217:8 230:1
242:19 261:10 263:25

266:22,23 267:1,7 268:18
271:23 272:5,14 273:2
274:22 276:6,13 279:8,12
281:7,12 282:19 283:19
285:18 286:6,10,20 297:14
298:19,23 299:19 302:17,
19 303:10,13 304:9,18,21
305:3,7,9,13,16,21 306:2,5
307:3,6 311:15,18 314:1,
16,22,25 315:10 318:12
319:1,23 324:10 326:3
327:20,25 328:7,17 330:5,
20 332:14 333:10 336:9
349:12 350:10 351:3
382:22 383:2 392:8

kinds 98:8

King 12:6 27:15 43:25
48:9,17 49:6,8 50:21 51:3,
12 52:3 54:15 88:12
138:22 143:2 214:17,25
215:9,16 219:24 220:1
400:16

knew 85:7,19 92:3 96:5
100:5 112:18 120:9 127:4,
5 129:17 134:3 142:12
182:2 191:4 196:3 202:7
355:1,5

knife-edge 42:22

knife-edged 45:17

knowing 126:10,11 343:3,
11 344:17,21 346:1 356:4
362:7

knowledge 36:14 51:9
78:3 122:6 263:10 344:5,8

Komisarchik 88:12

Kosuke 120:23 264:7,10

L

L.A. 32:17

label 136:10

labeled 82:24 179:19
290:15 349:21

labels 193:13

labored 394:25

lack 241:6

laid 143:2 317:5 403:22

lake 84:9,12 98:16 99:24
100:5,10,11,22,24 101:11,
13 102:11 103:8 104:12
106:25 138:18 151:22,23
160:8,9 161:9 175:13,17
176:1 177:3,12 179:20,21,
22 180:12 184:13,14,15
185:23,24 186:1 187:12,
22,23 188:15 190:12,13
191:14,20,25 192:3,8,14,
21 193:17,24,25 194:5,7,
17,19 195:12,17,21 228:23
233:12,13 234:1,5 237:1,

11 238:5,11 242:20 244:24
245:3,6,10,12 251:5 282:9,
10,18,21 304:19 305:6,23
306:5 308:8,24 310:4
312:15 322:2,8,14,18,20,
24 324:6 325:15,18,22,25
326:8,9,15,18,21,24 327:2,
3,6,11 328:23,24 329:7
330:2,7,14,18,20 331:5,18
332:18,24,25 333:14,19,20
335:17 336:10,17 352:24
353:8,10,13,16,18,19
354:13,15,24 355:3,8,11,
13,15,17 356:2,7,10,15,20,
22 357:9,11,14,19 361:14,
23 362:12 364:20,22
365:2,11,23 366:2 367:3
368:10,14 374:5,9 375:14,
19,20,24 376:9,10,16
377:2,8,18,21 378:3,5,9
380:18 381:3,10,18 384:18
385:12 387:17,18,19 388:5
391:6 392:13,14,17,24

Lake/bountiful 326:4

land 306:15,18,25

language 38:1,3,5,8 104:3
111:13 121:11 138:19
142:22 275:23 291:20
394:23

laptop 244:18

large 22:21 27:7,16 29:18
30:19 31:17 130:25 131:8
244:6 246:12,15 272:4
275:5 276:23 279:4,17
309:15 313:22 351:19
352:7 407:4

largely 140:3

larger 225:11 298:3 300:5
369:11

Larry 76:4

late 240:19 341:1,6

law 36:20 50:17 61:15
83:12 97:6 98:1,7,19
106:19 119:8 131:9 133:8
148:4 164:22 219:9 255:4,
10 268:13 272:12

lawmakers 59:8

lawyer 34:3 36:3,16 37:2
38:2 71:20 321:17 410:21

lawyers 88:9,14

lay 13:18 36:6 264:1

lead 120:24 205:18 297:24

leader 140:4

leads 14:13 16:18,19

League 7:13 208:5 301:7
396:16

lean 241:12 293:13,19

leaning 145:22

leanings 160:23

learn 97:16 110:20 126:7
312:6,10 394:6

learned 38:10 97:20 111:3
130:2 217:10 319:9 412:17

**least-republican-vote-
share** 137:23 138:4

leave 89:21 183:6 196:19
207:19,21 394:15

leaves 380:16

lecturer 77:18

led 164:14 187:18 213:1
276:2

Lee 394:9

Lee's 348:14

left 101:23,25 195:2,6
203:18 290:18 298:20
316:8

legal 7:19 37:5 45:23 47:12
56:1,25 57:3 71:17 78:6
88:11 97:13 220:13 221:5
239:9 250:6 255:3 321:18
394:15

legally 56:25

legislation 58:1 120:7,9
210:5

legislative 7:25 8:2,4 9:4
11:22 13:10 14:21 27:17,
19,23,24 29:2 30:19 38:23
48:21,22 80:18 106:18
107:5 145:7 160:24
164:14,18 165:9 167:8
200:8 210:4,9,13,15 211:6
213:13 214:1,5,8 235:19
239:6 247:24 258:6 262:17
264:16 266:15 285:13
342:17

legislative-related
264:24

legislator 342:15

legislators 393:8

legislature 7:14 38:23
43:2 63:25 64:19 66:9 81:7
82:9,16 90:19 93:25 95:15
99:8,13,19 101:6 110:23
126:21,23 127:1 129:13
141:22 142:3 148:20
165:9,15 166:21 167:19
168:10 169:1,5,19,21
170:12 171:4,12,15 172:17
173:18 174:21 176:23
177:10,16 178:8,16 179:7,
24 180:10 188:22 190:25
194:4 195:22,25 200:12
208:6 210:17,20 213:7
222:24 224:2,6 234:8,10,
14 235:10,11 242:3 255:22
257:2,7,9,11 258:9 265:22
301:8,18 309:19 341:10
385:14

legislature's 102:12 107:14 257:3 258:5 393:1	273:8 278:3 279:5	Louisiana 249:7 265:8	makes 34:12 60:18 103:16 210:3,14 219:20 296:7
legislatures 18:13	live 32:17 93:1,9 201:23 261:20 308:1,20 351:7 388:16	low 19:15 78:2 92:10,17 101:17 107:3 108:11 150:19 153:8,18,22,25 154:22 297:16 324:3,4	makeup 110:5
legislatures-identified 235:7	lived 76:19	lower 56:12 145:15 146:25 190:18 286:23 290:16 361:6	making 24:12 140:14 251:17 275:20 297:11 298:6 347:12 368:9 393:21
legitimate 99:19	lives 303:21 387:20 390:14	lowest 313:23,24	malapportionment 79:20
Lehi 195:14 304:2 333:17	living 10:11 261:5	luck 395:15	MALE 81:19 287:25 300:11,15
length 60:18 141:1 269:14	load 182:7	LULAC 50:19	males 154:2
lengthy 333:21	lobby 305:11	lumped 293:17	management 306:13
letter 28:24 121:10 164:25	located 336:4,17 389:22	lunch 205:16,19 206:17, 18,21	mandate 342:11 344:16, 20
level 31:8 61:23 64:9 115:14 124:11 183:5 262:17,18 263:12 283:17 284:4 285:22 348:12	location 335:25		mandated 344:24
levels 78:3	locations 278:10		manipulated 94:6
lie 150:6	locked 56:2 183:3		manipulations 131:4
lieutenant 412:6	Lofts 388:9,17,20		manner 33:21
life 250:3	logged 196:19		manual 171:17 172:5
light 268:10 350:22 351:2	login 196:9		manually 124:15 127:17 172:19 230:16
lighter 332:15	logins 196:22		
lightly 244:19,20	long 10:15,16 12:5 17:2 51:1 75:4 93:15 98:23 118:22 132:10 205:6,22 206:20 261:8,25 279:19 316:17 382:3	M	
likelier 226:20	longer 48:14 86:23 103:3 190:13 206:13 215:7 223:21 252:2	made 25:11 92:3 100:13, 17,20 101:11 102:10 104:19 149:19 189:10 191:23 192:3 218:8 220:4 232:17 246:21 250:12 252:15 261:20 287:22 304:13 309:21 311:13 324:22 374:18	map 14:4 18:17,24,25 20:18,20 33:3 41:18 42:6 61:9 78:13 80:25 81:22 82:9,12 85:1 86:2 88:11 89:4,13,14,15,22 96:25 98:15 99:4,7,8,15 101:9 102:12,13 103:6,20,22 104:4,5,9,18 105:6,8,18,20 106:5,6,8 107:9,13,14,16, 17,24,25 108:2,3,5,6 110:1,4,8,12,16 111:4,18 112:16 115:19,22 116:2,3, 13,20 118:15,18,20 123:10,14,16,21 124:15,25 129:11 132:10 133:18,21, 23 134:14 135:18 137:3 138:6,12 141:8,22 143:3 144:3,8,18,20,21,24 145:15,16,24 146:8,9,11, 13,14 151:6 155:6,8,9,21, 22 156:6 157:25 158:1,2,7, 8,25 159:14,20,24 160:16 164:15 166:3,16 168:5,25 169:3,10 170:22 171:3,8, 17,24 172:5 174:14 175:16,24 176:4,6,14,21, 24 177:2,9 179:17 180:9, 25 181:3,16,18 182:11,15, 20 184:12 185:23,24 186:11,12,13,14,15,25 187:9,17,19 188:9,16,25 191:3,7,20 192:19,25 193:2,10,11 194:9,24 195:21 196:1,3,10,21,25 198:7 201:11 202:8,23 203:5,9,10,15,17,22 204:6 208:24 209:1,4,5 210:9,10 211:1 212:17 214:1,9 225:13,17 226:20 233:17 234:24 236:17,21,25 237:7 238:15 241:7 242:8,10,11
likeliest 195:20	looked 38:4 88:19 92:4 99:1,2,8 106:20 137:1,3 138:21 149:24 150:15 158:1,7 171:24 182:19 183:12 191:24 205:6 222:10 229:22 247:7 256:6 259:7 274:10 300:4 302:9 311:24,25 312:4 317:22 320:3 323:9,16,25 326:23 337:21 348:1 353:5 354:21 355:14 362:6 363:19	magic 166:8	
likes 176:24 326:2 332:22	loosely 139:6	Magleby 134:3 141:6 148:25 151:2 239:24	
Likewise 164:9	looser 96:1	Magna 361:14	
limit 124:1 402:11,18	lopsided 21:11 23:3,5,24 69:22 70:3 340:16	magnitude 348:6	
limited 228:16 279:9 310:13 397:17	lose 25:5,6 294:25	main 53:22 119:17 138:8 187:20 355:21	
limits 307:13	Lost 76:1	maintain 332:1	
lines 79:10 80:4 85:15 95:4 182:23,24 183:1 187:14 236:13 290:11 296:17 307:13 308:10 339:13	lot 32:17 40:22 75:7 78:17 93:2,11 97:13 103:12 113:5 140:4 142:10 146:2 147:10 148:24 154:3 171:21 202:10 216:10 218:7 224:13 263:18 269:19 270:16 275:24 276:17 277:17,18 278:11 285:1 286:7 298:9 311:24 316:4 317:6 321:20 337:3 342:15 351:14 352:13 363:13 410:24	maintaining 285:3	
link 213:16 287:22 350:22 388:2 407:2,9 417:1,8	lots 19:4 21:1 91:4,12 141:3 214:4,23 306:18	major 113:20 194:2 199:2 256:6 263:5 320:7	
linked 306:1 366:21		majority 17:5 19:13 55:10 58:6,11 76:1 217:6,7	
linking 200:7		major 263:5	
links 187:2 304:24		make 7:16 9:13 11:19 34:11,17 56:22 60:17 73:22 77:25 82:5 85:12,16 91:14 95:10 97:3,7 98:4 102:5,11 104:18 107:6 116:21 117:6 120:4 127:18,22 130:16 134:21 137:7 146:2 162:9 190:6, 13 192:5,11 193:7 210:8 224:13 226:8,19 227:23 231:10,13 244:4 245:21 251:14,15,16 252:6 260:13 273:6 281:2 285:11 286:8 306:20 308:19 309:19 317:10 319:4 325:21 329:1,2,3 333:11,13,14 338:6 347:6 350:13 371:22 378:22 380:7 396:9 397:16 408:9 410:4	
list 83:5 107:3 122:19 173:24 245:7 265:6 268:5 280:5 376:14,15 382:1 393:10,23 396:19 400:13			
listed 78:21 95:17 200:15 388:25 403:18			
listening 37:14,16 385:24			
literalist 84:16 96:17			
literally 20:13 30:5 124:15 277:4			
literature 12:14 14:17 21:6 24:5 45:13 49:2 77:23 141:6 142:2,8 147:14 148:3,19 337:6			
litigation 57:25 79:25 143:13,15 148:7 214:24			

243:18,23 244:23 245:3,22 247:24 251:6,14 252:2 253:5,6,14,15,20 254:22 255:5 257:3,4,9 258:25 259:4 268:11 269:7,22,25 271:4,8,9,13 273:24,25 275:11,19 290:6,15,17,20, 21 291:8,10,11 292:4,10, 12 296:18,19 297:1,2 298:2 299:1,3,4,8,15 300:6,7 301:12 304:17 307:14 309:20 325:1 326:8 328:13 335:16 336:2 350:16 354:9,14 355:10,25 356:1,6,9 357:7,8 359:10, 17,25 360:3,11 361:12,25 362:13,21 363:1,4,11,22 364:15,17 366:15,20 367:15,16 370:9 371:11,17 372:14 374:7,11,15,23 382:7,8 383:3,25 384:4 387:6,24 388:6,13,21 389:1,12 390:19 391:3,25 392:2 406:5	244:6,12 248:24 254:1,17, 18,21,25 255:3,5,17,19 266:19 272:18,20 273:20, 22 274:3 275:5,7,8,11,18, 19 276:23,25 277:4,14,16 278:25 279:3,16 280:2,12 281:15 283:4,12,22 286:25 287:6,11 288:16 289:9 290:1,2,12,16 291:1,6 292:2,3,8 295:3 296:11,12, 24 298:15 299:21 300:2 302:10 310:8 312:5,7 320:15,19 322:22 323:2 324:9 325:7,21 329:19 331:11 334:1,4 335:9 336:5,6 337:1,9,13,16,20, 23 338:16,17,19,21 339:1, 2,15 346:13 349:9 354:21 355:15 358:9,11,16,25 359:21 360:1 364:17 369:19 370:11,18 380:1, 13,17 381:2,11 384:7 390:7,24,25 405:1 406:3 408:17,19 409:10	137:3 157:18 164:23 228:3 277:7 294:14,15 313:3 372:1 395:25 397:11,20,25 399:10 401:5,17 402:5 416:11,12 matters 22:12 228:7 413:12 maximize 106:15 254:3,16 maximizing 95:7 maximum 254:2,4 Mayya 88:12 Mcadams 115:1 146:4 Mccartan 121:23 276:4 278:9 Mccarty 264:8 McGhee 24:21 Mcmullin 146:5 224:25 348:15 mean-median 21:10 22:1, 5,21 37:22 40:2 42:7,18 64:22,24 65:9,14,19 69:4,8 114:2,7 140:3,5,7,13 141:17 142:24 144:7,12, 16,17,19 209:16,22 210:7, 21 211:7,8 267:5,16 268:20 271:19 273:17,23 274:11 299:23 300:4,5 340:18 342:22 meanders 91:12 meaning 85:13 281:12 325:18 351:14 meaningful 319:20 370:1, 2 means 12:9 15:12 17:11, 12 20:13 29:5 34:14 62:16 85:14 86:25 90:16 96:2 105:19 118:10 129:25 131:13 140:8 145:12 169:6 186:18 214:11 236:13 255:11 278:11 281:6 313:25 358:8 369:8 meant 141:18 175:7,25 184:2 232:15 292:7 294:5 383:23 measure 12:3,7,19,20 13:21 23:16 24:1 25:7,12 27:11 29:7 33:1 40:11 46:19 47:3,8 52:2 62:18 70:2 71:13 86:2 87:12 88:13 105:12 112:1,2 113:1,16 119:5 127:10 139:5,21 141:24 142:9,15 143:4,18 144:1 146:21 147:18 148:5 149:3,8 215:1,2,6,7 217:23 218:18 219:20 221:15 222:13 224:19 227:22 246:12,16 255:24 289:25 296:5 297:8 344:3 350:14 365:8	measured 15:22 90:7 142:5,13,23 measurement 129:4 221:24 262:22 measurements 157:6 measures 12:15,18 13:10 14:16 20:23,25 21:7,15 23:2,17 25:9 29:12,15,16 35:1,5 36:1,22,24 39:12,14 41:12 42:16 43:13,14 45:25 47:13 71:25 86:6,9 88:2 89:10 91:23 100:21 106:4 112:10 114:3,8,10 138:5,19 139:2,9,19 142:21 148:22 214:21,23, 24 216:2 217:14,16 218:1, 13 219:1,10,21 220:19 268:17,18 281:17 measuring 17:8 36:24 39:7 255:16 361:3 median 22:8 210:6 252:10 271:25 288:19 372:19 meet 11:19 145:9 295:23 318:19 338:18 340:5,6 370:21 meet all 324:9 meeting 340:5 melted 100:9 members 16:14 165:14 258:7 266:5 364:7 memory 265:9 292:18 mention 40:21 53:23 70:12,23 mentioned 12:23 20:23 22:10 23:3 29:12,22 59:10, 13 65:22 69:2 71:21 137:13 144:13 173:7 188:12 219:4,5 238:25 250:10 263:1 267:4,16 293:4 307:10 321:16 393:9 merit 152:5 mess 139:22 messed 149:17,18 met 56:24 122:20 353:6 method 116:17 273:5,11 383:17 384:5 methodological 262:21 methodologies 399:24 methodologist 220:2 methodology 120:25 261:12 262:13 398:11 399:6 methods 14:22 16:24 35:25 36:9,19 37:4,6 41:1 71:13 112:9,12,14 115:10 262:21 399:2 401:7 metric 42:23 43:8 48:4,5 63:14 231:22,25 340:14
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LEAGUE OF WOMEN VOTERS OF UTAH vs UTAH STATE LEGISLATURE

October 24, 2025

Evidentiary Hearing Day 2

342:11,13 343:13 344:6,16
346:13,14 368:2,4 383:10
metrics 41:5 43:8 200:3
210:25 214:3 217:22
220:17 341:17 342:4,18
347:3 360:6
metrics' 39:21 40:2
Mexico 161:16 400:1
Michael 260:4,20 266:9
Michigan 301:18
microphone 9:14 73:23
258:19 260:14 350:6
mid-2010s 119:2
midday 311:4
middle 113:7 187:22
190:12 209:25 230:1
232:2,3 288:20 296:25
298:20 299:19 314:2 321:5
328:13 361:1 379:9,10
midnight 411:8
midpoint 140:16
Mike 348:14
miles 77:5
military 94:4 234:18
Millcreek 101:23,25
104:12 241:9 306:9
million 103:2 109:3,4,6
mind 9:7 84:22 89:7 92:1
99:3 135:24 258:15 377:17
mine 48:19 135:3 152:18
173:1 305:2 315:23 317:2,
3
minimalization 85:9
minimize 376:24
minimized 106:11
minimizing 368:23
minimum 86:19 87:1
minority 55:15,22 56:1,13,
17 58:14 59:4,23 71:16,18
140:3
minority-majority 83:16
minus 28:8 229:16
minute 109:7 158:1 165:5
221:16 256:24 308:3
minutes 72:19 138:10
191:12 207:1 213:15
258:11 279:23 300:16,17
miscalculated 317:13
318:24
miserable 176:22
misfire 340:15
misheard 253:10
misleading 248:1 360:22
361:8

misremembering 172:11
Missouri 84:20,25
misspoke 159:10
mistake 127:19 228:18
246:21
misunderstanding
369:13
misunderstood 156:15
223:5
MIT 10:22
mixed 300:7 382:8,12
mixing 147:6
Moab 106:2 389:21
modal 316:25
model 43:13 48:20,22
51:13 53:18 55:21,24
58:24 59:7,21,23 71:17,18
398:10
modeling 51:19 88:21
models 49:9 58:24 403:1
modern 29:18
moment 129:15 138:15
256:8 258:13 265:10 284:2
310:23 339:20 390:2 394:1
Monte 119:10,12,17,18,21
123:2 130:4 134:23 156:5,
9,17 157:11,19 339:8,11
358:21,22
month 38:14,16 113:5
186:8 306:23
months 76:25 218:24
Monticello 390:11 391:6
Morgan 102:18 251:6,18
361:15
morning 7:7,17,22,24 8:6
10:3,5 32:13 68:7 71:11
74:13,14 140:20 164:3
414:1 415:22
motion 167:5 220:20
412:6
mountain 91:16 95:3
127:17 284:23 306:3 309:5
411:10
mountains 91:19 251:22
305:2
mouth 233:23
mouths 233:12,19
move 8:15 18:1 30:5,14
72:25 109:8 163:9 164:12
183:24 191:1 205:13
227:18,20 228:11 250:24
271:18 274:8 296:1 300:8
308:19 328:6 346:9 371:7,
20 396:10
moved 25:2 101:2 209:11,
13 251:5 261:18,23,24

294:22 306:25
movements 298:24
moves 26:24,25 221:10
306:21 308:22 328:17,18
335:19 336:1
moving 108:24 124:17,22,
23 126:21 150:21 212:17
308:15 318:22 327:22
372:2,4 404:3
Mulji 7:20 8:20 15:1 31:23
32:12,14 41:15 44:7,10,14,
18 53:6,13 60:8,12 67:2,5,
7 68:10 72:4
multi-pronged 46:2
multiple 20:6 50:8 160:9
170:9,19 218:1,13,25
219:10 322:18
municipal 83:21,22 84:15
85:8,17 96:3,10 98:20
103:19 104:8 106:10
123:23 198:16 229:7
232:16 236:23 237:18
254:15 282:1,18 284:22,25
285:9 287:9 288:15,19
307:12 316:9,23,25 317:13
318:2,6,10,13,15,22 324:4
368:23 370:10 371:9,12
372:16,19 373:25 377:18
municipalities 93:8,23
104:11,15 229:2,4 232:10
233:20 236:11,24 238:20
282:21 286:9,11 304:6,19
310:4 315:15 316:7 317:3,
4,16 328:19,21 332:4,11
365:7,24 366:4 370:20,25
371:21 372:5 374:9
375:20,24 376:5,9,12,16,
18 386:18 392:24
municipality 84:4 93:9
233:22 304:10 306:6
308:20 309:20 317:18,24
365:8 371:2,23,25 372:11
373:3,12,19,21 375:25
386:15
Murray 392:20

N

NAACP 246:22
Nairne 249:13
named 88:10
names 11:12 66:20,21
120:24
narrow 90:23
narrowing 360:2
Nassau 151:3
nation 59:21
nationally 64:10

Native 94:1 234:19
natural 94:17 106:12
192:13
naturally 331:17 392:9
nature 82:22 297:5 344:17
neat 190:14
necessarily 114:16
190:25 225:21 282:22
283:23 344:22 351:20
371:1 397:6 399:3
needed 101:1 103:5
104:16 126:21 370:23
negative 22:18 248:5
272:13 273:25 274:1
neglected 396:1
negotiating 306:24
neighborhoods 92:21
106:8 386:19
neighboring 305:17
Neil 10:8
nerds 17:14
nerve-wracking 223:15
nervous 231:13
neutral 244:8 315:6
358:11
nice 23:12 24:10 25:7,8
91:3 94:3,5 101:16 102:21
103:6 105:14 106:24
119:21 131:5,14 164:3
173:18 190:14 191:12
193:21 194:1 204:24
280:20 340:5,6
nicely 103:7
Nichols 143:21
nightmare 102:6 113:8
ninety 232:2 353:18
nitty-gritty 290:5
Nolan 264:8
nominally 115:2
non-compact 91:5,6
non-justiciable 143:24
non-zero 20:3 22:17
noncompetitive 53:20
55:5 56:19,21 58:9 59:2
noncontinuous 151:1
nondemocratic 57:1
nonlawyer 321:14
nonzero 26:17
noon 416:20,25
normal 88:15,22
north 101:10,16 104:12
143:21 175:18 176:1
177:4,13 190:4,14 212:6

241:9 246:7 265:8,17 291:18,19,24 326:3 327:19 330:6 332:24,25 333:19 387:17,18,19 388:5 391:11,15 north-south 100:8 103:10 175:6,9,13,16,21,25 176:10 178:4 187:21 189:17 190:3,7,9,19 192:25 193:12 194:21 northeast 185:14 northern 108:18 160:20 179:21 184:13 185:17 194:5,9 195:3,20 251:6,11 304:5,22 312:14 325:16 327:18 330:2,20 331:5,18 333:18 335:17 336:10,17 355:3 356:9 385:3,12 392:9 394:9 northwest 175:19 185:13 not-weird-looking 242:16 note 211:15 302:18 342:19 352:23 401:10,15 403:2 noted 69:4 99:9 188:11 290:17 404:20 notes 38:19 notice 304:12 307:12 309:7 334:9 335:13,15 noticed 46:6 67:21 198:2 223:7 293:3 noticing 295:9 354:21 noting 416:17 notion 19:7 23:9 notoriously 105:24 November 218:22 257:17 258:6 412:5 NS 175:6 NS2 174:11,23 null 22:3 number 24:18 28:22 30:8 78:18 80:15 88:22 107:23 141:10 151:9 154:5,10 155:14 163:10 166:8 170:23 171:1 178:13 186:19 193:7 202:14 204:19 216:2 228:22 235:3 244:6 245:24 246:3 253:4 265:3 274:20,23 277:5 278:23,25 279:4,6,8,17 287:9,10 288:14 290:25 292:5,14 316:8 317:1 321:22,23 322:7 323:11 334:19 335:2 351:6,20 352:7 353:1,12,14 354:9 355:15 356:13 370:19 371:23 373:12 380:3,11 388:24 398:12 404:5	numbered 178:3 186:13 numbers 22:8 67:8 68:1 107:20,21 108:11,13,15 148:16 154:25 198:8 272:2 303:19 313:3 350:7,20 373:3 375:6 378:19 numeric 105:15 numerical 89:9 109:1 <hr/> O <hr/> oath 9:8 73:16 162:22 207:8 260:7,8 300:24 object 231:23 398:5,17 400:17 403:1 objected 165:13 objection 8:20 14:25 15:1 41:8 52:22,25 73:2,3 81:25 82:1 125:25 163:11,13 240:15 266:12 346:2 347:16,19 351:22 396:12, 18,25 398:23 399:7,13 401:11,22 402:2 403:25 404:6 405:5,7,12 406:13, 15 409:2,12 objections 396:20 401:9 objective 275:12 295:23 observable 45:19 observe 30:20,21,23 49:13 51:16 53:10 320:9 359:16 366:19 observed 30:1 observing 272:1 obsession 330:20 obtain 270:1 obvious 198:6 occasionally 250:11 319:4 335:20 occasions 278:23 352:24 373:18 occupation 75:1 occur 211:17 314:15 354:24 occurred 170:10,16,19 occurrences 317:19 355:18 occurring 355:2 occurs 354:25 October 38:17 126:5 odd 26:9 68:14 odd-looking 158:12 oddities 375:1 oddly 303:20 310:3 374:8, 14,22,24	offer 14:21 33:9 58:13 81:14,21,22 266:8 377:14 offered 70:15 310:21 332:6 394:20 399:3,9 401:5,16 402:5 offering 71:12,17 321:18 office 51:11 offices 75:16 official 181:13 403:17 417:15,22 officially 412:23 413:5 offset 27:1 Ohio 74:24 75:18 77:18 okay-looking 155:23 older 48:15 Olivia 8:3 on/off 383:8 one's 398:13 one-or-two-sentence 141:2 one-percentage 212:17 one-tenth 280:14 369:16 one-to-one 115:3 one-unit 373:7 onerous 25:22 389:3 ongoing 86:4 online 53:14,25 54:20,25 311:14 open 174:2 207:21 244:17 256:10,13,17 270:15 305:2 415:22 416:13 opened 311:25 operate 117:5 operates 311:9 343:24 operating 310:13 311:21 operation 61:1 opine 32:25 34:2 38:7 40:20 41:4 opined 35:9 40:12 opining 37:4 40:25 opinion 33:6 36:8,18,23 37:8,9 39:14,20 40:1,6 70:15 71:12,17 95:25 96:23 97:17 107:8 116:17 119:12 139:8 142:1,7 148:18 149:7 214:14 248:11 249:5,17,25 277:12 331:20 332:7 367:22 382:13 opinions 12:1 33:10 39:11 70:20 310:19 321:19 394:19 opponents 24:18	opportunity 351:17 opposed 136:9 249:22 opposite 191:20 opposition 113:20 option 174:11,16,17 194:3 259:2 337:2 options 166:4,10 169:18 171:18 172:7 177:6,22 178:1 181:3 190:17 226:20 314:23,24 Oquirrh 91:19 94:8 305:2 order 13:24 19:14 57:13 61:8 95:16 122:11 177:25 308:21 332:1 381:25 384:18 orders 348:6 ordinary 398:14 Oregon 11:13,15 Orem 391:13 organization 264:19 organized 339:21 orientation 305:14 331:12 335:18 oriented 371:13 orienting 363:18 original 25:14 48:10 67:20 130:4 143:6 223:8 255:1 324:25 382:5 originalist 216:5 originally 130:5 190:11 224:3 originated 49:3,5 orphan 304:9 orphaned 304:3 Oskooii 166:19 303:22 304:13 308:12 309:18 389:2 outcome 19:22,24 23:5,6, 24 49:15 69:23 110:9 115:24 124:16 137:1 141:9 228:10 269:23 287:5 299:9 313:9 316:25 325:11 345:7,18,19 outcomes 21:11 23:3 70:4 123:22 132:3 142:18 155:10 287:12 outlier 325:2 output 122:17,18,24 over-performing 114:25 overlaid 362:8 overlap 317:7 overlaps 84:1 317:16 overly 250:14,21 252:3 373:15
---	--	--	---

overnight 334:6
overpopulated 102:14,16
 191:17,21 192:1
overrule 399:7
Overruled 41:10 346:4
 352:1
oversimplistic 249:18
overtaken 414:14
overturned 394:14
overview 15:5
overwhelming 55:10
 178:13
Owens 145:9
owns 303:2

P

p-value 131:22
p.m. 411:9 418:5
pack 24:18,25 69:16 70:5
 297:18 349:9
pack-- 24:12
package 120:16,20 121:5,
 16 122:12 154:14 276:15
 279:25
packed 350:4 351:10,21
packet 173:19
packing 23:9 349:8 351:13
 352:3,9,12
pages 168:18 211:15
 216:25 320:17 363:2
 402:11,19 405:18 408:24
paginated 68:21
pagination 67:19 68:14
pair 116:7
paired 56:1
Palmer 247:23
panic 129:15 149:16
paper 12:16,23 13:2,17
 27:13 28:25 30:15 60:17
 130:4 203:1 264:22
papers 214:22 264:24
par 378:24
paraded 138:18
paradox 221:9 225:9
paradoxes 340:18 342:20,
 21 344:6
paradoxical 220:24
 341:19 343:4,12,15,19
 344:17,21 346:1
paragraph 45:5 47:12
 59:18 60:9 63:22 69:1,3,21
 70:1 135:21,24 136:7
 209:25 217:21 218:18

228:14 230:1 231:15
 340:13 352:23 358:6
 368:20 377:23,25
parameter 280:19 369:21
parameters 123:10,13
 127:5 280:1
parentheses 122:18
 340:17
Park 84:2 236:12 237:6
Parley's 306:8
Parr 7:18
part 29:18 46:1 63:2 66:9
 76:22 78:23 94:22 121:20
 127:24 139:11,18 143:18
 154:10 160:21 194:5,6
 195:3,21 218:11 246:14,17
 250:2,17 252:19 281:10
 302:24 303:16 304:4
 305:23 306:5 307:8 331:18
 335:23,24 366:4 373:16
 377:25 384:23 389:3
 403:16
participation 77:21
parties 20:11,14 49:14
 56:2,13 62:17 141:15
 269:21 270:4 295:19,24
 373:22 388:3
partisan 11:9 12:3,8,15,20
 13:10,20,21,25 14:1,7,9
 15:6,7,15,19,20,22 17:8,
 17,18,21 18:5,25 19:19
 20:3,24 21:19 22:15,18,24
 23:10,16,17 24:2 25:12
 26:5,19,22,23 27:10,11
 28:2,7,23 29:7,24 33:1,2
 34:7,13,14,16,18 35:2,4,5,
 12,19 36:1 37:18,19 39:3,
 4,7,9,12,20 40:11 41:16,19
 42:13,17,24 43:7,18 46:10
 47:5,15,22 48:4,10,11,13,
 25 49:1,15,20 50:4,18,19
 51:24 52:1,13,18 53:18
 54:24 55:14,25 56:9,18
 59:7 60:23 61:3,5,6 62:12,
 15,17,19,20 63:1,13 65:4,
 12,17 66:16 69:15 70:5,9
 71:14,22,23 78:8 79:1,10
 81:23 83:1 93:16 94:12
 99:16 109:10,15 110:5,9
 111:7 112:1,10 113:11
 114:1 115:18 118:23 119:6
 124:16 132:13 133:20,22
 134:1 136:2 137:1 138:20,
 24 139:2,6,8,18,25 140:6,
 10,13,23 141:23,24 142:4,
 5,8,9,13,14,18,21,23,24
 143:4,19,25 144:2,25
 145:10,20 148:23 149:8
 160:23 168:8,21 170:6
 174:7 179:23 198:14 199:4
 209:17 211:7,14,15 213:25
 214:2,8,23 215:2,7,18
 216:3 217:16,22 218:2,13,

18,19 219:1,10,20,22
 220:19,23 221:11,25 223:8
 224:4,8,14 225:10,14
 226:18,22,25 227:21
 228:6,11 239:14 240:4,24
 241:12,21 248:13 251:22,
 24 252:16 253:14 255:6
 257:3,10 265:11,13,15,18,
 25 266:11 267:5 268:19
 269:15,16 270:23 274:11
 275:14 286:19,21 291:2,19
 293:19 294:20 295:4,10,
 17,18 299:11,23 300:2,6
 313:7 320:10 323:22 336:9
 340:17 342:2,21 343:10
 344:19 346:13,14,19,22
 379:21 380:12 382:6,12,18
 383:9 385:4,20 387:2,7
 401:7
partisans 297:18
partisanship 82:23 110:2,
 21 111:4,24 112:1 113:2,
 17 114:6,21 115:1,19,21
 117:8,11,20 118:3,14,15,
 17 124:19,25 128:15,20
 131:7 141:14 146:1
 150:21,23 158:17 199:5,6
 221:24 222:2 224:20
 226:12 250:11,18 252:4,15
 298:3 323:14 368:24 370:3
partly 298:21
partners 392:9
parts 189:18 256:1 281:8
 376:6
party 12:10 15:14 17:5
 19:13 24:13 25:1 33:22
 34:10 55:5,10,15,16,22
 56:23 57:3 58:5,10,14
 59:4,23 64:25 109:18,19,
 21,22 110:14,18 112:17,24
 113:20,25 116:6,14,19
 138:7 269:25 270:1
 297:12,18
party's 41:20 61:10 69:6,
 16 70:6
party-blind 118:4
partygoers 106:24
pass 136:23 139:15 202:13
 210:5 224:14 225:13,14
 259:12 269:1,6,7,10,12
 271:6 300:2 339:18 382:7
 383:4,17
pass/fail 382:20 383:8
passage 241:21
passed 111:14 129:13,18,
 19 133:25 134:17 136:23
 137:4,18 141:22 144:6,11
 145:21 158:19 174:7
 179:23 180:3 198:14
 215:12 219:8 226:21
 268:16 291:2 295:3 383:25

passes 116:3 134:10
 271:2,11 383:3,5,13,19
passing 226:25 274:6
past 147:10 180:17 263:8
 269:14 302:13 309:5 328:9
 347:5 402:6
pattern 314:20
pause 201:2 337:14
pay 19:16 220:7 282:20,23
 375:19
paying 152:21 375:23
PDF 359:18
peer-reviewed 277:19
 278:22 311:19 337:6
peg 156:2
pegged 114:3
penalty 131:8
penchant 394:22
Pennsylvania 125:22
 265:8 396:17 397:4
people 17:14 21:6 36:13
 75:16 77:24 78:2 88:15,19,
 23 89:5 90:22 91:4 92:18
 93:2,8,14,16 100:23 103:2
 104:6 107:23 108:4 109:2,
 4 113:16 116:23 117:13,
 16,19 120:21 123:16,20
 124:17,18 147:16,17 149:6
 150:10,22,25 152:7,8,15,
 20 155:4,11 158:23
 159:18,19 165:22 170:9,19
 201:22 209:12 213:4 215:8
 221:1 245:11,12 253:19
 254:20,24 255:9,16,20
 263:9 264:6 276:8 277:13
 286:2,18 308:18,20 310:2
 311:24 315:24 326:18,20
 338:4,5 344:13 345:22
 352:16 365:14 369:10
 370:6 371:6,7,22 372:2,7
 385:6
percent 14:3 16:3,17,18,
 19,22 17:19,20,22,23,24
 18:14 19:3,9,10 20:20 22:4
 28:7,8 30:1,2,4 31:2 41:21
 42:8 49:16 51:16,18 61:12
 65:2,5 69:7 87:1 108:3,8,9,
 16,20,21,24,25 118:6,7
 124:14,22 125:5,6,18,22
 131:10,20,21 132:7,11,18,
 23 133:1 141:11,20
 168:17,23 169:16 174:4
 209:8 224:23 225:12,18
 227:12,13 229:10,16,17,
 18,20,23 230:10,19 231:6
 232:2,3 270:5,6 280:15
 288:12,17 290:16 292:15,
 17 294:10,12,13,17 295:6
 314:3 317:2 319:19 323:3
 325:23,24,25 326:21
 327:2,7,8 329:9,10,13

LEAGUE OF WOMEN VOTERS OF UTAH vs UTAH STATE LEGISLATURE

October 24, 2025

Evidentiary Hearing Day 2

330:8,13,22,23 331:15
336:4 348:16,18,22 353:9,
18,20,21 354:13,15,18,19,
25 355:3,16 356:7,19
369:7,16 370:22 379:9,10
380:1,17 381:2,11,20
percentage 17:25 30:6
31:9,11 51:25 86:21 87:16
226:20
percentages 378:21
percentile 136:3,5 290:15,
19,20,22 291:9,10,11
292:15 296:18,19,20
297:1,3 299:2,3,4
percentiles 297:4 299:6
350:8,12,14
perfect 102:8,24 117:24
124:23 142:15 187:6
283:11 293:20 329:6
335:10 340:14 405:11,13,
21 408:14
perfectly 87:5 133:19
283:4
perform 114:17 120:14
134:12 224:17,18 225:7
272:20 288:11 293:22
298:9 323:17
performance 114:22
226:13 393:15
performed 64:10 138:11
221:17 264:11
performing 145:14
performs 105:9 271:16
perimeter 87:16,17,21
90:7,8 91:13 153:8 204:20
319:9 361:6
period 138:25
Perry 50:20
person 21:4 32:19 104:7
123:1 224:21 286:8 338:3,
9
personal 197:4 390:25
personally 302:6 361:21
400:4
perspective 412:15
persuasive 215:10 263:24
perturb 141:13
perturbation 141:19
perturbing 212:10
Ph.d. 9:21 10:22 74:7,24
260:20 262:6,11 264:2
phase 107:5
Phillips 7:20
philosophical 139:11
phone 413:2

photo 78:14
phrase 95:19 254:9
physical 75:16 417:19,20
physically 170:21 171:2
PI 220:20 412:5 413:14
pick 283:22
picked 318:11
picking 126:13
picture 276:25 318:21
383:2
pictures 200:2
piece 306:24 332:24 333:9,
15,16,19,20 355:19
pieces 262:22 355:5 383:7
Pierce 246:7
Pierucci 165:20 256:23
place 237:19,20 315:21
places 69:19 77:4
Plain 397:23
plaintiff 161:20 299:3,4
plaintiffs 8:14 32:14 72:25
81:13 84:21 134:5 217:3,
15 239:14 240:12 369:23
397:17 415:11
plaintiffs' 44:14 54:19
57:8,14 60:2,9 63:18,23
67:14 73:4,6 126:8 146:18
173:5,8 179:6 202:17,22
203:7 213:8,20 218:5
237:23 239:19 242:2
256:21 257:15,16,20,21
258:3 269:3,8 271:4,8,9,13
273:24,25 290:20,21
291:9,10 292:3,4,7,10,16
296:18,19 297:1,2 298:2
299:21 302:9 349:22,24
354:3 359:3 362:17 366:10
374:7,15,23 375:3 382:7,8
383:24 384:4 389:12
391:25 396:6 406:1,4,16,
18 409:5,8,13,15
plan 22:18 24:12 26:18
28:6 42:14,24 43:6 47:4,5
70:17 82:8,17 84:15
109:11 116:18 129:5
148:23 153:25 199:20
203:9,18 205:4,6 209:6
222:11 251:10 268:15,22,
24 269:3,8 270:22 271:25
273:23 274:6 290:19
292:16 296:17,25 302:12,
15,18,22 304:3,11,13
309:22 342:3 349:17,18,
22,24 350:3 382:6
planning 410:5
plans 11:19 35:10,14,17,
20 46:11 47:17 117:24
129:6 199:16 211:6

223:10,16 224:13 273:18
288:10 291:8 295:21 297:6
298:10 336:21
Planscore 403:1,13,15
platonic 158:18
play 15:25 213:6 235:10
256:20 257:15 258:15
played 213:23 256:25
257:19 258:21
playing 213:14 258:10
Pleasant 104:13
pleasure 340:4
plot 313:7
plugged 287:25
plural 342:20
podcast 256:22
point 20:4,5 30:10 31:12
49:10,11 50:7 53:22 58:23
63:11 65:3 78:20 89:17
100:22 101:2 103:17
105:15 107:13 109:25
111:7 117:14 118:2 119:25
128:18 130:23 139:4 155:4
165:7 166:9 168:13 170:21
183:2 191:5,22 212:22
215:5 218:10 222:6 223:2
229:25 238:23 240:9
247:10 250:1 253:11
254:20 255:1,2 275:6
276:12 282:16 283:21
285:11,18 286:6 287:17
293:4 294:16 299:17 309:5
312:11 321:8 346:3 347:12
354:14 368:9 379:25
414:13
pointed 248:6
pointedly 394:21
points 17:16 18:1 19:18
20:6 29:8 30:6 31:2,9
43:19 48:23 50:8 52:1
130:24 141:16 146:8,10,11
204:16 212:1 311:15
policymaker 43:2
policymaking 262:16
political 10:22 12:2,17
15:9 16:12 33:1,22 34:10
36:12 41:6 42:12 43:5
46:10,19 47:3 74:21,25
75:10 76:2 77:23 78:3
80:12 93:3 110:14,18
112:17 115:17 120:22,25
121:13,21 125:11,14 138:7
143:23 197:19 200:2
220:14 258:24 259:3 261:7
262:6,7,13,15,22,23
264:17,19 295:14 297:10
343:5 352:9 357:17 385:7
politics 25:17 76:10
109:11 111:20 112:20
116:1 261:12 262:12,25

264:17
politics-blind 118:20
poll 153:23 154:2 338:4
Polsby 89:14
Polsby-popper 86:12
87:4,12 88:1,7 89:13,25
90:4,12,17 91:1,3,14,20,25
92:5 101:14 105:11 123:19
152:10,17,19,23 153:6
155:19,20 156:2 158:22
159:1 174:8 231:21,23
248:23,25 249:2 253:21,23
254:16 255:18 318:24
319:8,9,15 360:17 361:5
368:2 378:15,18,24 379:11
polygon 88:5
pop 278:4
populace 230:4
populated 84:11 244:20,
21
population 83:17 84:10
100:25 101:1,2 102:5,8,24
103:23 104:1,17 108:25
124:6,9,13,22 125:18
150:16,19 173:22 176:18
183:15,16 184:6,7,8 192:8
195:17 229:10 230:10,15,
19 231:2,6 239:2 246:13
249:21,24 250:2 280:10,
12,14,18 282:13 283:5,11,
15 284:12 302:21 303:8
315:22,23 333:5,8 338:7,
13 353:9,13,15,19,21
355:8,17,20 356:5,7,20
368:22 369:4,9,11,24
370:8,21,24 379:14,16
380:20 385:11 388:24
population's 369:19
populations 101:17
portion 102:17 106:1
301:19 308:17,23 315:10
333:5 355:7 387:1 389:4
391:20
portions 100:9,11 109:14
363:11 371:15
position 34:23 239:19
256:4
positions 269:22 295:20,
24
positive 21:25 22:18,21
26:23 27:6 29:4
possibilities 329:16
possibility 132:13 229:22
322:5 371:11
post-hoc 235:14
postdoctoral 10:23
posted 258:4
poster 78:12

<p>potential 79:22 83:15 123:22 155:10 226:6 331:11 344:5 412:2</p> <p>potentially 413:13</p> <p>Powerpoint 234:15</p> <p>powers 84:23</p> <p>pract- 95:22</p> <p>practicable 95:16,20 96:1, 25 137:8 254:6 285:4</p> <p>practical 27:13 78:5 254:11 306:4</p> <p>practice 14:7 23:22 24:4, 20 26:15,16</p> <p>practitioners 88:14</p> <p>pre 206:5</p> <p>pre-existing 135:10</p> <p>preceded 277:25</p> <p>preceding 268:23</p> <p>precinct 61:19,23 124:10 150:11 182:23 183:21,24 184:1,6,9 244:21 283:13 284:3 317:16 326:24,25 327:5,6 373:13,19</p> <p>precincts 97:24 101:16 124:11 150:5 182:22 201:3,4,16,17,21,23,24 230:16,24 231:13 232:25 233:5,16 235:1 283:9,10, 16 319:5 326:3 327:14,17 330:6 367:6 373:17 379:17</p> <p>precise 60:21 232:13</p> <p>precisely 170:12</p> <p>predict 294:2</p> <p>prediction 293:20</p> <p>predictions 347:6</p> <p>predictive 114:16</p> <p>predictor 30:18</p> <p>prefer 32:5</p> <p>preference 312:13,14 325:14 330:2 376:17 390:25</p> <p>preferences 279:7 286:21</p> <p>preferred 59:8</p> <p>prefers 312:16</p> <p>premarked 406:21</p> <p>Premises 55:1</p> <p>prepared 135:15 403:10 406:3 414:17 415:13</p> <p>preparing 82:17</p> <p>presence 337:23</p> <p>present 43:13,18 154:23 200:2 263:23 316:9 336:1 339:2</p>	<p>presentation 78:12 234:13 313:12</p> <p>presented 104:24 160:23 177:10,21 194:4 195:22 258:8</p> <p>presenting 383:1</p> <p>presently 270:8</p> <p>preservation 377:17</p> <p>preserve 308:21</p> <p>preserving 200:22</p> <p>president 161:1,4 226:17 227:2</p> <p>presidential 113:10 221:19,21 222:3,7,10,13 224:1,3,7,15,24 226:16 227:12 348:2</p> <p>presiding 7:5</p> <p>pretty 29:9 65:1 80:10 87:11 92:6 103:18 104:19 141:18 147:8 151:4 169:13 180:5,7 184:23 201:7 202:3,6 212:2 215:10 222:25 236:24 263:11 272:22 293:12 299:8,15 317:18 363:11,20 415:17</p> <p>previous 31:3 105:7 146:16 201:11 323:8</p> <p>previously 196:21</p> <p>Price 391:9</p> <p>primary 264:3</p> <p>Princeton 262:7 264:9</p> <p>principle 377:17</p> <p>principled 89:8</p> <p>principles 301:23</p> <p>print 334:20</p> <p>printed 406:7</p> <p>printing 67:24</p> <p>printout 406:5</p> <p>prior 78:25 148:3 150:25 164:19 165:2,19 188:24 200:22 214:20</p> <p>prioritization 229:6 235:3</p> <p>prioritize 285:12,13,15 377:17,21</p> <p>prioritized 83:22 98:21,25</p> <p>prioritizing 376:23</p> <p>priority 107:3 128:1</p> <p>prison 309:11,13</p> <p>pristine 196:19,21</p> <p>probative 267:25</p> <p>probe 317:9</p> <p>problem 16:20,21 22:20 25:13,25 26:2 55:20 67:4 101:1 105:23 147:2 149:21</p>	<p>153:13,22 188:14 193:20 206:4 255:8 258:17 270:20 284:9,13 316:13 364:11 366:23</p> <p>problems 19:4 89:11 99:10,15,17 137:10 151:5 153:16 154:14 204:14 211:23 220:8</p> <p>procedural 47:18</p> <p>proceed 15:2 82:3 266:13</p> <p>proceeded 180:15</p> <p>process 13:13 156:6 157:12 164:11,14,20 165:8 166:1 167:9 172:2 180:8, 11 187:16,17,18 188:2 189:15 197:23 235:20 253:25 256:9 342:17</p> <p>process-based 99:11</p> <p>produce 69:15 70:5,9 115:24 117:10 124:8 126:15,18 157:12 181:19 279:4 280:2 284:8 287:4 331:17 336:19 343:18 358:25</p> <p>produced 203:14 314:5 316:12 328:14 337:8 339:2</p> <p>produces 182:10 275:5 277:15 319:17 337:12,16</p> <p>producing 152:11 201:7 278:19 315:9 325:11 331:10 336:16</p> <p>production 128:3</p> <p>professor 10:12 220:1 261:6,25 276:3 398:4</p> <p>professors 121:1 214:25 215:15</p> <p>program 111:10 156:17 158:12 251:1,17 252:6 258:23 275:24 276:1 280:1,7,11 281:25 282:3,6, 24 283:3 284:17 285:24 337:5 367:1 369:3 373:11, 16 406:5</p> <p>programmed 280:13 323:19,20 368:18 369:7 375:8</p> <p>programming 111:13 121:11 331:4</p> <p>programs 277:24</p> <p>progression 136:11</p> <p>prohibit 115:6</p> <p>prohibited 192:12 333:2</p> <p>prohibition 344:19</p> <p>prohibits 33:20 34:9,20</p> <p>project 78:11 120:24 126:25 276:2,9 289:7</p> <p>prominent 21:12</p>	<p>promise 55:14 143:6 182:5 217:4,15</p> <p>promises 218:8</p> <p>prong 47:16 92:22</p> <p>proofs 277:3</p> <p>Prop 83:10,19 85:24 94:16 127:7,12 188:20 189:1,4 202:10 218:21 324:11 360:2,12 365:4</p> <p>proper 64:7 321:9</p> <p>properly 280:23</p> <p>properties 204:24 268:10</p> <p>proponent 39:5</p> <p>proponents 39:3 49:6 219:19</p> <p>proportion 55:16 373:13</p> <p>proportional 16:7,15 19:11 139:15</p> <p>proportionality 16:9 19:7</p> <p>proposals 33:7 258:8</p> <p>propose 55:24</p> <p>proposed 14:16 20:24 21:7 25:11 33:2 35:14 41:2 49:23 50:2,4 51:3 86:7 129:5 146:19 148:22 214:22 237:24 268:15 410:5,12</p> <p>proposing 214:22</p> <p>proposition 33:14 34:2,9, 19,24 35:23 36:6,10,19 37:2,5,9 71:19 82:13,15 84:14 92:9 97:18 107:10 109:9 111:23 115:6 124:5 127:7 137:9,22 138:15,16 198:25 200:25 214:10 215:12 219:8 220:15 231:10 239:19,22 242:11 243:11,17 244:7 245:15 280:4,7 284:14 286:25 302:3 321:11,15 323:19 361:19 363:7 364:23 367:17 368:19 378:9</p> <p>protect 56:13</p> <p>protecting 56:1</p> <p>protection 55:22 56:18 58:15 59:4,23 71:17,18</p> <p>protective 122:10</p> <p>protrusion 360:25</p> <p>proud 80:10</p> <p>provide 9:8 73:16 179:5 213:16 260:6 341:9 343:20 395:1 417:1</p> <p>provided 8:10 54:15,18 113:20 247:25 334:1 369:23 386:6 407:1</p> <p>provision 218:7 242:16 322:10</p>
--	---	--	---

provisions 82:20,24 83:5
109:8

Provo 261:16,17 308:1,24
391:12 395:15

proxy 249:24

pseudo-county 376:13

public 121:19 277:12
306:18 312:2

publicly 122:12 278:15
311:17

publish 264:20

published 12:24 214:17
221:8

publishes 276:1

pull 28:12 44:5 66:23
170:13 172:6 297:23
302:12 318:4 326:5 340:8

pulled 156:21 160:4
203:14 204:9 323:5

Pulling 319:22

punishes 130:25

punishing 130:20

purple 160:16 349:24

purpose 55:4 109:16,17
115:16 117:23 120:10
147:6,8,9 248:7 276:24
283:25 357:15 397:6
399:23

purposefully 33:21 34:9
110:13 112:16,19 116:6
138:7

purposes 40:4 119:1
231:11 249:21 306:4 388:4

push 206:8 238:9 279:24
413:13

pushes 226:10

put 12:16 29:20 47:24
51:15 100:13,14,18,24
101:22 102:16,18 103:13
114:4 115:23 117:12,19
129:13 138:18 150:5,11
173:13 175:14,15 180:10,
14 182:23 183:4 185:12
186:21 187:14 189:10,24,
25 191:14,20,25 192:14
194:9,10,11 195:7 202:25
205:8 227:20 236:18
237:14 238:2 248:24
258:18 272:18 286:8
297:20 303:18 330:25
344:9 363:8 364:16,17
369:15 373:21 387:23

puts 75:15 122:23

putting 192:9 355:5

Q

quadrant 175:20,21
190:24 351:3

quadrants 100:5 175:12,
14,15,21,23 180:14
189:11,24 190:10,18
194:10,11

qualifications 14:24

quality 122:14 248:19
306:13

quantify 42:19 62:18

quantile 169:4,12

quantiles 168:20 169:5

quantitative 42:11 45:8,
17,25 47:13 81:23 266:10

question 20:13 29:11
52:14,21 53:2 62:8,10
63:9,13 67:12 84:21 89:21
134:12 148:18 160:22
170:6,11 174:2 196:8
215:21 232:13 268:5,23
275:11 283:2 301:20
310:24 317:9 337:4,10
342:1 344:2 346:5,7
347:22 351:24 371:18
372:15 402:10 411:16

questioning 34:6 394:25
399:5

questions 31:22 53:5
60:13,22 71:2 145:4
149:10 162:5 167:3 259:16
278:16 395:6 415:8

quibbling 225:23 231:21

quick 8:9 65:16 72:15
141:1 162:15 171:25 400:6

quickly 97:16 222:25
223:19 269:13 271:6
379:13

quirk 332:21

quote 71:18 188:14 217:14
248:18,19,20 249:17,19
250:4 358:7 368:22 374:8
377:15 385:19,20

quote/unquote 90:5

quoting 220:17 377:20

R

race 113:13 132:1 223:3,5,
11 224:25 225:1 348:23
364:6

races 75:8 113:13,14,21
114:4 139:21 145:17
146:16 225:6 226:9
227:19,20 228:8

racial 80:12 183:9,16
184:7 275:15 301:17

radically 227:25 250:13

Raffensperger 247:17

railroad 389:25

raise 260:9 365:13

raised 18:8

ran 88:21 129:3 137:14
148:7 280:23 281:24
292:25 324:14,15

random 198:11,17 244:9
382:1

randomizes 156:13

randomly 132:19 198:10

range 15:24 28:7 31:14
51:25 90:17,18,19,20,21,
23 113:15,16 117:11,20
118:3,17,18,19 123:22
129:11 132:2 151:16,18
152:9,10,12,17 155:10
156:1 158:23 159:1 169:16
229:16,19 232:2,3 272:21
279:13 288:11,12 348:11
379:9,10

ranges 28:7 91:16 95:4
169:9 284:23

ranging 123:19

rank 130:11 225:4

ranked 129:14,16,19,24
130:2,7 131:10,15,19
132:3,9 134:13 135:17
137:19 138:3 267:8 268:20
280:5,8 284:15 289:18,25
290:11 291:5 292:2,11
313:23 324:15 368:19

ranks 313:1

rapidly 69:13

rare 150:18 317:18

rarely 330:13

rate 153:21 209:6

rates 153:18 154:23
208:20

ratings 75:9

rationale 197:16

rationalizations 235:14

re-drawer 24:16

re-plug 287:24

reach 87:25 112:15 217:8
283:10

reached 164:23 170:9
410:9

reaction 145:25 146:3

read 12:24 28:20 33:15,16
36:4 45:6 46:6,13,16,22
51:1 57:20 69:3 84:14
99:10 115:6 135:23

138:15,21 149:17 188:1
196:5 210:1 216:14,18
217:2 220:8 250:5 271:5
288:9 290:18 317:12
321:14 341:16 358:13,21
369:1,13 377:22 382:11,15
385:24 387:2 394:8 397:18
402:14,21 405:20

readership 75:12

reading 37:13 47:10 60:7,
8 175:4 288:13 377:7

ready 7:10 8:25 9:18 32:9
73:8 74:4 207:25 208:1,2
301:9

real 75:21 88:19 90:22
114:17 117:14 127:18
159:17 211:21 212:4,24
213:1 253:18 255:20 400:6

real-world 152:15

Realclearpolitics 75:3,
13,14,19

realized 168:21 169:5

reallocated 310:2

rearranging 194:19

reason 57:4 61:15 68:1,11
100:17 104:14 196:15
220:12,14 228:1 236:1
283:7,22 284:5 286:2
308:15 313:15 314:10,21
315:8 326:1 332:9 333:10
354:20 371:1 385:2

reasonable 21:24 51:5
58:5 64:20 92:4,5 94:25
98:2 123:20 160:3 176:16
245:11 272:17,23 293:5
345:22

reasoning 19:5

reasons 27:21 76:15
100:13 225:8 283:7 285:8
293:21 332:9 388:24

rebuttal 315:10 357:21
358:1,5 410:1

recall 17:9 21:2 22:5 43:25
44:7 54:6 59:9 65:25 69:8
172:12,13 177:24 186:11
197:10 201:20 209:18
218:17 222:21 236:14
238:1 253:1,8 256:2 265:5
322:21 323:1 339:12
346:15 375:21 386:16
394:5

receive 20:15

received 8:24 24:3 73:7
163:17 165:25 177:11
264:13 398:2 399:12
401:20 402:24 404:12
405:15 406:18 409:6,16

receiving 55:15

recent 11:11 12:13 49:2
339:14 348:14 399:24

recently 12:6 14:17 268:16	302:13 313:21 314:9 315:6 326:11 368:18 369:9	relying 47:2	399:21 400:14 405:3,4
recess 72:18,21 163:2,3 207:17,23 301:2,4,5	redraw 301:19	remain 56:7 72:19 114:7	reported 180:3 288:19 369:22
recognize 44:21 54:19 67:15 173:8 180:18 187:9 199:13 203:4 208:13 351:5,9 375:9	reduce 309:20 321:22 322:7	remaining 349:14	Reporter 217:1
recognized 228:25 403:8, 24	reduced 279:8 309:23	remains 150:8	reporting 350:8 354:12 382:21 383:14
recognizes 234:11 376:8	reducing 254:15	remedial 33:6,10 35:6 79:22 272:20	reports 8:11,17 37:14 46:13 125:21 130:7 246:5 273:3 278:19 293:4 310:6 319:14 399:19 409:11
recollection 129:23 172:4,9,19 186:7 311:3	reduction 227:14	remember 11:12 13:1 38:14 54:2,4 66:12,20,21 76:11 79:3 144:21 166:7 170:8,17 171:4,23 178:19 194:12 411:13	represent 35:22 41:17 54:9
recommend 283:24	refer 11:12 34:7 217:13,22 352:4	remind 12:25 195:24 296:2 339:7 410:13	representation 16:16 19:12 56:3 139:16 262:14 305:12 307:7 399:8
reconfigurations 195:18	reference 13:5 69:20 321:12 371:6 389:9 407:24	reminder 9:12 57:21	representative 145:8 154:12 165:20 256:23 275:7 277:15 329:18 331:10 336:20 337:9,13 338:1,7 358:10
record 10:7 57:10 67:14 72:23 74:1,16 127:22 134:21 162:10 163:5,15 166:25 187:1 208:4,5 213:11 236:8 260:16 301:7 311:18 334:15 396:10 397:18 402:14,21 407:16 417:16,22	referenced 18:7 339:5 385:18 400:12	remotely 416:6	represented 380:10
record's 378:23 406:25	references 400:13	removals 251:13	representing 240:12 266:4
recorded 9:12 73:21 128:19 252:13 260:12	referring 34:8,18,19 60:16 168:24 216:2 218:1,13 239:18	remove 127:18 251:3,25	represents 264:19
recording 256:21,25 258:21	refers 175:6 176:13,17	removed 149:18	reproducible 122:22
records 407:25	reflect 88:22 358:12	removing 87:7	Republican 30:2 59:8,19, 20 78:1 114:1,18,20 115:2 118:6,7 129:8,9,10 130:1, 11,12,17 135:22,25 136:3 137:15,19 145:16 146:7, 10,12 160:25 161:13 225:5,15 226:11 227:4 228:1 252:11 256:22 267:10 292:23 293:8,10,13 294:9,11,13 295:1,5,10,16 298:6 313:2,4,5,23 324:19, 20 349:10,13,17,23 350:4 351:6,12
recreation 306:13	reflected 286:25	rendered 248:20	Republican-leaning 155:1,14 265:20 293:11
red 174:10,17 184:21 328:15 336:3 349:18,21	refresh 117:3 129:22 182:8	Reock 86:11,16,20,25 87:6,10 88:7 174:8 319:10, 12 360:18,19,21 361:1,3 368:1	Republicans 11:5,7 14:5 15:18 16:3 17:19 19:1 20:17 23:8 114:5,11 124:24 128:24 161:3,6 212:18 225:10 297:21 351:10
reddish 318:14	regard 16:1 299:21 307:7 405:16	Repbu- 130:16	reputable 278:23,24
redefine 376:12	region 94:10	repeat 9:11 346:6	request 73:22 162:22 171:11,14 417:12
redirect 71:5,8 259:14 395:7,8	registration 386:5,13	repeated 331:12 360:3 372:23	require 21:8 49:19 82:16 84:14 137:22 263:5 267:13 274:11
Redist 120:16,20 121:16 122:12 125:21 154:14 158:11 230:9,19,23 231:7 251:1 275:23 276:1 279:25 337:5 360:1 373:11,16 379:15	regular 101:16	report 18:8 28:5,17 32:21, 24 33:5 35:8,16 36:8 39:11 40:14,16,19 43:23 46:7,9, 22,24 54:7 65:25 66:24 67:11,16,20 68:12,19 69:12,14 70:1,13 78:23 80:14,17 83:5,7 101:4 105:1,2 108:12,13 111:22 117:10 119:14 125:9,20 126:2,9 135:15,20 145:6 147:24 149:13 153:3 157:6 179:23 188:1,5 208:12,19, 23 209:16,21 211:14 214:15 219:5 228:14 229:25 231:14 239:17 240:2 241:16 242:6 245:24 246:2,11,15,18,24 248:8, 11 249:4 250:9 270:14 272:25 287:4 288:4 289:21 310:14,18,19,22 312:19 313:15 315:10 316:20,21 318:5 319:25 320:18 323:6 326:6 333:22 334:17 336:10 339:14 340:8 341:16,21,25 342:9,25 347:2 349:1,8 352:19 355:9,12 357:21,22,23 358:2,5 360:20,21 368:17 369:18,20,24 372:17,19 377:2,7,12,13 378:15,19 380:4 382:3,5,6 384:8 389:7,10 390:8 393:3,19	required 111:23,25 119:13 245:15 370:9
redistrict 80:5	rehash 119:15 140:25		requirement 83:19,21 85:24,25 92:20 94:15 95:6 111:22 112:4,6 120:6 124:7 358:25 360:12
redistricting 11:2,8,16 13:11 14:23 18:12 33:3 35:10 42:14 46:11 47:17 56:19 57:25 64:3,12 76:16 78:10,16 79:25 80:6 81:8 82:17 84:15 86:5 88:15 92:14 93:5 103:25 104:5 109:16 129:5 143:12 144:13 145:8 149:24 151:14,24 160:16,24 164:20 165:21 179:12 180:19 181:5 199:14 200:4 213:13 244:8 249:8 256:8, 18 258:6 264:11 265:2 266:10 268:15 278:2 280:5 286:16 301:12,13,23	rejected 177:10,17,20 252:16 394:4		
	rejecting 153:20		
	related 18:12 97:14 109:10 148:17 262:25 322:13 387:16		
	relates 111:8 147:15 165:21		
	relationship 29:6 90:8		
	relative 227:22		
	released 234:14		
	relevant 77:20		
	reliability 398:11 399:2		
	reliable 119:5 231:9 267:22		
	relied 94:23 246:24 400:3		
	relies 61:1 211:16		
	rely 42:21 43:7 51:19 65:19 347:5		

requirements 82:23 83:10,18 85:23 96:9 97:6 107:9 127:13 137:9 200:5 243:11 requires 15:15 25:15 26:11 35:24 36:10 37:17, 22 58:20 61:3 62:15,24 102:3 112:12 268:14 312:21 requiring 141:23 resampling 338:15 research 43:1,4 120:25 262:19,20,21 263:16 277:10,19 researcher 338:2 researchers 338:2 resemble 292:2,11 resembles 299:9 reservation 233:1 235:24 reservations 94:2,13 232:17,22 234:20,24 residents 102:15,23 resolve 16:25 188:14 192:11 resolved 103:5 resort 303:1,4 resorts 306:14 respect 91:23 106:8 156:19 186:3,10 198:25 250:20 284:17 318:6 355:19 375:7 378:3 396:15 398:3 399:16 401:21,23 respecting 378:10 respective 409:10 respond 9:13,14 73:24 145:11 149:14 151:12 152:6 155:3,17 219:7,11 252:25 260:15 322:3 337:18 responds 212:16 response 12:14 44:2,22 45:1 57:9 59:13 63:18 90:15 145:5 310:20 319:11 322:4 357:23 responses 338:10 394:25 responsive 278:17 responsiveness 16:1 26:6,11,18,24 56:10,11 58:22 71:24 rest 82:6 102:4 166:16 185:15 186:4 194:14,20 333:7,8 338:12 restart 300:18 restate 81:21 restrict 122:7 230:15	restricted 27:18 127:21 128:2,22,25 133:25 135:19 136:12,15,17,18,24 137:5, 6 150:1,16 157:3,7 159:9, 11 233:3 241:20 242:5,6, 10 244:6 restriction 191:22 restrictive 318:19 357:11 382:23 restroom 72:15 result 45:8 77:13 187:13 188:9 220:25 222:7 224:3, 8 226:16 278:1 341:19 343:12,22 344:7,21 345:13,16 resulting 280:18 results 137:17 141:15 144:5,10 222:10 273:13,21 287:16 293:25 294:4 312:25 313:17,18,19 315:9 319:21 325:12 343:4,18 345:2,3 346:19,23 347:6, 11,14 348:2,3 373:4 383:15 386:2 retained 11:22 38:13 40:24 80:18,21 164:18,22 265:19,23,25 266:14 340:23 341:13 retention 80:22 107:20,21 108:4,11,12,15,20,21,23 164:25 201:2,10,13 208:20,25 209:6 341:2 retrospective 76:6 return 207:17 379:19 returns 279:9 reverse 57:13 269:23,24 reversed 143:20 269:23 295:20,24 review 12:17 38:3 82:12, 15 95:13 310:5,8,10 reviewed 37:25 163:16 309:21 310:24 321:11 revisits 51:8 revolving 79:6 Reymann 7:17,18 67:23 68:5 72:24 82:1 202:15 206:24 404:2 405:22,23,24 406:10,19 407:7,14,18,20 408:1,3,6,8 409:7,17 410:15 411:12,19 414:3,8, 15,19,22 415:4 417:19,21, 23 rich 149:20 151:7 244:20 411:14 ride 106:24 ridiculous 154:10 Rights 78:7 80:13 83:13, 15 249:22	rigor 248:18 rigorous 352:15 rise 7:3 226:22 river 91:12 95:3 106:2,23 152:25 153:4 204:15 367:8,10,11,13 389:22 rivers 91:9 127:16 284:23 Riverton 233:8 304:24 305:17 361:24 362:2 roads 256:6 Roberts 217:7 robust 14:13 Rodden 125:17 Rogers 8:3 9:2,4,19 10:2 13:3,7 14:19 15:3,4 28:16 29:10 31:22 41:8 44:9 52:22 53:1 71:5,6,9 72:2,7 73:3 335:4 400:8,11,18,20 401:1,3 402:1,4,13,15,20, 23 403:7,12,15 404:16 408:11 Role 44:24 rolling 168:12 202:11 room 117:19 123:15 124:13 248:3 283:19 362:9 407:25 root 131:3 Rosenblatt 12:7 27:15 43:25 138:22 143:3 214:17,25 215:9,16 220:1 400:16 rotation 51:11 rough 78:18 87:2 109:1 225:4 roughly 12:12 16:18,19 17:23 31:19 33:17 49:16 50:24 222:22 379:25 rounding 316:3 319:19 route 309:2 391:1 row 133:3,4 209:4 288:10, 14 rubber 88:4 Rucho 79:5 217:10 rule 45:9 51:20 132:12 344:19 371:10 ruled 143:23 204:25 rules 42:12,22 45:24 56:1 ruling 85:3 97:21 165:6 167:5,7,11 399:15 run 124:10 137:22 144:2 146:4 154:13,18 223:25 275:4 279:20,23 281:2,3,5, 11,23 284:6 324:24 327:19 334:6 345:1,10 run-on 252:22	running 123:1 139:24 180:6 190:14 runs 224:22 235:25 rural 103:12 204:22 256:1 <hr/> S <hr/> S-C-E-L-I-G-A 79:9 S-E-A-N 74:17 Sabato 76:4 safe 272:14 293:6 safely 297:12 safer 298:5,6 safety 24:15 sake 34:6 salary 75:19,21 Salt 84:9,12 98:16 99:24 100:5,10,11,22,24 101:11, 13 102:11 103:8 104:12 138:18 151:22,23 160:8,9 175:13,17 176:1 177:3,12 179:20,21,22 180:12 184:13,14,15 185:22,24 186:1 187:12,22,23 188:15 190:12,13 191:14,20,25 192:3,8,14,21 193:17,24, 25 194:5,7,17,19 195:12, 17,21 228:23 233:12,13 234:1,5 237:1,10,11 238:5, 11 242:20 244:24 245:3,6, 10,12 251:4 282:9,10,18, 21 304:19 305:6,23 306:5 308:8,24 310:4 312:15 322:2,8,14,18,20,24 324:6 325:15,18,22,25 326:4,8,9, 15,18,21,24 327:1,2,3,6,11 328:23,24 329:7 330:2,7, 14,18,20 331:5,18 332:18, 24,25 333:14,19,20 335:17 336:10,17 352:24 353:7,9, 13,15,17,19 354:13,15,24 355:3,8,11,13,15,17 356:2, 7,10,15,20,22 357:9,11,14, 19 361:14,23 362:12 364:20,22 365:1,11,23 366:2 367:3 368:10,14 374:5,9 375:13,14,19,20, 24 376:9,10,16 377:2,8,18, 21 378:3,5,9 380:18 381:2, 10,17 384:18 385:12 387:17,18,19 388:5 391:6 392:13,14,16,24 sample 14:11 30:17 149:23 150:18 152:24 153:24 154:12 156:22 158:13 199:16 202:2 244:10 277:8,13,14,15 281:11,14 329:18 331:11 336:20 337:9,13 338:1,19 409:10
---	--	---	---

sampled 360:4	score 86:13,16,20,25 87:6, 10 88:2,3,11 89:13 90:5 91:1,3,15,20 92:1 101:14 124:23 135:18 140:13 141:18 144:16,17 152:23 155:19,20,23 156:3 158:23 183:17 184:9 253:23 254:16,22 255:16,18 273:5,17,20,23,24,25 290:2,17 292:3,12 296:11 318:24 319:7,8,12,15 327:5 360:17,18,19,21 361:1,3,5 368:1,2 378:15 379:11	second-most 146:12	services 77:5
samples 156:24	scored 225:24 226:1,21	second-slash-second-third 83:20	session 7:4
sampling 277:15	scores 88:1 90:1,13,17 92:5 95:2 104:22,24 105:5, 7,8,17 123:19 144:19 145:15,21 155:14 174:8 221:3 225:3 248:24 253:7 287:11 300:5 319:16,17 320:12 360:16 378:24	secondary 145:2	set 7:8 27:16,22 30:19 41:2 122:17,21,24 126:16 127:5,10,11,21,25 128:2,5, 9,21,22,25 133:16,25 134:9,10,18 135:1,2,5,6,7, 17,19 136:1,4,6,9,10,12, 14,15,17,19,20,23,24 137:5,6 150:1,16 153:10, 12 156:20,22,24,25 157:1, 2,3,5,7,8 158:9,20 159:7,9, 11 166:17,20,21 167:5 168:1,13,25 169:21 170:2, 14 171:18,20 172:7,22 173:1 175:3 196:21 197:17 198:3,4,8,19,20,24 199:5, 6,8,17,20 203:6,11 204:9, 12 205:5 229:3 230:10,20 231:5,9 232:1,3,6 233:3 241:20,23 244:7 255:3,4,5, 10 259:5 274:25 275:5,7, 10,18 276:23 280:18 281:24,25 282:3,6 285:24 288:25 289:2,4,6,9,11 290:23,24 291:6,22 295:3 296:21,22 313:12,20 315:4,5 339:2,21 346:12 353:8 357:7 359:21 363:8 372:19 379:22 380:24 381:5 405:25 412:5 413:23 414:6
San 10:23 91:11 106:3,21 149:20 151:7 191:16 192:17 233:2 389:14,18 390:20 392:14	scoring 224:11 227:3	seconds 213:15,16 258:11	sets 82:20 127:23 128:23 134:22 135:13 137:2 154:7 166:18 167:23 168:14 174:5,6 177:7 183:9 297:4 315:3
Sandall 165:20 256:23	scrambles 307:7	section 14:15 119:14 135:21 185:22,24 209:22 228:15	settings 183:8
Sandall's 257:15	scratch 119:23	seek 45:18 375:9	settled 279:13
sandwich 207:11,12	screen 28:18 159:3 163:22 180:18,24 182:14,16,19 183:6,20 187:9 197:25 202:25 203:2,16,18,22 204:6 208:11 241:15 242:9 256:10,13 259:3 270:11 287:23 294:22 340:9 350:21,25 354:8,9 356:1 359:7,15 362:25 366:14 367:15 368:21 387:8,24 388:9 391:4	seeking 376:17 398:21 407:1,3	seven-tenths 16:22
Sandy 101:21 150:2,6,8,10 241:8,13 328:4 332:14	screens 244:17	seeks 376:1,2	Seventeen 404:17,18,21, 22
Santaquin 236:11	scroll 200:1 201:6 359:14 362:24	select 183:24	severe 194:22 221:1
sat 157:25	scrutinized 278:11 311:18,24	selected 198:10 332:18	severely 191:17,21
satisfy 295:22	scrutiny 312:2	selecting 183:21 239:25 318:18	shade 219:25
Saturday 75:24 311:4	scuffle 176:20	selection 334:23 335:8	shaking 407:12
save 197:21	scut 176:24	semester 263:7	shape 204:25 249:22,23 365:10 366:6 374:21
SB 37:12 38:25 39:9 41:18 42:6 48:5 50:10 60:25 61:7 120:1 131:9 133:8 141:23 199:8 200:10,17 210:21,24 214:7 223:8 253:13 341:10 358:22 382:11,15 383:16 384:1	Sean 73:11 74:7,17	Senate 64:4 66:8 80:3 95:11 134:4 144:20 161:11	shaped 310:3 374:8,14,23, 24
scale 298:24	searching 153:6	Senator 148:11 165:20 256:23 257:15	Shapefiles 319:3
scenario 124:21 213:2 356:6	seat 12:12 15:13 16:7,18, 19,23 18:23,24 19:9,16,20, 22 20:19 26:13 30:9,23,25 41:20 55:16 73:19	send 171:9,18 176:21 180:3 224:6 411:18 413:1 417:14	shaping 103:7
schedule 413:5 415:21	seated 7:6 72:19	senior 75:2	share 12:11,12 15:13,23, 24 16:3 18:14 19:15 20:16, 19 22:6,10 23:23,25 26:2, 3,8,12,13 30:1,2,3,5,10,20, 22,23,25 41:20 53:10 61:11 68:2 129:8 130:1 137:15,19 146:20 225:11, 21 227:8 267:9,10 270:2, 11 271:22,24,25 292:24,25
schedule-wise 413:12	seats 15:10 16:4 17:5,17, 20,23,25 19:1,2,10,13 41:21 49:17 270:6	sense 22:13 25:8 34:11,12 62:20 100:13,14,18 103:16 107:6 114:19 133:2 193:7 210:3,8,14 225:4 253:18 293:18 294:5 296:7 308:19 329:1	
scheduled 416:1,3	seats-vote 26:2,3	sensitive 113:24	
scheduling 414:5,10	seats-votes 13:22 15:11, 17 17:10 19:17 20:4 23:15, 25 26:4,10 43:19 49:11 50:5 56:6,11 58:21 62:12, 16,24 63:24 64:8 65:18	sensitivity 212:16	
scheme 185:4		sentence 55:8 57:21 68:23 69:3,25 135:24 210:1 220:16 229:8 231:15 250:18 252:19,24 288:7 341:15 369:14	
scholarly 18:4 49:2		sentences 82:25 252:20	
scholars 45:15 48:23 57:24 276:3,6,20 277:20 279:7 338:25		separate 16:15 306:6 334:22 373:17	
scholarship 311:19		separately 324:1	
school 99:20 234:5 261:24 276:7 285:14,15		September 167:12,14 188:23 210:17 213:7,12 222:23 223:21 234:14 257:24	
science 10:23 12:17 16:12 74:21,25 77:23 93:3 112:8 121:13 131:20 132:8 142:2,8,23 147:13,14 148:2,19 220:14 261:7,13 262:6,7 264:17 343:5		sequence 156:11	
sciences 10:13 121:12		Sequential 119:10,12,17, 21 123:1 130:4 134:23 156:17 157:19 339:8,11 358:20,22	
scientific 35:25 36:22,23 112:11 115:10 138:5 148:22		series 251:13	
scientists 12:2 15:9 33:1 36:12 42:13 43:5 46:10,19 47:3 120:23 121:21 125:12,15 131:17 149:5 264:19		serpentine 87:8	
scope 32:21		served 11:1 65:22 66:3 265:1,5 395:1	

293:8 294:2,13 295:1,11 296:2 324:17,19,20 shares 14:14 22:24 51:16 65:1 69:7 296:10 297:9,25 sharing 61:12 shave 201:3,5 shed 101:1 268:10 sheet 242:3 sheets 173:13 203:8 406:3 Shenandoah 94:24 shift 61:10 114:21 317:24 370:5 371:25 373:8 shifted 223:1 shifts 294:21 295:7 296:23 320:9 323:13 335:20 shoehorning 286:20 short 77:6 129:23 Shortly 129:12 show 12:16 14:10 20:7 23:13,14,24 25:17 30:16 51:24 112:21,22 150:17 181:9 183:8 186:24 199:16,23 276:21 289:22 307:15 318:6 320:1 323:7 326:7 363:23 397:7 398:25 399:5 401:6 402:6 showed 25:18 88:16 108:14 162:7 172:10 335:16 373:4 showing 154:24 160:12 187:7 258:24 277:20 312:20,25 318:7 320:2 336:5 350:21 387:24 shown 21:17 179:6 257:3, 10 277:2 387:7 403:3 406:23 shows 18:25 19:2,19 22:18 101:5 105:6 184:5 273:9,10 288:8 290:11 291:5 313:9 316:8 shrinks 230:20 shrunk 227:9 sic 54:15 112:1 127:12 sic]-- 79:9 127:7 side 183:20,22 189:12 190:20 194:12 203:18,19 294:18 298:19 305:20 316:21 321:15 327:21 328:7 330:25 sides 57:24,25 sign 77:5 331:9 signed 89:3 341:2 significance 131:22 sim 174:11,23 175:1 similar 68:13 90:20 128:7 137:20 141:15 144:24	151:24 152:18 161:24 166:18 199:3 217:16 287:15 297:9,14 305:9,10 375:1 379:4,6 similar-looking 319:23 similarly 42:5 45:23 194:7 401:10 simple 14:12 18:13 21:8 293:12 simplify 348:1 simplifying 319:4 simplistic 30:13 simply 269:20 271:22 272:1 296:5,10 313:6 314:1 327:12 328:12 333:23 344:12,13 345:17 352:4 369:12 370:24 372:1,7 sims 120:12 324:12 simulated 118:9 156:9 157:11 168:1,9 170:2,5,14 171:18,20 172:7 175:3 177:7 178:17 197:17 198:8 242:10 275:18 280:12 310:8 320:15 322:22 349:9 350:10 354:9 359:10 361:25 362:21 366:15 369:19 380:24 409:10 simulation 117:4,23 118:24 119:16 122:16,21, 24 127:11 133:16,25 154:7 167:22 168:14 174:5,6 232:6 233:7 252:1 274:15 279:1,20 280:8,18 283:3 285:24 286:24 287:13 288:21,25 289:2,18 290:7, 8,23,24 293:9 296:12 310:10 312:5,25 315:3,4,5 325:1,6 363:5 simulation's 229:9 simulations 81:4 85:4 93:6 116:22,25 118:23 119:5 122:20 123:2 124:8 129:4 133:12 134:23 137:8 147:5 151:10 152:3,11,13 153:16 157:8 172:22 228:12 230:3 231:6,10 232:1,4,19 236:5 240:25 250:12,14,19,24 253:12, 16,18,23 264:11 267:14,18 274:13,23 278:6 280:16 282:24 284:17 287:5 288:12,17,18 289:12 291:18,23 294:9 298:16 313:10,11,13,17,18,19,20 314:4 315:23 316:10,12 318:9,13,14,18 319:21 320:5,10 322:2,23 323:10, 14,20,21 325:21 326:24 329:22 334:4 349:3 358:17 359:22 368:18 370:19 377:16 379:10,22 381:17	384:16 simultaneously 27:4 170:9,18 303:10 322:19 324:10 355:1 376:24 single 16:11 45:8,15,16 46:18 47:3 63:8 64:25 69:6 176:21 194:25 219:19 233:5 246:18 331:12 340:14 342:13 396:4 single-member 16:5,11 17:3 sister 303:2,21 sisters 387:16 sit 307:4 328:19 site 309:11,14 sits 303:24 308:17 325:15 336:13 sitting 142:12 191:8 211:12 situation 29:14 55:14 98:5 342:7 343:25 360:22 situations 47:14 83:23 84:6 six-ten 154:4 sixth 94:15 sizable 380:19 385:11 387:1 size 65:5 201:24 231:12 255:25 279:21 skeptical 94:11 ski 306:14 skied 77:2 skimmed 46:15 skimming 37:13 skip 149:20 233:18 skips 304:23 sleep 29:21 slew 214:21 slight 273:4 slightly 148:17 268:4,11 297:11 314:24 319:7 363:21 slow 165:12 slowly 314:11,13,23 small 24:18 148:16 284:11 303:11 314:15 319:6 333:5 355:7 smaller 290:25 298:20 smart 276:20 277:7 smarter 32:19 SMC 120:13 162:1 337:24, 25 338:14,22,25 339:5 smooth 101:15 314:6,16 315:1 319:5	smuggling 93:16 snake 160:11 snapped 88:4 snarky 126:22,25 sneak 19:14 sneaking 19:6 social 10:12 121:12 131:17,20 132:8 142:2,7, 23 147:13,14 148:2,19 149:4 261:13 386:20 sociological 217:11 software 125:21 263:17, 19 275:21,22 276:16 279:20 sole 42:23 solid 220:2 290:14 solve 10:17 solves 284:12 someone's 128:18 something's 132:20 Sopranos 220:3,5 Soren 8:1 sort 11:17,18 16:20 23:6,7 24:25 25:8 48:20 49:2,5,22 61:22 62:8 65:8 79:24 82:20 185:25 197:23 208:25 221:10 263:16 264:1,21 278:20 284:19 319:20 321:24 343:2 351:16 358:20 360:22 374:18 381:25 383:8 409:9 Soto 247:23 sought 122:6 sound 33:22 36:1 50:23 66:19 349:10 386:23 sounded 386:18,20 sounds 19:8 20:14 23:11 30:12 33:25 41:24 50:24 195:20 300:19,21 386:25 397:10 source 45:16 sources 45:16 south 175:18 176:1 177:4, 13 190:4,15 233:2 304:24 328:3 332:13 392:4,14,16 southeastern 105:24 southern 80:11 84:3 103:15 179:22 184:14 185:25 194:6 195:1,13,17 204:15 236:22,25 238:11 256:1 330:10 333:6,12,14 southwest 204:15 305:8 307:8 308:8 361:17 392:10 southwestern 351:3 space 329:16
--	---	---	---

span 373:19	103:19 104:8,18,20 106:11	221:19,21 222:25 223:24	statistics 10:13 22:2
Spanish 391:9,14	123:23,24 151:9,13,16,18,	224:1 251:9 256:9 261:9	29:17,18 74:23 121:12
speak 9:13 51:22 73:22	22,23 154:25 160:9 173:25	381:5,12	263:2,5,11 266:10 281:1
260:13,14 399:20	174:1 175:8 177:12 188:16	starting 7:21 107:13 168:4	336:25 369:24 373:5
SPEAKER 287:25 300:11,	198:16 229:7 238:15 241:8	171:2 188:4,7 190:22	stats 21:4
15	245:22 253:7 254:15	204:16 222:6 241:16	statute 11:20 92:19 95:23
speaking 73:23 82:19	282:1,4,18 287:10 288:15,	406:10	102:3 112:7,12 142:20
147:23 274:22	19 302:22 309:21,23	starts 68:22 69:2 160:19	216:9 220:10 221:6 266:21
special 11:17 131:7	317:13 318:2,6,10,14,15,	217:3 304:20	268:17 272:8 273:10
282:17 285:25 301:16	22 320:17,19,24 321:2,10,	Stata 121:19	291:13,24 346:25 384:1
specific 44:20 47:1 91:8,	23 323:11,15 324:3,4	state 7:14 11:17 27:17	statutory 38:1,3,4,8
25 101:3 113:21 123:12	346:25 347:1 365:1,11	30:19 40:21 41:2,6 61:19,	step 162:6 283:3,20
124:1 138:19 148:8 268:14	368:23 370:10 371:12	20 63:8,15,23 64:3,4,9,13,	step-by-step 188:8
359:2 360:15	372:11,20	19,25 66:8 69:5,14 74:15,	Stephanopoulos 24:21
specifically 34:19 39:21	splitting 98:22 104:14	24 77:9,19 79:12 80:3,11	stick 204:5
40:3,8 47:22 62:6 70:21	245:15 282:20 364:24	84:22 95:10,11 106:1,17	stipulate 392:23
123:10 169:15 196:24	375:19 377:21 381:10	115:17 117:8 142:1 148:5,	stipulated 14:23 393:10
199:8 218:14 322:1 362:5	spoke 391:24 392:2	19 156:12 181:12,14,18	stipulation 8:14 81:13
373:24 374:17 386:17	spoken 165:14,19	194:14 200:3 204:20 208:6	373:23 410:9
specifics 80:17 394:5,6	spot 43:9	210:9,13,20 211:5 213:11	stochastic 14:8 61:6
specifies 119:8 131:9	spouse 10:18	214:1,4,8 219:8 220:9,24	stood 303:12,16
speech 118:25	spread 75:17 146:8	239:6 246:8,22 248:15	stop 139:17 205:10 242:21
speed 113:4	square 130:20 131:3	261:15 262:17 265:22,24	stopped 77:4 178:14
Speedway 364:2	360:25	267:22 268:8 281:9,10	stops 230:11,16
spell 74:15	squared 130:23	285:12,14 293:23 301:8,	story 185:3
spelled 147:23	stable 114:7	17,20 302:7 314:13 326:13	straight 91:16 95:4 153:1,
spend 182:13 208:22	stage 156:5 302:10 368:25	340:16 341:19 342:22	6
316:4	stake 161:11 293:25	344:18 357:18 376:1,6	straightforward 93:22
spending 182:4	stance 219:12	384:24	94:2 104:20
spent 76:25 142:10 158:1	stand 45:21 192:9 299:16	state's 77:13 80:2	strange 157:12
164:6 219:5 277:18 390:14	302:15 384:9 406:24	state-of-the-art 158:11	strange-looking 156:21
spike 298:18,20	stand-in 114:10	216:7	strategy 13:24 23:11
spilling 332:3	standard 12:7 20:2 29:14,	stated 58:23	24:11,12
spit 111:13	16,17 39:4 146:19,23,24,	statement 36:21 410:4	street 88:16
spits 117:25	25 239:9 259:5 267:9	statements 398:22	stretch 87:13
split 83:24 84:5,7,13 85:1,	272:17,23 292:24 296:1,4,	states 11:13 16:13 27:18,	stretching 361:13
10,11,13,15 91:18 96:5	9 297:8,16,25 324:16	19 56:19,21 59:20 76:17	strict 140:14 144:22
97:23,25 98:14,16,24	standards 55:6,9 79:21	79:15 148:9,16 181:12	253:22 368:22 369:4,9
99:25 100:6,23 101:18,24	82:18,21 95:15 280:5	262:14,16 265:4	strictly 127:12
102:1 103:4 104:11 124:11	standing 394:12	states' 79:9	strikes 305:3,18
156:12 173:24 174:3	stands 339:7,8	statewide 58:6,11 61:10,	strong 201:12 211:18
175:9,10,11 180:13	Stanford 264:4	12 65:1 69:6 114:3,5,15	212:3,11 330:1
187:21,22 188:15 189:4,18	stark 313:16	225:11,21 226:25 227:17,	stronger 210:11
190:3 194:21 201:21	start 10:6 15:4 21:23,24	19 270:5,6 293:23 340:19	strongly 312:15
228:16 230:16,24 232:25	27:14 32:20 82:11 83:4	342:23 348:10,12,23	struck 79:9 209:3
233:3,18 236:14,18,20,23	87:7 138:1 140:2 149:20	statewides 113:19	structural 57:4 82:21,24
237:12,17 238:4,8,10	164:10 175:19 181:7 189:9	stating 10:6	83:4,9,10 85:22,23 92:8
241:12 245:4,10,13,17	195:25 196:20 202:12	statistic 22:3 65:4,16	94:15 95:5,14 96:24 97:6
282:14 283:13 286:10	205:7 207:25 230:12	147:3	99:14 107:9 109:8 196:6,7
291:21,22 304:14 308:14	283:16 284:8 285:10,11	statistical 13:19 14:22	stuck 119:19,23 281:9
317:2,4 320:24 321:1,3,4,	318:18 327:18,21,22	22:13 27:21 29:15 35:25	student 261:22
6,10,22 322:2,8,9,12,18	328:1,5 334:2 340:7 341:5	42:16 43:14 44:25 48:20,	students 78:9 180:21
332:1,2,11 362:12,14	360:7 385:6 396:24	22 71:13 75:11 81:23	263:20
370:19,25 371:2,9 378:7	started 7:9,11 8:7 31:5	88:21 112:8,12,20 115:9	
380:23 388:5,12,20	79:24 99:24 113:3,9 119:2	116:17,22 129:4 131:17,22	
splits 82:22 83:21,22	127:9 164:13 169:9 173:25	138:5 148:21 261:12	
84:15,18 85:8,17,20 96:4,	180:12 184:15 190:15	263:13,17 275:23 280:23	
10 98:17,20,21 101:25	191:4 202:5 203:12	296:5 337:3,12	
		statisticians 12:2	

studied 33:17 64:3	suggests 23:6 295:21 331:3 349:12	22,25 61:1,5,6,13,20,21, 22,25 62:5 211:19,25 212:8,9,21	24 334:22
studies 262:11	summarize 263:14	swinging 212:1	talk 14:19 15:9,10 30:15 41:11 47:21 56:8 69:18 78:13 80:17 83:2 103:21 105:4 109:7 112:25 116:9, 10 120:21 124:4 129:21 133:9 134:20 137:11 138:10 159:14,24 162:22 189:9 207:9 214:13 263:13 277:11 280:10 300:24 321:10 347:3 349:7 350:6 370:7 372:16 382:2 389:7, 8
study 36:13 263:3 264:16	summarizing 173:15	swings 24:16	talked 15:21 17:7 26:1,10 125:15,18 187:17 209:15 240:22 246:6 250:22 257:6 269:14 284:20 286:14 302:19 358:6 360:19 372:18 378:13 384:16 386:7 387:15
stuff 113:5 151:5 171:21 172:9 180:6 196:20	summary 15:22 122:18,24 129:24 141:2 168:18 173:12 242:2 373:5 406:2	Swiss 150:2	talking 70:3 156:16 164:10 181:4 189:9 217:9 236:16 250:20 253:5 266:20 297:12 320:20,21 353:6 357:1 361:23 378:1 386:18,19,20 415:3
style 313:12	summer 261:20 341:2,6 390:15	switch 163:21	talks 13:20 133:11 225:9
subgroups 279:16	Summit 102:18 193:25 228:23 237:14 353:24 361:15	switched 223:19	tamp 56:8
subheadings 82:25	super 324:11 386:16	sworn 9:9,22 73:17 74:8 260:10,21	tamping 58:21
subject 275:2 286:6	superficial 248:19 249:4	symmetric 17:11,12 55:21 56:7 58:14,20 59:1,3,21,22 62:16 140:10	tangible 407:16
subjected 299:17	supplemental 310:6,14, 17,19,22 312:19 316:20 318:5 319:25 320:18 323:6 326:6 333:22 334:17 349:1 352:19 357:23 377:13 399:21	symmetry 12:8,21 13:20, 21,25 15:6,7,15,21 16:9 17:16 18:2 19:24 20:2,10, 24 21:2,19 22:23 23:16,17 24:2 25:12 27:11 29:15,16 33:2 34:14 35:4,5 36:1 39:7 40:11 47:15 49:15 50:4,18 53:18 55:14,25 62:15,19 71:14,23 81:24 112:10 133:22 138:20 139:18 140:6,17 141:24 142:5,9,13,22,23 143:4 149:3,8 214:11,23 215:2,7, 18 216:3 217:22 218:2,14, 19 219:1,10,22 220:10,19 221:11,15 266:11 268:19 291:3 295:4,17,19 300:2 340:16 401:8	target 92:1,7 155:5
subjective 285:12,19 286:6,22 344:2,3	support 55:17 142:2 322:16	sympathetic 410:24	task 176:22 266:22 389:6
submissions 168:25 364:19 410:7	suppose 17:24 22:21 31:1 289:13 294:14 306:3 315:7,21 325:8 344:1 345:17 360:14 368:6 369:5,12 371:3,12,16 382:23 388:16	symptom 153:24 154:22	taught 77:15 263:6,7
submit 126:2 166:14 177:25 178:7 179:7 187:2 407:24	supposed 88:22 124:2 307:14	system 12:20 15:16 16:6, 13 17:9 19:12 21:17 55:6 57:22	Taylorville 327:21,25 328:5,9,10,16 330:5 392:22
submitted 46:7,9 66:24 67:16 68:12 80:24 81:7,10 90:19 99:6 126:9,10 166:11 167:18 168:10 176:19 178:5,16 253:24 288:10 302:10	surely 120:11	systematic 314:1 384:13	teach 77:18,19 78:7 261:10,11 263:1,3,6,19,21
submitting 152:8 166:21 254:17,25 410:5	surgery 192:6	systems 16:12,16 17:4 45:1,14 53:20 55:10 57:1 58:4,10 59:1,3,22 319:3	teaching 261:8 263:7
subsequent 107:25 108:3	surmount 51:21	Szeliga 79:8	technical 13:18 14:9 16:23 25:13 53:8 373:15 377:10
subset 157:19 223:10	surprised 18:23 92:10,17 195:6 313:19 314:20 339:3 354:22		technically 66:7 96:7 306:6 352:14 364:5
substance 68:6	surprising 108:17 137:18 314:19		technique 121:2
substantial 151:4 255:25 351:6	surprisingly 128:20		techniques 119:16
substantially 105:13 144:23 194:22 224:10 226:17	surrounding 236:18	T	Technology 10:14
substantive 47:16	survey 262:21 277:10 338:2,6,8,12	T-R-E-N-D-E 74:17	telling 36:12 205:11
substitute 405:17	suspicious 128:11 138:1	table 15:12 105:3,6 166:10,12 208:16,19 248:8 270:13 273:9,10 287:4 288:4,8 289:20 317:21 382:4 383:20	tells 28:25 50:10 292:15 344:7
subsumed 235:22	sustain 403:25	tables 272:24,25 273:1 293:16 319:13	telltale 331:9
subtracting 228:9 271:24	Sustained 240:18	takeaway 318:16 320:8 323:12	ten 72:19 162:17 166:25 167:18,22 168:8 286:4 400:15
suddenly 128:8,10 223:16 318:20	swap 372:8	takes 93:3 122:23 176:22 253:23 263:9 279:23 334:4 390:22	ten-minute 72:15
sued 161:9	swear 147:16	taking 147:7 166:16 212:17 254:23,25 271:22,	tend 93:8 115:24 152:25 154:9 214:4 235:4 305:8 392:11
suffice 205:3	sweeping 361:16		
sufficient 20:7 247:20	swim 368:5,10		
sufficiently 311:8	swing 14:7,9 18:1 29:24 31:7,15,17 41:20 49:4,22 51:24 52:1,10,13 60:13,14,		
Sugahara 10:12			
suggest 148:4 195:25 297:5 349:9 415:25			
suggested 93:25 130:5 145:9 212:8 221:2 232:12 266:23,25 364:16			
suggesting 28:6 149:3 321:20			
suggestions 80:25 271:23			

tendency 119:18 294:5	148:12,14 149:11 156:4	thinks 24:16 376:3,4	title 12:24,25 13:1,8,12
tenth 31:11	161:15 162:23 163:16	Thirteen 202:15,16	175:1 403:17
term 26:6,7,17,25 34:7	165:18 167:11,12 179:13	Thirty 10:16	titled 50:17 54:23 55:5
130:23 133:9,12 136:6	207:9,13 213:7,13 232:12	thought 77:5 82:19 96:21	176:9
280:23 352:5	239:24 246:2 247:13,17	98:20 109:3 127:3 146:1	today 8:7,11 10:4 32:23
terms 11:20 26:4 37:3	248:10 260:2,7 289:6	149:17,18 151:21 152:4	34:2,6 76:24 82:7 164:15
51:15 56:9 62:12 109:1	300:25 311:23 317:22	157:24 171:7 184:23 196:7	263:18 274:24 289:1
131:7 165:24 212:24 283:4	339:12 354:17 370:1 372:9	198:24 204:21 216:6,10	339:6,22 397:9 404:14
352:15 393:23	374:21 387:4,11 394:3,18	229:20 236:1 245:14	405:25 417:5,8
terrible 91:23	395:19 396:16 397:3	248:4,7 254:8 293:6 316:6	told 36:16 40:9 188:22
terrible-looking 244:22	401:23 403:9 406:1 409:8	326:10 350:7 383:1 384:13	235:9,11 255:22 257:9
terribly 143:5 183:19	testing 27:4 118:8 267:2	405:8 408:16 410:8	258:22 259:7 312:4 334:3
273:14 345:5	tests 24:7 38:24 45:23	thousand 338:4	tomorrow 407:8
test 19:24 21:10,11 22:1,2,	46:1 70:20 116:11 129:25	three-criteria 157:1	ton 308:19
22 27:10 35:15,19 37:18,	137:20 138:4,8,11,13	three-to-one 19:22	Tooele 160:19 187:25
22 39:9 41:19 42:3,7,18	139:1,5,23 266:21,23,25	three-way 245:10	193:18,24 194:7 195:22
46:2 48:11 49:20,21 50:10,	267:1,6,21 268:2,3,24	threshold 43:9 125:23	352:25 353:14,23 354:16
18 51:4 52:19 59:7 60:24	269:1,4,7,11,19 271:17	225:18 272:12 353:8	355:11,22 356:3,5,15,18,
64:23,24 65:4,14,16,20	274:5,10 275:13 289:17	357:12	22 357:8 361:13 363:24
69:4,9,23 70:4 71:21,22	292:19 293:2,3 295:16	thresholds 45:17	364:8 366:22 368:6,12
89:1,4,6 109:16,17 112:21,	296:3 299:12,16,18,23	throwing 219:25 251:9	Tooele-box 251:4
22 113:1 115:10,11,16	345:4 361:9 383:15	throws 250:25	tool 257:3
116:2,3,16,22 117:4	Texas 181:24 182:5	tie 147:5	top 127:7,13 128:1,6 174:9
118:23 121:6 129:19,20	250:22	tied 210:6 358:20	190:18 202:23 273:9,16
131:11,17 133:7,17 134:1,	text 36:4 61:14 215:19	ties 78:4,6	278:14 288:14 290:10
7,14 136:2 137:15,17,23	223:8 355:21 377:12 378:8	till 411:1,2	292:5,14 296:13,17 305:15
138:3,23 140:23 141:17,23	411:15	time 12:6 17:2 51:1 68:6	306:7 312:23 313:8,10
142:8,15 143:9 144:2,7,12,	thankfully 77:8 151:6,23	72:10 76:3 81:1 91:9 122:8	314:21 317:6 326:9 328:24
25 145:10,21 146:19,21	158:9 183:18	126:23 129:12 131:21	329:2 336:3 349:7 360:15
147:3,6,9 148:21 149:8	theorem 56:22	142:11 150:9 160:25 164:6	377:15
174:7 179:24 198:15 202:7	theoretical 54:23 276:19	167:8 168:20 182:4,13	top-line 124:18
209:17 210:7,22 211:7,8,	277:17	189:5 196:3 199:7,11	topic 205:14 262:14
14,16 213:25 214:8 220:24	theoretically 87:6	205:6,16,25 208:23 219:6,	topics 164:12 262:20
224:4,8,14 225:10,14	theory 30:15 45:19	8 220:22 231:24 245:16,18	382:1
226:22,25 240:4,7,14	there'd 389:4	246:1 255:24 256:5 259:20	topography 77:13
267:5,6,9,10,16 268:14,19,	thing 17:13 25:7 26:9 53:6	260:2 262:1 266:2 277:18	tops 229:20
21 269:15,17,20 270:7,23,	64:16 86:8 87:8 90:3 97:19	279:12 299:19 306:20	toss 133:2,4
25 271:10,11,18,19 272:16	100:1 103:6 119:21 130:1,	310:13,25 311:10 316:5	total 166:23 183:15 184:7
274:2,9,11 290:3 291:3	9 131:23 135:7 145:19	321:4 322:23 323:3 324:3	209:10 229:19 386:22
292:25 293:12 294:20	148:13 173:21 182:10	325:23,24 327:8,14 328:25	totally 213:2 340:24
295:4,16,17 296:2,3 298:8,	188:11 191:24 193:10	329:1,3,9,11,13 330:9,14,	380:10
9,25 300:3,7 340:15	209:3 211:13 222:1,2,3,9	22,24 331:6,7,15 333:4	touches 86:18
342:22 343:3,8,18 344:23	251:3 263:17 264:1,21	334:7 336:4 346:16 348:11	tough 151:5
345:1,7,18 346:20,23	278:20 281:13 303:22	355:1,3 367:19 395:19	town 341:7
382:12,19	324:1,25 337:22 357:1	396:22 410:22 411:10	traditional 92:14 94:19
tested 51:23 52:8 383:15	402:4	413:14,23 414:4,5,7	131:17 301:22
testified 9:23 74:9 97:8	things 21:16 33:25 82:22	415:18,21 416:21	traffic 306:13 308:2
107:12 109:9 115:5 137:14	87:25 90:3,25 92:12 97:15	timeline 171:23	tragic 112:9
147:12 245:14 248:12	98:9 99:13,19,20 100:3	times 9:11 13:12 77:11	Trail 306:21,25
249:7,14 260:22 308:12	105:11 111:16 114:13	132:5 133:3,4 152:7	train 138:14 219:13
398:16 403:4 406:4	124:3 131:14,23 132:3,4	265:17 267:4 274:24 321:3	traits 345:1
testify 90:11 132:16	157:14,17 173:3 189:22	322:18 338:12 353:12,14,	transcript 397:14 402:11
140:22 156:20 247:20	198:12 235:5,9,11 237:2	22 360:4 362:12,14 363:8,	transcripts 405:17
288:24 289:1 309:18	251:25 254:24 256:6	23 389:8	transition 314:6 315:1
339:10 403:3	260:12 279:16 280:20	timetable 113:6	translate 73:25 169:7
testifying 89:25 240:16	284:2,23 293:24 302:17	timing 75:25	
351:23	324:2,6,12 344:14 363:18	tiny 283:18 319:19	
testimony 9:8 22:11 24:10	382:2 388:23 394:24	tip 84:3	
27:14 32:23 33:24 35:13	thinking 23:9 84:24		
37:14,16 41:23 42:9 72:10	176:15 197:22 215:13,14,		
73:16 97:8 117:1 121:25	15,17,22 219:6 237:10		
134:4 140:19 147:10	255:17,20		

260:16	turned 15:10 128:13 143:7	underlie 13:20	unpleasant 389:6
translation 131:5	turnout 25:15,20,23 26:8 28:1 77:21	underlying 29:6 65:5	unplug 287:24
transportation 92:13,18 102:3 105:21,25	turns 78:5 94:12 116:4	underpopulated 255:25	unpopulated 97:24 244:13,15 309:24
travel 252:2	tweet 170:4,17	understand 34:8 41:25 60:15,24 63:9 65:7 85:13 95:14,19 112:5 125:24 146:20 149:4 156:12 210:24 214:15 220:23 227:10 231:1 232:23 239:5 244:18 247:5 250:17 252:18,23,24 254:14 343:7 354:11 367:19 368:9	unreliable 394:20
treasurer 223:3,11	twenty 78:19	understanding 36:6 45:18 46:8 61:7 62:9,21 82:7 95:22 147:13 200:17 239:21 268:13 269:16 272:11 305:7 306:22 317:14 318:3 331:22 332:5 354:17 397:11	unremarkable 299:15
treat 20:11 282:6,8 306:15 317:16 401:9	Twenty-two 375:4	understood 34:15 95:9 240:2,12 408:6	untoward 91:21
treated 244:24 269:21 270:1,2 282:11 295:19,25 303:18 315:14,15 316:7 375:15,25 378:7	Twitter 110:23 126:23	undue 34:9 37:19 109:23	unusual 35:7 45:10 154:5 304:9,18 305:4,13,19 365:10
treating 20:14 151:19 323:25 376:20	two-and-a-half 10:17	unduly 33:21 34:10 109:19 110:17 112:16,23	updates 278:20
treatment 310:3 365:8 366:19 374:8	two-party 15:16	unfair 139:17	updating 278:19
treats 367:6	tying 147:7	unfortunate 89:19 136:8	upper 349:16 350:10
treks 261:20	Tyler 7:25 38:19 414:3	unhelpful 249:18 250:1	usefulness 342:6
Trende 8:17 73:11,12,14, 20 74:7,13,17,18 80:14 81:14,16,22 82:5 107:8 110:20 145:5 149:11 160:22 162:21 163:16 164:3 173:8 174:11,23 184:20 207:8 208:10 225:8 240:20 242:9 243:16 244:16 259:24 288:22 289:1 389:2 406:23	types 98:3 122:24 139:1 241:10 280:1 281:15 285:5	UNIDENTIFIED 81:19 287:25 300:11,15	useless 249:19
Trende's 288:25 360:21 387:4 406:1	typical 275:8 299:8	uniform 14:6,8 29:24 41:20 49:4,22 51:24 52:10, 13 60:13,14,22,25 61:1,5, 6,13 62:5 211:18,25 212:8, 21	user 121:6
Trende.3. 197:12	typically 13:25 16:6,14 17:4 19:12 28:11 35:11 40:24 46:1,19,20 50:8 61:4 86:7 121:11 270:3 274:21 295:22 397:13	uniformly 61:20,22 62:1	username 196:9 197:6
trial 11:14 171:22 397:14	U	unincorporated 84:18 96:4 104:19 233:15 302:23 371:4,14	UT 174:11,23
triangle 350:1	U.S. 15:16 16:6 19:11 64:8 216:24 217:1,25 218:12,25	uninhabited 308:23	Utah 7:14 16:6 18:12 30:3, 22 35:6 38:9 39:15,21 40:3,5,7,15,17 41:6,14 43:17 51:15 59:8,20 62:5 64:25 70:17,21,24 76:18, 19,21,24 84:3 93:1 97:6 98:16,17 105:24 108:25 114:24 118:4 119:8 125:7 131:9 133:8 148:5 165:1, 15,21 176:10 180:25 183:18 195:1,3,7,13 196:24 199:14 204:15,24 208:6 211:6 212:25 215:12 220:24 222:4 225:9 228:24 232:22 236:22 238:3,9,18 245:12 255:24 256:1,22 261:15,20 267:22 268:13 272:12,13 282:7 284:18 293:10 295:14 301:7 302:7 303:17 304:5 308:18 331:24 332:3 333:15 336:21 337:1 340:14 341:19 342:22 348:10,12 351:3 353:16,24 363:14 367:3 380:19 385:3,7 387:24 390:11 391:3,10,21
trick 79:16	UC 10:23	unique 282:11 291:20,24 295:14	Utah's 41:6 65:11 196:10 204:12 267:23 375:10
tricky 222:4	uh-huh 73:24 183:23 184:2 198:5 260:15	United 16:13 27:17 262:14,16	Utah-specific 98:7
triggers 154:20	Uintah 94:13 232:20 234:20,22,23 235:23 389:19	uniting 309:24	utilizes 60:25
trip 391:16	UIRC 258:7 385:20 386:23	units 229:1 274:25 275:2	
true 19:11 29:7 40:16 50:16 51:2 145:22 185:3 210:23 212:23 215:7,24 224:23 230:8 231:18 247:21,22 324:2,7 392:18	ultimately 38:25 112:2 124:19 248:13 394:11	universal 389:5	
Trump 110:25 168:17 222:5	unaffected 238:19	universe 88:18 90:21 226:24 253:24 254:1 276:25 277:3,6,16 329:18, 19	
trust 380:10	unaware 50:1 234:18	universities 234:19 235:1	
truth 397:6,11,20,25 398:21,22,25 399:3,9 401:5,16 402:5	unbi 272:19	university 74:24 76:5 234:19 262:5,7 264:5	vacated 394:12
TSA 206:5	unbiased 272:20	unknowable 329:19	vague 173:19
Tuesday 410:15,16,17	uncertainty 22:14 42:16, 20 43:14	unknown 277:16	Vaguely 33:15
Tufte 17:2	uncle 390:14	unlike 25:11 131:15 313:20	valid 43:15 230:20
turn 41:16 43:20 44:20 45:4 55:3 57:15,16 64:22 68:20,25 69:11 77:24 83:7 125:8 135:20 289:16	uncomfortable 197:22		
	uncommon 116:7		
	unconstitutional 106:19		
	unconvincing 395:1		
	uncorrelated 25:20 31:19		
	uncorrelatedness 25:19		
	unculled 134:9		
	undergraduate 10:21 263:12		

validity 212:12 valley 94:24 304:22 305:6, 22 330:5,11 391:11 392:1, 18 valuable 268:7 343:21 values 27:5 297:24 vanishingly 352:24 variable 240:1 variation 287:18,20 298:3 319:6 varies 279:6 variety 77:19 276:3 278:8, 10 280:25 293:20 314:12, 14,23 326:12 327:10 342:18 352:13 vary 16:24 18:19 venture 311:6 verify 333:24 Vernal 261:21 390:12,15, 21 version 32:19 49:3 53:17 67:8 68:2 79:19 89:6 102:22 105:9 106:19 139:20 177:11 186:21 193:12,17 318:2 versions 122:9 178:11 179:14 407:10 versus 7:14 23:8 29:3 50:19 66:18 78:1 190:7,8 192:10 208:6 216:11 246:7,22 247:16,23 249:13 273:15 295:11 301:7 311:21 322:12 323:20 375:15 376:9 394:8 396:17 397:8 402:8 vertical 29:1 viable 212:21 Vice 226:17 227:2 video 213:17,18,23 406:22 view 112:9 181:19 182:10 189:3 210:7 214:15 215:5 228:3 250:1 253:7 267:21 268:6 270:7 305:18 307:2 308:15 309:25 341:16 361:11 viewed 188:19 violating 80:13 violation 188:19 196:4 Virginia 76:5 77:3 80:2,9 94:24 141:5 144:13,17,20, 21 145:1 196:16 210:12 viridis 185:4 virtue 284:24 303:13 327:12 virtues 276:17	vision 124:1 visions 116:8 visited 77:9 visits 77:13 visualization 247:25 248:6 263:22 vitae 13:2 volume 180:16 vote 12:10,11 14:3,14 15:13,23,24 16:3,19,22 17:20 18:14,18 19:9,15 20:15,19 22:6,9,24 23:23 24:25 25:5,6 26:8,12,13,16 30:1,2,3,4,10,20,22 49:14 51:16 53:10 61:10,12 65:1, 6 69:6 77:25 78:1 110:23 114:20,21 129:8 130:1 137:15,19 146:20 218:21 224:23 225:11,21 227:8 237:18 267:9,10 270:2,5 271:22,24 292:23,24 293:8 294:2 295:1,11 296:2,10 297:9,25 324:17,19,20 340:19 342:23 348:17,22 vote-seats 62:21 63:4,7 voted 111:4 160:25 161:3 voter 55:17 77:21 386:5,12 voters 7:13 23:9 69:16 70:6 208:6 212:24 213:1 215:11 219:8 301:7 349:10 350:4 351:6,15 380:20 385:11 396:17 votes 15:10 17:22 20:18 24:22 25:2,9,21 55:11 56:24 58:6 114:23 149:2 150:22 voting 19:18 78:7 80:13 83:13,14 183:15 184:7 246:13 249:22	Warshaw's 46:15 240:2 400:13 403:16 Wasatch 91:19 237:13 251:7 Washington 205:8 261:18 389:14 Washington's 247:24 wasted 24:22 25:1,5 149:2 watch 359:15 362:24 water 32:1,3 306:12 366:25 wave 110:24 111:1 ways 98:12 108:18 134:9 141:3 153:19 171:9 212:11,15 266:22 268:11 273:7 287:18 299:18 304:3 314:12,14 321:9 322:3 326:12,19 327:11 330:17 336:22 337:1 352:12 363:18,21 364:25 365:11 weak 53:11 weaken 25:18 Weber 228:23 302:24 Webex 417:1,7 website 75:15 199:13 258:5 403:13,14,18 Wednesday 411:1,3,8,9 weed 157:22 week 75:24 223:1,20,23 weeks 38:11 167:2 171:21 weigh 287:19 344:8,13 weight 248:20 315:16 338:5,11 343:23 344:1,8 345:13,16 346:1 358:12 376:21 398:1 399:11 401:13 weights 281:18,19 325:10 weird 76:15 79:16 87:24 89:4 132:21 133:4,5 157:16,20 158:22 weird-looking 100:20 157:23 158:7 242:13 weirder 89:16 160:7 well-defined 23:15 94:5 138:24 well-known 278:22 340:18 342:19 well-respected 220:2 west 77:3 179:20 189:12 190:19 193:18 304:23 327:22 328:3,6,7 330:5 356:11 391:25 392:4,18 western 100:14 192:22 356:2 Westlaw 216:23	whatnot 195:14 253:8 whichever 32:4,6 317:17 373:11 white 80:16 Whitford 79:5 143:16 148:8 212:5 216:12,24 who've 219:21 wholly 101:22 322:14,24 324:5 325:19 326:21 327:1 332:13,15,16 354:23 365:23 366:2 374:5 widely 57:23 147:8 wider 155:10 wife 113:7 wiggle 123:15 124:13 283:19 362:9 wildly 202:9 win 15:14 18:24 19:1,2,10, 15 24:13 25:4 30:9 56:23 111:1 114:12 145:23 226:6 294:3 380:15 window 272:14 winning 17:5 25:1 58:6 115:1 210:6 wins 18:23 23:7 wise 286:5 withdraw 398:6 withdrawn 412:12 witnesses 409:23 WOLF 412:3,9,14 413:1 Women 7:13 208:6 301:7 396:17 won 19:20 20:19 264:24 348:15 word 15:11 40:14,17 136:8 175:1 231:8 342:21 352:10 362:4 369:6 379:12 380:6 411:15,18 words 9:15 27:6 73:24 218:16 260:15 269:22 290:16 352:12 374:12 395:4 work 12:5 18:5 34:17 117:4 148:15 151:8 152:1 153:10 176:24 187:14 206:23 212:20 247:2 264:14 273:8 274:16 276:21 313:21 336:18 341:1,5 343:10 379:17 410:20 416:10 workarounds 216:5 worked 11:6 77:1 161:6 164:22 205:9 265:14 working 165:1 230:11 276:8 283:17 376:24
--	--	---	--

W

wait 125:10 257:17 308:3
walk 99:3
walking 77:7
Wang 69:5
wanted 30:3 92:3 126:23
128:12 154:1 155:21
171:25 196:18 203:1
214:13 219:14 252:9,12,23
357:12 364:15 373:9
378:22 391:5
wanting 283:22 384:22
warning 154:20
warrant 308:15
Warshaw 22:10 24:9
46:14 402:6 403:2

works 42:3 141:2 154:8
181:25 206:22 212:3
298:22

world 20:16 34:13 52:3
85:3 114:17 159:17 211:21
212:4,24

worried 201:11

worries 204:2

worry 13:8 16:24 66:22

worse 26:21 31:16 87:25
91:15 105:9 114:5

worst 88:11

worst-case 124:21

worst-looking 160:13
244:12

worth 19:9 326:17

worthless 259:5

Wow 132:24 146:3

Wrapping 299:11

wraps 204:17,19 242:19

wreck 138:14

write 58:1 75:10 278:17

writing 13:13 35:16 65:25
76:22 272:8 277:19

written 35:8 40:20 75:22
76:4,7 120:11 143:13
216:9 375:5 383:17 398:18
410:7,10

wrong 99:1 160:10 219:22
239:25

wrote 13:2 43:21 44:21
52:4 76:1,11 126:11 129:1,
2 210:12 215:1 239:1
342:25 374:7 375:17
393:2,19 398:18

Y

Yale 74:21

year 10:17 76:7,16 143:12
164:7

year-old 218:7

years 10:16 18:20 48:14
74:25 76:6 86:7 221:7
261:23 276:9 397:8

yell 251:20

yes-or-no 52:21

yesterday 21:10 22:10
25:14 89:24 90:11 116:25
122:1 129:22 156:20 157:9
161:15 274:24 286:13
302:20 308:12,25 309:18
312:23 337:8 339:6,10
396:1 412:4

yield 297:16

yielding 163:7

York 11:13 30:22 65:23
66:11,15 69:6 71:21 79:13
265:7,13,15,16,21,24
278:5

York's 66:10,11

young 48:16 262:5

Z

zeroed 104:4 159:17
174:24 179:15

zeroing 103:19 176:21,25
283:15 302:21 303:8

zeroing-out 389:4

zeros 174:11 176:10,17

zip 233:17

zoom 187:11 308:7 361:22
388:8 391:3