New York Supreme Court

Appellate Division—Fourth Department

TIM HARKENRIDER, GUY C. BROUGHT, LAWRENCE CANNING, PATRICIA CLARINO, GEORGE DOOHER, JR., STEPHEN EVANS, LINDA FANTON, JERRY FISHMAN, JAY FRANTZ, LAWRENCE GARVEY, ALAN NEPHEW, SUSAN ROWLEY, JOSEPHINE THOMAS, and MARIANNE VOLANTE,

Petitioners-Respondents,

-against-

GOVERNOR KATHY HOCHUL, LIEUTENANT GOVERNOR AND PRESIDENT OF THE SENATE BRIAN A. BENJAMIN, SENATE MAJORITY LEADER AND PRESIDENT PRO TEMPORE OF THE SENATE ANDREA STEWART-COUSINS, SPEAKER OF THE ASSEMBLY CARL HEASTIE, and THE NEW YORK STATE LEGISLATIVE TASK FORCE ON DEMOGRAPHIC RESEARCH AND REAPPORTIONMENT,

Respondents-Appellants,

and

NEW YORK STATE BOARD OF ELECTIONS,

Respondent.

Docket No.: CAE 22-00506

JOINT RECORD ON APPEAL
Volume 6 of 6 (Pages 2687 – 3272)

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(For Continuation of Appearances See Inside Cover)

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1 THE COURT: Mr. Chill?
2 MR. CHILL: Your Honor, I might need a
3 bathroom break somewhere through just in case.
4 THE COURT: Pardon me?
5 MR. CHILL: I will need a bathroom break if
6 I need it somewhere through or halfway through.
7 THE COURT: If you need a bathroom break,
8 you let me know.
9 MR. CHILL: Yes, sir. Thank you.
10 CROSS-EXAMINATION
11 BY MR. CHILL:
12 Q. Mr. Lavigna --
13 A. Yes.
14 Q. -- in the first paragraph of your report,
15 Page 2, you state that you are a political research and
16 campaign strategist with over ten years of experience and
17 expertise, but you give no details of your experience,
18 correct?
19 A. I give some details on that, that I provide -- I
20 think it's on political trends. And, you know, I do give
21 some background on it.
22 Q. Not much, do you admit?
23 A. Right.
24 Q. Not much.
25 Your curriculum vitae shows and you have

1 admitted you have -- that you have some political bias in
2 your work for Republicans; is that correct?
3 A. That's correct.
4 Q. And my understanding -- tell me if you think I'm
5 wrong -- is that experts are supposed to be, at least
6 publicly, nonpartisan?
7 MR. BROWNE: Objection, your Honor. He's
8 already been admitted as an expert.
9 THE COURT: Yeah. Sustained.
10 MR. CHILL: But it goes to his weight.
11 THE COURT: He can bring it up.
12 MR. CHILL: It goes to his weight, your
13 Honor.
14 THE COURT: He can bring it up. He's
15 biased towards Republicans if he says he is.
16 MR. CHILL: Yes. That's the idea.
17 THE COURT: Go ahead.
18 BY MR. CHILL:
19 Q. Next you claim, again, Page 2, I am a national
20 pollster who has conducted survey research for leading
21 elected officials, corporations, and public affairs
22 initiatives for decades; is that correct?
23 A. That's correct.
24 Q. Again, you give no details, do you?
25 A. No, not in the report.

1 Q. We only have the two reports.
2 A. Right.
3 Q. In your third sentence you state, I provide
4 strategic guidance on political trends and have deep
5 understanding of partisan influence in redistricting
6 efforts and political campaigns. And, again, you give no
7 details; is that correct?
8 A. That's correct.
9 Q. In your fourth sentence you claim, through my
10 experience as a political strategist, I have developed a
11 deep understanding of New York's geographical and
12 political landscape. You do not explain how this
13 experience leads to or connects to having this "deep
14 understanding," do you?
15 A. Not in the report, no.
16 Q. You are not a political scientist, correct?
17 A. I am not a political scientist.
18 Q. You have no master's degree of any kind?
19 A. I do not.
20 Q. You certainly don't have a PhD obviously?
21 A. No.
22 Q. Nor have you published any reports on
23 redistricting?
24 A. No, I have not.
25 Q. Now, isn't it true that you rely extensively in

1 your rebuttal report on the Cook Partisan Voting Index,
2 CPVI?
3 A. I do rely on that, yes.
4 Q. And isn't it true that you never said anything
5 about the CPVI or Cook report in your initial report?
6 A. I did not in the initial report.
7 Q. Is there a reason why you left that out of your
8 initial report?
9 A. No reason.
10 Q. There was a time constraint put on -- you had to
11 serve the reports by a certain period of time. Do you
12 know that?
13 A. Yeah. I didn't know what the dates were, but I
14 knew there was a time constraint on it.
15 Q. But you waited to put in your main reliant --
16 data reliance in the second report, not in the first
17 report?
18 A. Well, in my second report, I think, I'm more
19 rebutting the other report.
20 Q. So is it fair to say that at least in your
21 initial report, the CV -- I'm sorry -- CVPI (sic), is that
22 a good way to say it --
23 A. Yes.
24 Q. -- a short term, without going through the
25 whole --

1 A. Yes.
2 Q. -- Cook and so on?
3 A. You can just say Cook.
4 Q. I'll try to say CV -- or I'll say Cook.
5 A. If you say Cook, you'll be fine.
6 Q. Cook. Cook. Okay. I don't want to --
7 A. That'll make it easier.
8 Q. Let's go to your tables, the CVP -- Cook tables.
9 A. Cook tables.
10 THE COURT: What page?
11 MR. CHILL: This is the rebuttal report,
12 your Honor, because he said it's only in his rebuttal
13 report.
14 THE COURT: The rebuttal report?
15 MR. CHILL: Yes, rebuttal report,
16 Pages 5, 7, 10, and 13. And I'm going to take him
17 through it, your Honor.
18 BY MR. CHILL:
19 Q. Is it fair to say that you believe that the Cook
20 report is accurate?
21 A. Yes, it is fair to say.
22 Q. So let's look at -- on Page 5. Can this --
23 Congressional District 18 has a PVI of R+1, correct? R+1
24 would mean Republican, would it not?
25 A. Wait. Page 5?

1 Q. 5.
2 THE COURT: Are you looking at --
3 MR. CHILL: The chart on Page --
4 THE COURT: -- the graph?
5 MR. CHILL: The chart. The chart.
6 BY MR. CHILL:
7 A. On Page 5?
8 Q. The chart on Page 5.
9 A. Okay.
10 MR. BROWNE: I think we have our pages
11 confused here.
12 THE WITNESS: Yeah. I have 1, 2, and 3.
13 MR. BROWNE: Congressional District 18 is
14 not mentioned on Page 5.
15 Q. Hold on. Hold on. Hold on. Hold on.
16 Congressional District -- Congressional District --
17 THE COURT: 1, 2, and 3. I have
18 Districts 1, 2, and 3.
19 Q. Yeah, 1 and 2, the one that Lee Zeldin's on.
20 A. Yes.
21 Q. Lee Zeldin, District 1.
22 A. Yes.
23 Q. Excuse me. District 1. So R+1 would say leans
24 Republican, wouldn't it?
25 A. R+1 would be leaning Republican, yes.

1 Q. Yes.
2 And strongly Republican, R+6, isn't it?
3 A. Yes.
4 Q. Strong Republican, wouldn't you agree?
5 A. Yes.
6 Q. Is a Republican the congressman today in that
7 district?
8 A. Yes, he is.
9 Q. Okay. Was the district always Republican?
10 A. Not -- not always.
11 Q. So would you concede that for at least 12 years,
12 a Democrat held that district --
13 A. Yes.
14 Q. -- under the old map, a Democrat?
15 A. Yes.
16 Q. In an R+6 district.
17 So certainly with respect to District 1, it's
18 not totally accurate when it says R+1?
19 A. Well --
20 Q. Yes or no?
21 A. No, it's accurate. It's accurate. I think when
22 the -- the CPVI is -- it's a standardized measurement
23 across the country for congressional districts. There are
24 other things that come into play when you run a race at
25 certain times. It could be a candidate may have a legal

1 issue. It could be any numerous things that adds a
2 different kind of context to a number.
3 Q. So when you use these CV -- these Cook
4 reports --
5 A. Yes.
6 Q. -- because of what you just said yourself now,
7 it's certainly imponderable that might come into a local
8 election, could change the outcome?
9 A. Yes.
10 Q. So, therefore, it's not necessarily totally
11 accurate, fair?
12 A. I don't know if "accurate" -- it's a guide, yes,
13 but --
14 Q. Predictable?
15 A. It's not a -- it's not a predictor. It's not a
16 hard predictor.
17 Q. Those always reflect what the R number shows --
18 A. Right.
19 Q. -- or the D number shows, correct?
20 A. Correct.
21 Q. Let's look at the same page, Congressional
22 District 3. I'm sorry. Change -- we're going to change
23 tables. Let's go to Page 7 -- no. Let's go to Page 10.
24 THE COURT: Page 10?
25 MR. CHILL: 10, your Honor. There's a

1 table on Page 10.
2 Q. Now, the old district map -- I'm talking about
3 the 2012 map, correct, when I talk about the old map?
4 A. Yep.
5 Q. -- has a PVI in 19, District 19. Do you see it?
6 A. Yep.
7 Q. R+3, pretty strong?
8 A. I wouldn't call it strong, but it's definitely
9 leaning Republican, R+3.
10 Q. R+3?
11 A. Yep.
12 Q. Leaning Republican.
13 And who holds the seat now, a Democrat or a
14 Republican?
15 A. A Democrat.
16 Q. So when -- it says R+3, which you indicate that
17 a Republican will win, but a Democratic won; isn't that
18 correct?
19 A. The R+3 --
20 Q. Did a Democrat win or not?
21 A. What's that?
22 Q. A Democrat did win?
23 A. A Democrat won in --
24 Q. In an R+3 district?
25 A. Right, in a district that leaned Republican.

1 Prior to that it was republicans, Faso and Gibson.
2 Q. Let's go to Page 13. Let's look at District 24.
3 That's got a D+2. That means it leans Democratic,
4 correct?
5 A. Correct.
6 Q. And who was the congressman from 2015 to the
7 present? I think that's three terms.
8 A. Right. John Katko.
9 Q. And he's not a Democrat?
10 A. No, he's not.
11 Q. So, again, when I use the word predictor, it
12 wasn't accurate to the extent that what it should have
13 shown if it was accurate, that a Republican would carry
14 that district; is that a fair statement?
15 A. Not in this particular case because --
16 Q. I'm asking about this particular case.
17 A. Right, because District --
18 THE COURT: He answered it and said --
19 MR. CHILL: Okay. I'm ready to move on,
20 your Honor.
21 Q. District 22, same page, 13. You would have to
22 say -- it's an R+9 -- it's a strong Republican district,
23 would you not --
24 A. Yes, it is.
25 Q. -- according to the Cook report?

1 A. Yes.
2 Q. And yet only recently a Democrat holds that
3 district, correct?
4 A. Correct.
5 Q. So, once again, is it fair to say it does not
6 accurately predict what it should have predicted based on
7 the Cook report? Fair statement?
8 A. For that district for that time, yes.
9 Q. That district --
10 A. Yes.
11 Q. -- and the other district we talked about? Same
12 answer?
13 A. Yes.
14 Q. District 11 -- let's see what page that's on.
15 THE COURT: What page?
16 MR. CHILL: I'm going to try to find the
17 page, your Honor. Yes. It's on Page 7, your Honor.
18 THE COURT: Thank you.
19 Q. -- has a PVI rating of R+7, is that correct, in
20 the old district?
21 A. That's correct.
22 Q. And that's a really strong Republican district?
23 A. That's a somewhat strong Republican district,
24 yes.
25 Q. Somewhat strong Republican district.

1 And yet from 2019 to 2021 a Democrat won in that
2 very strong Republican district; isn't that correct?
3 A. Yep. Max Rose had it for a cycle.
4 Q. It says so. Max Rose. Thank you for putting it
5 into the chart.
6 MR. CHILL: Let's go back again to a chart,
7 your Honor.
8 THE COURT: I mean, I think you've made
9 your point, Mr. Chill.
10 MR. CHILL: Okay.
11 THE COURT: I don't know if you want to ask
12 him a question.
13 MR. CHILL: I have one more without --
14 BY MR. CHILL:
15 Q. Old District 1 --
16 THE COURT: What page?
17 MR. CHILL: I'm looking for the page.
18 THE COURT: Probably 5?
19 THE WITNESS: 5.
20 MR. CHILL: Huh?
21 THE COURT: 5.
22 THE WITNESS: 5.
23 MR. CHILL: 5.
24 BY MR. CHILL:
25 Q. You're a very helpful witness. Thank you.

1 -- that district is, again, a strong Republican
2 district, R+6, is it not?
3 MR. BROWNE: Your Honor, I think we've
4 already talked about District 1.
5 MR. CHILL: He asked me if I had one more,
6 and I said --
7 THE COURT: I think we did talk about
8 Page 5.
9 MR. CHILL: No, I have one more on that
10 page.
11 THE COURT: Wouldn't it have made more
12 sense just -- I mean, you've made your point on all
13 these districts --
14 MR. CHILL: Okay.
15 THE COURT: -- to ask him a question about
16 the validity of his --
17 MR. CHILL: Yeah. Yeah.
18 THE COURT: -- what he's testifying about?
19 MR. CHILL: Yeah.
20 BY MR. CHILL:
21 Q. So certainly you would have to concede, would
22 you not, that the Cook report is not a very good
23 predictor; it depends on local factors often?
24 A. It's a good predictor. But local factors do
25 come into play, yes. It's never going to predict 100

1 percent but --
2 Q. This is the only data that you have in your
3 report; is that not correct?
4 A. Predictive data, yes.
5 Q. No. I mean data that you opine to.
6 A. Yes.
7 Q. On Page 3 of your rebuttal report, you claim
8 that the Cook report is, quote, widely considered by
9 courts, nonpartisan organizations, and redistricting
10 experts to be a reliable measure of partisan lean in
11 districting. And you cite a number of cases, the Benisek
12 case and the Rucho case and a Phillip Randolph case,
13 correct?
14 A. Correct.
15 Q. You're not a lawyer, are you?
16 A. No, I'm not.
17 Q. Did you read these cases?
18 A. I did not read those cases.
19 Q. You cited them without reading them?
20 A. Well, I worked with Counsel on those cases.
21 Q. Counsel gave you the cases, and you put them in
22 your report --
23 A. Yes.
24 Q. -- but you didn't read them?
25 A. I did not read those cases, no.

1 Q. But you relied on these cases to form your
2 opinion, did you not? You put them in your report.
3 A. Yes. Yes.
4 Q. You put them in the report, so I'm asking you,
5 you didn't rely on them; you didn't read them?
6 A. I did not.
7 Q. Did you know that the Benisek case was reversed
8 by the Supreme Court of the United States?
9 A. I did not.
10 Q. Isn't it true that the Ohio case you cite was
11 not used directly by the Court?
12 A. I don't know that.
13 Q. You don't know that.
14 Isn't it true that aside from these two state
15 cases in other jurisdictions that are not precedentially
16 binding on this Court, the Cook report has never been used
17 in any other redistricting litigation, not in New York,
18 not anywhere else, not in any of the 50 states?
19 THE COURT: Is that a question?
20 MR. BROWNE: Yeah.
21 MR. CHILL: Yes.
22 Q. Isn't it true that it hasn't been used
23 elsewhere?
24 A. I'm not aware of that, true or not true.
25 Q. You don't know?

1 A. No.
2 Q. In your rebuttal report, Page 4, you criticize
3 Dr. -- I can't pronounce that name either --
4 A-n-s-o-l-a-b-e-h-e-r-e because, quote, he did not
5 consider whether these races were representative of
6 New York's actual turnout or candidate quality, including
7 selecting races with strong incumbents or with underfunded
8 challengers. You made that statement?
9 A. Yes, I did.
10 Q. Isn't it true that the Cook report does not
11 consider New York's actual turnout?
12 A. The Cook report does not consider the statewide
13 candidate turnout.
14 Q. Isn't it true that the Cook report does not
15 consider congressional candidate quality?
16 A. Correct.
17 Q. Isn't it true that the Cook report does not
18 consider incumbency?
19 A. Correct.
20 Q. Isn't it true that the Cook report does not
21 consider campaign fundraising or whether a challenger is
22 underfunded?
23 A. Correct.
24 Q. So isn't it true that the Cook report is subject
25 to all of the critiques you offered against Dr. whatever

his name is? Yes?

A. Yes, but the Cook -- the Cook --

Q. I just asked you, the same criticism that you made of the other expert is true of the Cook report? Is that not a fair statement?

A. It's a fair statement.

Q. Isn't it true that the Cook report also does not consider contemporary events?

A. It does not. I'm not aware of that. No.

Q. You claim that the more common method of gauging the partisan tendencies of a district is to look at the previous elections in the state, correct?

A. Yes.

Q. The Cook report is a measure of district partisanship relative to the national average, correct?

A. Yes.

Q. In other words, if a district has a score of R+1, it means that the district is 1 percent more Republican than the national average, correct? However, if the national mood is Democratic-leaning, which it has been lately, correct --

A. Yes.

Q. -- then an R+1 could still mean a Democratic-leaning district; isn't that so?

A. Yes. An R+1 is a tight district. Correct.

1 Yes.
2 Q. But still definitely Republican-leaning?
3 A. Yeah.
4 Q. So the fact that New York has nine districts
5 under the old plan with an R-leaning Cook report doesn't
6 say that there should be nine Republicans elected in this
7 state, correct?
8 A. Say that again.
9 Q. I'll say it slowly. I'm sorry. The fact that
10 New York has nine districts under the old plan with an R+
11 rating does not say that there should be nine Republicans
12 elected in the state?
13 A. Right. Correct.
14 Q. It just means that there are nine districts that
15 were more Republican-leaning than the country overall?
16 A. Yes.
17 Q. But the national congressional vote in 2020 was
18 Democratic-leaning by approximately 3 percentage points;
19 isn't that correct?
20 A. I'm not aware of that.
21 Q. Okay. In your rebuttal report, Page 4, you
22 state, I first examined whether new district lines could
23 be justified by valid considerations based on traditional
24 redistricting principles, including compactness,
25 contiguity, population shifts, and keeping counties,

towns, and communities of interest together. Did I quote you accurately?

A. Yes.

Q. But you provide no data or any evidence measuring the geographic compactness of the old or new districts? You don't?

A. No.

Q. Isn't it true that you provide no data or evidence of population shifts with retention of core districts between the old and new districts? You have no data to back any of this up?

A. Right.

THE COURT: Let him answer the question instead of answering for him.

MR. CHILL: I'm sorry. I apologize. I hear.

Q. Isn't it true that you provide no data counting the number of divided counties, towns or offer any systematic definition or location of communities of interest?

A. Yes.

Q. You should be happy. I'm going to leave the Cook business.

I want to talk to you about the Voting Rights Act. Isn't it true that in coming to your conclusion, you

1 do not take into account the Voting Rights Act of 1965?
2 A. I did not look at the Voting Rights Act of 1965.
3 Q. Even though you didn't look at it, are you aware
4 that the Voting Rights Act of 1965 demands, as a matter of
5 law, that minorities have an opportunity to elect
6 candidates of their choice?
7 A. Yes, I am.
8 Q. Okay. And we've heard a lot about cracking and
9 packing, so forgive me, this interracial area. Isn't it
10 true that the Supreme Court demands that the district
11 lines cannot contain too many minorities -- that would be
12 called packing, or racist -- in certain places or too
13 little? That would be called cracking. You can't put too
14 many minorities --
15 A. Right. Correct.
16 Q. Are you aware that just a few weeks ago, a
17 justice of the Supreme Court of the United States stated
18 that drawing these majority-minority districts, or what we
19 call voting rights districts, is extremely difficult to do
20 without packing or cracking?
21 A. I'm not aware of that.
22 Q. And isn't it true that drawing these voting
23 rights districts would take precedence of all other
24 redistricting criteria except equal population?
25 A. Yes.

1 Q. In your rebuttal report, Page 8, you note,
2 quote, keeping these districts, 7, 8, and 9, as
3 majority-minority districts does not require the
4 Legislature to contort District 11 into its present
5 configuration, which breaks up important communities of
6 interest. Did I quote you correctly?
7 A. Yes.
8 Q. You do not provide evidence to substantiate this
9 statement, do you?
10 A. No, I don't.
11 Q. Are 7, 8, and 9 communities of interest?
12 A. Yes, they are.
13 Q. What's the community of interest?
14 A. Wait. Sorry. I'm not aware of them being a
15 community of interest.
16 THE COURT: Are we talking about
17 Districts 7, 8, and 9?
18 MR. CHILL: Yes, your Honor.
19 THE COURT: Of the congressional districts?
20 MR. CHILL: Yes. I left that -- I'm not
21 touching the state Senate.
22 THE COURT: Okay.
23 BY MR. CHILL:
24 Q. So what -- you say that communities of interest
25 were broken up in District 11. What communities of

1 interest were broken up in District 11?
2 A. The Orthodox --
3 THE COURT: I'm sorry. I missed your
4 answer.
5 A. The Orthodox Jewish community.
6 THE COURT: Thank you.
7 A. The Russian communities.
8 Q. Were they in -- excuse me.
9 A. They are in 11.
10 Q. Are you saying that they're in 11 -- they were
11 in 11?
12 A. They were in 11.
13 Q. I'll get to that.
14 So you define Orthodox -- Orthodox Jews, I take
15 it, right?
16 A. Yes.
17 Q. -- as communities of interest?
18 A. Yes.
19 Q. We'll return to that.
20 But doesn't drawing, when you have to draw
21 numerous majority-minority districts as required by law,
22 necessarily impact adjoining non-minority-majority
23 districts --
24 A. It could.
25 Q. -- including the 11th?

1 A. It could.
2 Q. Well, you mentioned Jewish Orthodox, so let's
3 talk about the Jewish Orthodox. In your initial report,
4 Page 4, you state, quote, by breaking up concentrated
5 Orthodox Jewish and Russian communities with strong social
6 and cultural ties, the new map spreads conservative
7 Republican-leaning voters across multiple districts. And
8 you go on, these new districts move large numbers in the
9 Russian Jewish communities into Brooklyn into
10 Congressional District 8 and divide the Orthodox Jewish
11 communities between Congressional District 9 and
12 Congressional District 10.
13 You also state in your rebuttal report, Brooklyn
14 has one of the largest Orthodox Jewish populations in the
15 world. Culturally, spiritually, and politically they form
16 a community of interest, which is something you said a few
17 minutes before when we were talking, correct?
18 A. Correct.
19 Q. You also make the following assertion in your
20 rebuttal report, Page 6: The Legislature cracked
21 established Orthodox Jewish and Russian communities with
22 strong social and cultural ties, spreading these
23 conservative Republican-leaning voters across multiple
24 districts.
25 A. Yes.

1 Q. Okay. Jew is a noun; is that correct?
2 A. It's a religion. Jewish is a religion.
3 Q. I asked you a question. Is the word Jew a noun?
4 A. Yes.
5 Q. Okay. On this noun what are the
6 characteristics, criteria, or markers that defines one as
7 a Jew?
8 A. When I wrote this, what I was talking about --
9 Q. Could you answer my question, please?
10 A. I can't.
11 Q. You can't answer the question? You don't have
12 markers?
13 A. No.
14 Q. So you can't define who is a Jew.
15 Isn't it true that the census does not count
16 Jews as a minority?
17 A. I'm not aware of that.
18 Q. Isn't it true that the census doesn't count Jews
19 any which way?
20 A. I'm not aware of that.
21 Q. So how do you know who's a Jew in Brooklyn?
22 A. It'd be --
23 Q. I haven't got to Orthodox yet. Wait.
24 A. -- the --
25 Q. I'm just talking about Jew.

1 A. It's just a long -- having worked on those
2 districts -- in those districts and been there, we know
3 who -- it's their community. We understand that.
4 Q. You don't have a shred of evidence other than
5 the fact that you worked in those communities and know
6 who's a Jew to back up your statement that these Jewish
7 communities were cracked or packed or whatever you said,
8 correct?
9 A. I know from what I saw.
10 Q. Evidence? Data? Poll numbers? Voting
11 patterns?
12 A. Poll numbers, I mean --
13 Q. No. No. No. Do you have it in your report
14 anywhere?
15 A. No.
16 Q. Now, Orthodox is an adjective modifying the noun
17 Jew. So you talked about Orthodox Jews, right?
18 A. Yes.
19 Q. One of the criteria, markers, measurements
20 defined in Jew is Orthodox.
21 MR. BROWNE: Your Honor, I'm going to
22 object. Let's just get to the question.
23 THE COURT: Yeah. I'm not quite sure where
24 this is going, Mr. Chill.
25 MR. CHILL: Well, I'll make a --

1 THE COURT: If you want to ask him where'd
2 he get his -- he probably took it from some data. I
3 don't know. If you want to ask him where --
4 MR. CHILL: I asked him and --
5 THE COURT: -- he got the figures --
6 MR. CHILL: -- I'm going to show him
7 that -- if he's willing to concede that he has no
8 data at all showing -- defining what an Orthodox Jew
9 is, let alone a Jew, I will stop the questioning on
10 this area.
11 BY MR. CHILL:
12 Q. Yes, Mr. --
13 THE COURT: Let's move on.
14 MR. CHILL: I'm moving on.
15 Q. Will you concede that you have no data at all
16 and no way of defining what's Orthodox and no way of
17 defining what's Jewish?
18 THE COURT: He's already said that.
19 Q. Okay. So if you can't define Jew and you can't
20 define Orthodox Jew, how do you know how they vote?
21 A. We know how they --
22 Q. You can't define who they are. Who's voting --
23 THE COURT: Let him answer the question.
24 A. We know how they vote because of their
25 community. We can look at election results by election

1 district. We know how they vote.
2 Q. Where is that in your report?
3 A. I talked -- I spoke about it in the report.
4 Q. Where?
5 A. Well --
6 Q. Where?
7 A. -- we can identify the election results.
8 Q. Where in your report do you --
9 A. It's not in my --
10 Q. -- talk about how Orthodox Jews vote?
11 A. It's not in my -- it's not in the report.
12 Q. Let's go up to Kiryas Joel, and this is --
13 THE COURT: Are you referring to the
14 report?
15 MR. CHILL: That's the second report, your
16 Honor, Page 10.
17 THE COURT: What page?
18 MR. CHILL: Page 10, your Honor.
19 BY MR. CHILL:
20 Q. You claimed --
21 THE COURT: One second.
22 MR. CHILL: I'm sorry.
23 THE COURT: Whereabouts on Page 10 are you?
24 MR. CHILL: Yes, your Honor.
25 THE COURT: Are you referring to certain

1 language in that on Page 10?
2 MR. CHILL: Yes, I'm going to.
3 BY MR. CHILL:
4 Q. You claim that the new map separates the
5 Orthodox communities in Sullivan and Rockland Counties
6 from the Kiryas Joel Jewish community in Orange County,
7 correct?
8 A. Yes.
9 Q. But you can't define Orthodox -- or Orthodox
10 Jewish again, right?
11 MR. BROWNE: Objection, your Honor. Asked
12 and answered.
13 THE COURT: Sustained.
14 MR. CHILL: It's a different area of the
15 state, your Honor.
16 MR. BROWNE: It's the same question, your
17 Honor.
18 MR. CHILL: But it's a different part of
19 the state. If it still had the same criteria that he
20 can't measure with respect to Rockland and Sullivan
21 County, I'll --
22 THE COURT: Move on, Mr. Chill.
23 MR. CHILL: -- I'll go on.
24 BY MR. CHILL:
25 Q. Is it your contention that these Orthodox Jews

1 tend to vote Republican rather than Democratic?
2 A. Yes.
3 Q. Are you familiar with the election in the area
4 known as Kiryas Joel, which you mentioned, election
5 results?
6 A. Yes.
7 Q. And is that a district heavily populated by
8 Orthodox Jews voting Republican?
9 A. It depends. The community -- if you look at
10 election results from that community, you will see large
11 differences in votes. Sometimes in an election district
12 it can be 400 to 5 for a Democrat or 400 to 5 for
13 Republican.
14 Q. And the fact that they're Orthodox does not
15 dictate how they're going to vote, is that a fair
16 statement, on a given election?
17 A. I would almost say the opposite. The fact that
18 they're Orthodox could potentially tell you how they were
19 going to vote.
20 Q. Well, do you think that the -- did they vote
21 Democratic or Republican for Congress?
22 A. They vote for the candidate. It's not --
23 Q. No, in the last election.
24 A. I don't know the last election. I don't recall.
25 Q. And if I tell you that they voted for a Democrat

1 named Sean Patrick Maloney, would you believe me?
2 A. Yes.
3 Q. Even though in the same election cycle they
4 voted heavily Republican for other candidates?
5 A. Yes.
6 Q. In your rebuttal report, Page 9, you mention the
7 following community members --
8 THE COURT: One second. Let me catch up.
9 MR. CHILL: Sorry. Sorry. Sorry.
10 THE COURT: Rebuttal report, Page 9.
11 MR. CHILL: Yeah.
12 THE COURT: How far down?
13 MR. CHILL: Your Honor, maybe I should take
14 a short bathroom break here if that's okay. I'm not
15 far from finishing. I'm not far from finishing my
16 cross.
17 THE COURT: You need a bathroom break?
18 MR. CHILL: Yes. Please.
19 THE COURT: Take five minutes.
20 (A recess was taken.)
21 THE COURT: All right. Let's continue.
22 You're still under oath, sir.
23 CROSS-EXAMINATION (CONT'D)
24 BY MR. CHILL:
25 Q. In your rebuttal report, Page 9, you mention the

1 following community members as expressing their desire to
2 keep their Brooklyn Jewish populations together. One of
3 those you mentioned was Avi Greenstein. You do not attach
4 copies of transcripts of their comments, do you?
5 A. I did not.
6 Q. Have you read those statements that you cite in
7 here?
8 A. Yes, I have.
9 Q. And how about David Pollock?
10 THE COURT: Are you asking him if he read
11 his public comments?
12 MR. CHILL: Yes.
13 Q. Have you read his statements?
14 A. I've read the public comments on the IRC
15 website.
16 Q. And I show you this document.
17 THE COURT: Is it marked?
18 MR. CHILL: Mark it for -- I'm not offering
19 it into evidence.
20 THE COURT: Please bring it over so she can
21 mark it.
22 (Respondents' Exhibit A-1 was marked for
23 identification.)
24 MR. BROWNE: So there is some writing on
25 that document, your Honor. As long as we can put

1 that on the record --
2 MR. CHILL: Okay. I don't mind. I'm just
3 going to ask him if that's what he read.
4 MR. BROWNE: Your Honor, there's -- the
5 topmost paragraph on the exhibit is circled, and
6 there's a sentence underlined.
7 MR. CHILL: I'm going to ask about that
8 sentence.
9 MR. BROWNE: And there's also writing on
10 the bottom. I can't make it out.
11 MR. CHILL: That comes from the original.
12 THE COURT: Thank you.
13 All right. Show it to the witness --
14 MR. CHILL: Yes.
15 THE COURT: -- Mr. Chill.
16 BY MR. CHILL:
17 Q. Do you recognize --
18 THE COURT: See if he can identify what it
19 is.
20 A. I looked at it online. It wasn't a paper.
21 THE COURT: You're familiar with it?
22 THE WITNESS: Yes.
23 THE COURT: All right. Question?
24 MR. CHILL: The question, I want him to
25 read the first paragraph out loud.

1 THE COURT: Can you identify what it is
2 first? I don't know what you're looking at.
3 BY MR. CHILL:
4 Q. It's -- tell the Court what you're looking at.
5 A. I'm looking at David Pollock, Jewish Community
6 Relations of New York.
7 Q. In which you put into your report as a source?
8 A. His testimony, yes. Do you want me to read it?
9 Q. Yes, please. Read it out loud.
10 A. It is important to note that New York State's
11 Jewish communities are not homogenous. The Jewish
12 community is --
13 Q. Slowly.
14 A. The Jewish community is incredibly diverse.
15 Geographically we reside throughout the state.
16 Religiously we span secularism to Haredi yeshiva and
17 Hasidic. Economically we are rich, poor, and everything
18 in between. Politically we span the spectrum from liberal
19 to conservative, and our immigrants in New York include
20 concentrations of émigrés from the former Soviet Union,
21 Israel, Syria, Iran, Ethiopia, and many, many more. My
22 service to the Jewish community has taught me that no one
23 speaks for the entire Jewish community at the JR --
24 JCRC-NY. We try to identify and to develop consensus
25 among the various Jewish communities and to act where --

1 when there is consensus.
2 Q. Thank you.
3 And this is one of the sources you relied on?
4 A. Other parts of it, but yes.
5 Q. Parts of it.
6 With respect to Mr. Goldenberg that's cited, do
7 you know what makes him a member of sufficient importance
8 to qualify as giving any weight to what he thinks?
9 A. No, I don't.
10 Q. And with respect to Mr. Greenstein, do you know
11 what gives him a -- makes him a community member of
12 sufficient importance to qualify as giving him any weight
13 to his desires?
14 A. No, I don't.
15 Q. And with respect to Mr. Fryshman, who is also
16 cited in your report, do you know what makes him a
17 community member of sufficient importance to qualify as
18 giving any weight to his desires?
19 A. No, I don't.
20 Q. And you also mentioned a Dr. Israel Weinstock in
21 your reports; is that correct?
22 THE COURT: Are you still on Page 9?
23 MR. CHILL: No. I'm just going to ask him
24 the question if he knows -- if he's aware of who
25 Israel Weinstock is.

1 A. I don't recall what --
2 Q. You don't remember -- do you remember using him
3 at all?
4 A. I don't remember all the names. No.
5 Q. Do you remember him?
6 A. I do not.
7 Q. Okay. Do you remember a Mr. Louis Jerome you
8 mention in your report?
9 A. Yes, I do.
10 Q. Okay. And same question I asked you before:
11 What gives him the status as a community leader sufficient
12 for you to rely on him with respect to his desires?
13 A. I don't know.
14 Q. On Page 5 of the rebuttal report, you claim that
15 District 3 was competitive.
16 THE COURT: One second.
17 MR. CHILL: Sorry, your Honor.
18 THE COURT: Page 5.
19 MR. CHILL: I have to get it too.
20 BY MR. CHILL:
21 Q. Okay. With me?
22 A. Yes.
23 Q. You claim that District 3 was competitive; isn't
24 that true?
25 A. Yes, I did.

1 Q. And isn't it true that a Republican has never
2 won that district in 20 years?
3 A. Never won, correct.
4 Q. Even though you claim it's competitive?
5 A. It's competitive. They weren't landslides. It
6 was competitive. They were competitive.
7 Q. Competitive but never won by --
8 A. But never won.
9 Q. Okay. On Page 6 of your rebuttal report, you
10 state that District 1 has been represented by a Republican
11 for years. Isn't it true that District 1 has also been
12 represented by a Democrat for 12 years as opposed to a
13 Republican for only 6 years?
14 A. Yes.
15 Q. Also on Page 6 of the rebuttal report, you claim
16 that Republican-leaning communities share social values.
17 What are the social values that Republican-leaning
18 communities share?
19 A. Social values run the gamut from economic
20 outlooks, community, church. It's a bind. It's a tie.
21 Q. Tie? Democrats don't share that value of going
22 to church?
23 A. They do. They share different ones. It can be
24 church as well. It can be --
25 Q. So are you suggesting or saying that Republicans

1 go to one kind of church and Democrats go to a different
2 kind of church?
3 A. No.
4 MR. BROWNE: Objection, your Honor.
5 THE COURT: Sustained. I don't know if we
6 need that. Next question.
7 MR. CHILL: Okay. I'm happy to move on,
8 your Honor, but he did open the door.
9 Q. On Page 8 of your rebuttal report, you state
10 that Jewish populations in Brooklyn share ties that
11 stretch across connected neighborhoods. What are the ties
12 that discrete Jewish neighborhood communities share across
13 connecting neighborhoods?
14 A. Again, ties in the Jewish community is religion.
15 Q. They're all Jewish --
16 A. Right.
17 Q. -- which you couldn't define?
18 A. I can define Jewish. That's not --
19 Q. So we'll revisit that from the beginning.
20 MR. BROWNE: Objection, your Honor.
21 THE COURT: Let's not revisit that.
22 MR. CHILL: Okay. Okay, your Honor. I
23 agree. I agree.
24 Q. On Page 10 of your rebuttal report, you claim
25 that the enacted plan maneuvers District 18 from a

1 Republican-leaning district to a Democratic-leaning
2 district; is that correct?
3 A. Yes.
4 Q. Isn't it true that for more than ten years,
5 District 18 has elected a Democrat even though under the
6 2012 map District 18 is rated R+1?
7 A. Yes.
8 Q. On Page 11 you conclude that District 19 has not
9 always been a Democratic district. Fair statement?
10 A. Fair statement.
11 Q. Isn't it true, however, that notwithstanding
12 having been elected under the 2012 map with a Cook rating
13 of R+3, the present congressman is a Democrat?
14 A. Yes.
15 Q. Your original report did not address or offer
16 any accounting for the fact that New York is losing a
17 congressional district, correct?
18 A. Correct.
19 Q. And your report does not offer any explanation
20 of how that change might impact the boundaries of the new
21 districts, right?
22 A. Correct.
23 Q. You state that the new District 24 stretches
24 across four media markets. Do you recall that statement?
25 A. Yes.

1 Q. Can you find in there where you said that?
2 A. What's that?
3 Q. Can you -- do you know where you said that? I
4 don't want to hold up the judge while I look for it.
5 You'll find it faster.
6 A. It's in my original report?
7 Q. I think so.
8 THE COURT: District 24 are you referring
9 to?
10 MR. CHILL: New District 24.
11 THE COURT: Page 12 at the bottom of the --
12 I assume, of the rebuttal report, I assume.
13 MR. CHILL: Yes. Yes. Yes. Yes. Yes.
14 I'm trying to move it along.
15 THE COURT: If you could --
16 MR. CHILL: I'm trying.
17 THE COURT: -- identify the page and
18 whereabouts on the page you're referring to.
19 MR. CHILL: I'm sorry, your Honor. I
20 apologize.
21 THE COURT: That's all right.
22 BY MR. CHILL:
23 Q. Isn't it true that you offer no evidence of this
24 nor data to substantiate this claim?
25 A. What page are we on?

1 THE COURT: Page 12, bottom. I think we're
2 still talking --
3 MR. CHILL: Yes.
4 THE COURT: -- about District 24.
5 Q. Yes, District 24.
6 A. Okay. What was the question?
7 Q. The question is, isn't it true that you offer no
8 evidence nor data to substantiate this claim?
9 A. What was the claim? I was looking for the
10 pages.
11 Q. That new District 24 stretches across four media
12 markets.
13 A. Correct.
14 Q. You provide no data showing the number of people
15 of each media market?
16 A. Correct.
17 Q. You don't provide any information about which
18 media market you are discussing --
19 A. Correct.
20 Q. -- or any explanation of how you are defining a
21 media market --
22 A. Correct.
23 Q. -- nor any discussion of media markets in the
24 context of any of the other districts? You don't discuss
25 media markets with respect to any other districts, do you?

1 A. Correct.
2 Q. Isn't it true that these communities you're
3 talking about share Lake Ontario waterfront, Lake Ontario
4 watershed, and issues concerning the lake?
5 A. They do.
6 Q. So it's not just media markets?
7 A. Well, not all of them go to the lake, but yes.
8 Q. Which districts do you claim are partisan
9 gerrymanders?
10 A. 23. 24.
11 Q. So you don't mention 4, 5, 6, 7, 12, 13, 14, 15,
12 20, 25, or 26. Does that mean they are not -- those
13 districts are not partisanly gerrymandered?
14 A. I was looking at the districts where Republicans
15 were packed into. They could be by default because when
16 you pack into a Republican district, you're reducing
17 competitiveness across the other districts and you're
18 protecting incumbents.
19 Q. So are you claiming that as a result of partisan
20 gerrymandering specific districts, it affects the entire
21 state? Is that what you're saying?
22 A. It affects -- it definitely affects the
23 surrounding districts.
24 Q. But you don't know which one of those are the
25 surrounding districts?

1 A. I can tell you looking at a map.
2 Q. No, just your -- I'm asking you as an expert.
3 THE COURT: I think he just said that he'd
4 have to look at the other maps.
5 Q. Oh, go look. Go look. I'm sorry. I didn't
6 hear you.
7 A. Right. So 23 -- if you go to 24, the district
8 along the lake, it would impact 25 because you make 25 a
9 solid Democratic district by going from Niagara County
10 then south around Monroe back up to the lake because you
11 miss the lake in Monroe to get up to St. Lawrence County.
12 See, it kind of just circles Rochester, so it impacted
13 that district, which is --
14 Q. So the boundaries of one district can impact the
15 boundaries of an adjoining district; isn't that correct?
16 A. That's correct.
17 Q. So isn't it possible, as an expert, that voting
18 rights districts adjoining District 11 can impact what
19 District 11 ends up looking like population-wise?
20 A. The voting rights wouldn't affect 25.
21 Q. I'm not talking about 25. I'm asking you about
22 11 --
23 A. Oh, okay.
24 Q. -- Staten Island. If you have to do voting
25 rights -- I'm going to make it simple -- do voting rights

1 districts in adjoining districts next to 11 and you have
2 to do those lines by law, so many minorities here, so many
3 minorities there, isn't it inevitable that you have to
4 affect the adjoining district, which is 11, in some way?
5 A. It's possible.
6 Q. In your original report, Pages 3 and 4, you
7 state, quote, this partisan revision creates multiple town
8 splits.
9 THE COURT: He's looking for it. Can you
10 tell us where you are on the page?
11 MR. CHILL: Probably the bottom of the
12 page, sir.
13 THE COURT: Oh, it's the very -- it goes
14 over onto the other page.
15 MR. CHILL: Yes, the bottom of the page,
16 your Honor.
17 BY MR. CHILL:
18 A. What page are we on?
19 Q. Bottom of 3.
20 THE COURT: Starts on the very bottom of 3
21 and goes over to Page 4.
22 A. Got it. Thank you.
23 Q. Town splits. Isn't it true that given the legal
24 requirement that congressional districts cannot vary in
25 population even by one person that it is impossible not to

1 split town lines and yet comply with this requirement?
2 A. I don't know if it's impossible, but yes.
3 Q. In your original report, Page 4, Paragraph 2,
4 you state, with respect to District 3, the communities in
5 new District 3 have no nexus, right?
6 A. Yes.
7 Q. Isn't it true that they share the fact that the
8 inhabitants of District 3 all live along the Long Island
9 Sound and the district is called the Sound District?
10 A. That's true.
11 Q. Again in your original report, Paragraph 3, you
12 state, quote, the Legislature also divided an established
13 Asian community in District 10 by moving half of it to
14 District 11?
15 A. Yes.
16 Q. And you have no data to back that up; that's
17 fair to say?
18 A. Yes.
19 Q. In fact, isn't it true that the Asian community
20 is not split between 10 and 11; the new Congressional 10
21 includes the eastern half of Sunset Park, which is
22 predominantly Asian, along with Manhattan's Chinatown just
23 as it was drawn in 2012 by a federal court? Do you know
24 that?
25 A. I do not know that.

1 Q. In addition, the new 10 also includes the Asian
2 neighborhoods of South Brooklyn, Bensonhurst, and
3 Bath Beach. Did you know that?
4 A. No.
5 Q. You also claim, Page 8, same report, that the
6 enacted plan severely divides united Hispanic communities,
7 right?
8 THE COURT: Are you looking for it?
9 THE WITNESS: Yes.
10 THE COURT: Can you refer us to where you
11 are on the page, sir? How much longer do you
12 anticipate, Mr. Chill, your cross-examination will
13 take?
14 MR. CHILL: Three, four minutes.
15 THE COURT: Okay. It's 25 after.
16 MR. CHILL: Page 4. I'm not going to hold
17 the Court up on this question.
18 BY MR. CHILL:
19 Q. In the original report, Page 6, Paragraph 3,
20 last line -- I'm doing better -- as a result of new
21 District 22, you say District 22 shifts a competitive
22 Republican district to a safe Democratic district in the
23 new map?
24 A. Yes.
25 Q. But the Cook report only rates it as likely?

1 A. The new 22?
2 Q. Yeah.
3 A. It is likely Democrat.
4 Q. Yeah.
5 A. Yes.
6 MR. CHILL: I have no further questions,
7 your Honor.
8 THE COURT: Thank you, Mr. Chill.
9 All right. I just want to ask, who else
10 hasn't gone yet? Anybody on the Majority? How long
11 do you anticipate your cross-examination to take?
12 MR. GOLDENBERG: I always worry about the
13 accuracy of these estimations.
14 THE COURT: Right.
15 MR. GOLDENBERG: I'd say, ballpark, an
16 hour. It could be an hour to 90 minutes.
17 THE COURT: All right. I think this is an
18 appropriate place, then, to take a break and start
19 again in the morning.
20 MR. GOLDENBERG: It could be less. But I
21 agree, your Honor, if your goal is to stop at 4:30.
22 THE COURT: It is. The staff has to wind
23 up in their office.
24 So we can start again in the morning fresh.
25 We'll start again at 9:30 sharp. I'll ask everybody

to be here on time and I'll be ready. We'll go right then. Okay. Thank you all.

Certified to be a true and accurate transcript.

Tara D. MacNaughton

Tara D. MacNaughton, CSR, RPR, NYACR
Official Court Reporter

- o O o -

TRANSCRIPT OF BENCH TRIAL, DATED MARCH 15, 2022 [2734 - 2944]

1 SUPREME COURT OF THE STATE OF NEW YORK

2 COUNTY OF STEUBEN : SUPREME CALENDAR

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3 **TIM HARKENRIDER, GUY C. BROUGHT,**
4 **LAWRENCE CANNING, PATRICIA CLARINO,**
GEORGE DOOHER, JR., STEPHEN EVANS,
5 **LINDA FANTON, JERRY FISHMAN, JAY**
FRANTZ, LAWRENCE GARVEY, ALAN NEPHEW,
6 **SUSAN ROWLEY, JOSEPHINE THOMAS, AND**
MARIANNE VIOLANTE,
7
Petitioners,
8
-versus- Index No:
9 E2022-0116CV
GOVERNOR KATHY HOCHUL, LIEUTENANT
10 **GOVERNOR AND PRESIDENT OF THE SENATE**
BRIAN A. BENJAMIN, SENATE MAJORITY
11 **LEADER AND PRESIDENT PRO TEMPORE OF THE**
SENATE ANDREA STEWART-COUSINS, CARL
12 **HEASTIE, NEW YORK STATE BOARD OF**
ELECTIONS, AND THE NEW YORK STATE
13 **LEGISLATIVE TASK FORCE ON DEMOGRAPHIC**
RESEARCH AND REAPPORTIONMENT,
14
Respondents. BENCH TRIAL
15

16
Steuben County Courthouse
17 Bath, New York
March 15, 2022
18
P r e s i d i n g :
19
THE HONORABLE PATRICK F. McALLISTER
20 Judge

21 A p p e a r a n c e s :

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21 Attorneys for Senate Majority

22

23

24

25

1 I N D E X T O W I T N E S S E S

2

13 I N D E X T O E X H I B I T S

14

1 I N D E X T O E X H I B I T S

2

1 THE COURT: Let's note appearances for
2 today. Let's start with the petitioners.
3 MR. BROWNE: Your Honor, Robert Browne on
4 behalf of Petitioners.
5 MR. WINNER: George Winner, Keyser,
6 Maloney & Winner, for Petitioners.
7 MR. TSEYTLIN: Misha Tseytlin on behalf of
8 Petitioners.
9 MS. DiRAGO: Molly DiRago on behalf of
10 Petitioners.
11 THE COURT: On behalf of the Governor?
12 MS. McKAY: Heather McKay and Muditha
13 Halliyadde on behalf of the New York State Attorney
14 General's Office.
15 THE COURT: Thank you.
16 On behalf of the Senate Majority Leader?
17 MR. GOLDENBERG: Good morning, your Honor.
18 Alexander Goldenberg, Cuti Hecker Wang.
19 MR. HECKER: Eric Hecker, Cuti Hecker Wang.
20 MR. CUTI: John Cuti, Cuti Hecker Wang.
21 MS. REITER: Alice Reiter, Cuti Hecker
22 Wang.
23 MR. MULLKOFF: Daniel Mullkoff, Cuti Hecker
24 Wang.
25 THE COURT: Thank you.

1 On behalf of the Speaker of the Assembly?
2 MR. CHILL: Daniel Chill.
3 THE COURT: Mr. Chill.
4 MS. REICH: Elaine Reich, Graubard Miller.
5 THE COURT: Thank you, Ms. Reich.
6 MS. REICH: Good morning, your Honor.
7 MR. BUCKI: And Craig Bucki, B-u-c-k-i,
8 from Phillips Lytle in Buffalo.
9 THE COURT: Thank you, Mr. Bucki.
10 All right. So we're going to continue with
11 cross-examination of Mr. Lavigna, and I believe --
12 Mr. Goldenberg, were you going to do cross on that?
13 MR. GOLDENBERG: Yes, your Honor.
14 THE COURT: All right. Let's have
15 Mr. Lavigna come in -- or he's here. Please swear
16 Mr. Lavigna in again, please.
17 CLAUDE A. LAVIGNA,
18 called herein as a witness, having been first duly sworn,
19 was examined and testified as follows:
20 THE DEPUTY: Please state and spell your
21 name again for the Court.
22 THE WITNESS: Claude Lavigna,
23 L-a-v-i-g-n-a.
24 THE DEPUTY: Thank you.
25 THE COURT: All right. Mr. Goldenberg?

1 MR. GOLDENBERG: Good morning, your Honor.
2 THE COURT: Good morning.
3 CROSS-EXAMINATION
4 BY MR. GOLDENBERG:
5 Q. And good morning, Mr. Lavigna.
6 A. Good morning.
7 Q. My name is Alex Goldenberg. I'm an attorney at
8 Cuti Hecker Wang, and I'm one of the attorneys for the
9 Senate respondents in this case.
10 I just want to give you and the other attorneys
11 and the Court a heads-up that I have placed at the desk
12 already this morning four exhibits that were introduced
13 yesterday by the petitioners marked Petitioners'
14 Exhibits 1 through 4. Those are the expert reports
15 submitted by you and by Mr. Trende, and I'll be referring
16 to them at various times throughout our conversation
17 today.
18 A. Okay.
19 Q. Mr. Lavigna, you submitted two reports in this
20 case; is that correct?
21 A. Yes, I did.
22 Q. And in your first report you assign labels to
23 different congressional and state Senate districts, such
24 as safe or leaning or competitive or stronghold; is that
25 correct?

1 A. Yes, I did.
2 Q. And you don't explain in that report what you're
3 basing those characterizations on, do you?
4 A. Not in the report.
5 Q. Your first report includes no data; is that
6 correct?
7 A. That's correct.
8 Q. There are no tables?
9 A. That's correct.
10 Q. There are no charts?
11 A. That's correct.
12 Q. And there are no election results?
13 A. That's correct.
14 Q. Mr. Browne asked you on direct examination what
15 you considered when drafting your reports, and one of the
16 things that you identified for Counsel was the CPVI. Do
17 you recall giving that response?
18 A. Yes, I do.
19 Q. Did you consider the CPVI when drafting your
20 first report or only your second report?
21 A. Both reports.
22 Q. But when you described on Page 2 of your first
23 report what information you relied on to reach your
24 conclusions, you didn't mention the CPVI, did you?
25 A. I did not.

1 Q. Is there any data that you relied on in
2 connection with your first report other than the CPVI?
3 A. Yes. I used data from the Board of Elections
4 for past election results, that type of data. Yes.
5 Q. And was that -- when you say "for past election
6 results," what elections are you referring to?
7 A. Generally down-ballot races, state Senate; if it
8 was Congress, looking at congressional races.
9 Q. And you got that data directly from the State
10 Board of Elections? Is that your testimony?
11 A. Yes.
12 Q. And when Mr. Browne asked you yesterday what
13 data or information you relied on in reaching your
14 conclusions, you didn't mention that; is that correct?
15 A. I don't recall.
16 MR. BROWNE: Objection, your Honor. That
17 mischaracterizes the testimony.
18 THE COURT: You'll have to speak up,
19 Mr. Browne.
20 MR. BROWNE: I'm sorry, your Honor.
21 Objection based on that mischaracterizes the
22 testimony from yesterday.
23 THE COURT: Overruled. Go ahead.
24 BY MR. GOLDENBERG:
25 A. What was the question again?

1 Q. The question was, when you described yesterday
2 what you relied on in reaching your conclusions, you
3 didn't mention data from the Board of Elections, did you?
4 A. I thought I did. I don't recall that.
5 Q. Did you use the same data with respect to your
6 analysis of each congressional and state Senate district?
7 A. I looked at all the data. I may not have used
8 for every single race every data point that I looked at
9 for another race, but I did look at all that data.
10 Q. So it's possible, then, that for a particular
11 Senate district or congressional district, you looked at
12 the CPVI in one or more other elections; in that very
13 different congressional or Senate district, you did not
14 look at those same set of elections?
15 A. Correct.
16 Q. Was each description that you used to describe
17 districts, for example, competitive, stronghold, or safe,
18 tied to a specific level of partisan performance reflected
19 in the data?
20 A. Generally, yes.
21 Q. What was the threshold for a stronghold
22 district?
23 A. A stronghold district, especially using the Cook
24 Partisan Voter Index, once you get to 5 and higher,
25 it's -- that's where the strong starts coming in, and then

1 there's levels of that.
2 Q. When you say "levels of that," what do you mean?
3 A. Well, an 8 is stronger than a 5; a 10 is
4 stronger, so a 10 would be, you know, much stronger.
5 Q. And did you use consistent terminology to
6 differentiate between data that suggested an 8 percent
7 difference or a 10 percent difference?
8 A. To the best of my ability, I did.
9 Q. But there could have been variations in the
10 words you used to describe various districts; is that
11 correct?
12 A. Correct.
13 Q. With respect to the CPVI itself, what elections
14 does that index use to calculate the numbers in the index?
15 A. That generally looks at presidential turnout,
16 presidential results, presidential elections, that type of
17 stuff. It's more high end.
18 Q. And specifically how many presidential elections
19 are accounted for in the CPVI?
20 A. I think it goes back two.
21 Q. So in other words, the current CPVI numbers
22 would be the 2020 presidential election and the 2016
23 presidential election, correct?
24 A. Correct. To the best of my knowledge, yes.
25 Q. And the CPVI itself does not factor in other

1 elections like state gubernatorial or attorney general
2 elections, correct?
3 A. No, it does not.
4 Q. Do you know how the CPVI uses those presidential
5 election results to characterize the plus R or plus D
6 factor in a given district?
7 A. I don't know their algorithms or anything like
8 that, no.
9 Q. Do you know whether it's an algorithm or just
10 the standard measure that they use to come up with their
11 numbers?
12 A. No. I don't know the background on that.
13 Q. The CPVI is associated with the Cook Political
14 Report; is that correct?
15 A. Correct.
16 Q. Does the Cook report itself encourage analysts
17 to use statewide races to supplement the data that is used
18 for that index?
19 A. Not to my knowledge.
20 MR. GOLDENBERG: I'd like to mark an
21 exhibit for identification as S-6.
22 (Respondents' Exhibit S-6 was marked for
23 identification.)
24 MR. GOLDENBERG: May I approach, your
25 Honor?

1 THE COURT: Yes. Thank you.
2 BY MR. GOLDENBERG:
3 Q. Mr. Lavigna, I'd like to direct your attention
4 specifically to the second sentence of the third paragraph
5 of this document that I've just handed to you. And I'm
6 going to read it, and just let me know, please, if I've
7 read it correctly.
8 MR. BROWNE: Your Honor, can we get an
9 identification on what the document is?
10 THE COURT: Yes. Have him identify the
11 exhibit.
12 Q. Mr. Lavigna, I'll represent to you that this
13 document is a printout from the website of the Cook
14 Political Report in which the authors of the report and
15 the CPVI identify how their index works and the factors
16 that go into it and also provide some additional
17 information about the index. Have you seen this text
18 before? Are you familiar with this language from the
19 website?
20 A. I did look at the website. I don't know if I'm
21 familiar with all of this language. I had read it prior.
22 Q. Okay. And, again, turning to the second
23 sentence of the third paragraph, it states, while other
24 data, such as the results of senatorial, gubernatorial,
25 congressional, and other local races can help fine-tune

1 the exact partisan tilt of a particular district. And it
2 then goes on to say, those results don't help for
3 comparisons across state lines. Do you see that language?
4 A. Yes.
5 Q. Is it fair to say that this language indicates
6 that in the view of the authors of the Cook Political
7 Report and the CPVI, data such as senatorial,
8 gubernatorial, and congressional races can help with the
9 analysis of particular districts in a state?
10 A. Can you repeat that, please?
11 MR. GOLDENBERG: Can you read it back?
12 (The record was read back by the court
13 reporter.)
14 BY MR. GOLDENBERG:
15 A. Yes.
16 Q. You reviewed the report that we submitted for
17 Dr. Ansolabehere; is that correct?
18 A. Yes.
19 Q. And you state in your report -- and I can direct
20 you to the language. This is in your reply report on
21 Page 4. That's Petitioners' Exhibit 4 that's right in
22 front of you. You state that this narrow approach,
23 meaning the approach used by Dr. Ansolabehere, excludes
24 available and highly relevant data. Do you see where you
25 wrote that?

1 A. In Paragraph 2?
2 Q. Correct.
3 THE COURT: Paragraph 2, is it not?
4 Q. It is the third sentence in Paragraph 2 on
5 Page 4.
6 A. Yes. I see that.
7 Q. You don't identify in your report what data
8 Dr. Ansolabehere excludes, correct?
9 A. Correct.
10 Q. We established that the CPVI is an index based
11 on the last two presidential elections; is that correct?
12 A. That's correct.
13 Q. And Dr. Ansolabehere includes those races in the
14 data that he presents, correct?
15 A. I did not see that.
16 MR. GOLDENBERG: I would like to mark for
17 identification S-7. And before I do that, your
18 Honor, I would like to move into the record the
19 previously marked exhibit, S-6.
20 MR. BROWNE: Your Honor, we would object to
21 that. There's no foundation for this document.
22 Where did it come from? It's not a complete
23 document. It's a screenprint.
24 THE COURT: Mr. Goldenberg?
25 MR. GOLDENBERG: I've identified for the

1 Court that document was printed directly from the
2 Cook Political Report website.
3 THE COURT: Sustained. The objection's
4 sustained.
5 (Respondents' Exhibit S-7 was marked for
6 identification.)
7 MR. GOLDENBERG: May I approach, your
8 Honor?
9 THE COURT: You may. Thank you.
10 BY MR. GOLDENBERG:
11 Q. Mr. Lavigna, do you recognize this as the expert
12 report submitted by Dr. Ansolabehere that you reviewed
13 earlier in this case?
14 A. Yes.
15 Q. I'd like to turn your attention specifically --
16 and unfortunately the document doesn't have page numbers,
17 but we're looking at Paragraph 49 at the moment and
18 specifically the last sentence of Paragraph 49. Here
19 Dr. Ansolabehere reports data from prior elections; is
20 that correct?
21 A. Yes, he does.
22 Q. And he lists six elections in this paragraph; is
23 that correct?
24 A. Yes, he does.
25 Q. And those elections include the 2016

1 presidential election and the 2020 presidential election;
2 is that correct?
3 A. That's correct.
4 Q. And those elections also include four other
5 elections, the 2016 US Senate election, the 2018 US Senate
6 election, and 2018 governor's race; is that correct?
7 A. Yes.
8 Q. I will represent to you -- and if we want to go
9 through the rest of the report, we can -- that where
10 Dr. Ansolabehere refers to prior election results, he
11 includes those six races throughout the report. Does
12 looking at this document change your view as to whether
13 Dr. Ansolabehere included the presidential election data
14 in his report?
15 A. It does.
16 Q. In fact, he did include that data, correct?
17 A. He did.
18 Q. And to the extent that Dr. Ansolabehere relied
19 on that presidential data and the other races referred to
20 in his report, he took a broader approach than relying
21 only on the CPVI; is that correct?
22 A. Yes.
23 Q. I believe you testified yesterday that one of
24 your concerns with Dr. Ansolabehere's approach was that
25 part of his analysis relied on data from certain statewide

1 elections that you felt were not as representative of
2 political performance in New York. Is that an accurate
3 description of your testimony?
4 A. Yes, that is.
5 Q. I'd like to turn your attention to Exhibit P-1
6 which is before you. This is the expert report submitted
7 by Sean Trende in this matter. And I'd like to turn your
8 attention specifically to Page 12 and Footnote 2.
9 THE COURT: Is that his original report?
10 MR. GOLDENBERG: Yes, your Honor.
11 THE COURT: Page 12?
12 MR. GOLDENBERG: Yes, your Honor. It's
13 first marked Petitioners' 1, Page 12, Footnote 2.
14 BY MR. GOLDENBERG:
15 Q. Mr. Lavigna, in this footnote Mr. Trende
16 identifies the data set that he used in preparation of his
17 first report -- and I should clarify -- the data set with
18 respect to prior election results that he used; is that
19 correct?
20 A. I'm not aware of what Mr. Trende did.
21 Q. I'll refer you to the second sentence, where
22 Mr. Trende says, I have used the calculation of
23 partisanship contained in the data set that I downloaded
24 from the ALARM Project. Do you see where the text says
25 that?

1 A. Yes.
2 Q. And he then says, this is an average of the
3 performance in a precinct across the 2016 presidential
4 election, 2016 New York Senate election, 2018 New York
5 governor election and 2018 New York attorney general
6 election, and the 2020 presidential election in New York.
7 Do you see where he says that?
8 A. Yes, I do.
9 Q. If Mr. Trende relied on that data in connection
10 with his analysis of partisanship in New York, do you
11 think that would have been a mistake?
12 A. I would have no -- I would not know that.
13 Q. So you testified yesterday that, in your view,
14 using a broader array of state election data does not
15 accurately reflect partisanship in New York. That's what
16 you testified, correct?
17 A. Correct.
18 Q. So would your view be that if Mr. Trende relied
19 on that data, it did not provide an accurate view of
20 partisanship in New York?
21 A. If it was solely on that, potentially yes. I
22 don't know what else he relied on.
23 Q. But if it was solely that, in your view, that
24 would have been the wrong data set to rely on?
25 A. I would not have done that. No.

1 Q. You suggest on the same page we just looked at
2 on your reply report that -- at the end of the paragraph
3 we just read that Dr. Ansolabehere does not have a passing
4 understanding of New York's political geography. Do you
5 see that at the end of the paragraph?
6 A. Yes, I do.
7 Q. You've never spoken to Dr. Ansolabehere, have
8 you?
9 A. I have not.
10 Q. And as you sit here today, you have no personal
11 knowledge regarding his work on New York elections, do
12 you?
13 A. No.
14 Q. I'd like to discuss your analysis of the state
15 Senate districts in the State of New York. You testified
16 yesterday that you have particular knowledge and
17 experience with state Senate elections; is that fair to
18 say?
19 A. Yes, it is.
20 Q. And that knowledge and experience comes from
21 working over many years in different capacities to help
22 elect state Senate Republicans; is that correct?
23 A. That's correct.
24 Q. I'd like to turn your attention back to the
25 reply report that we were just looking at.

1 MR. GOLDENBERG: Your Honor, this is,
2 again, Petitioners' Exhibit 4, Mr. Lavigna's reply
3 report.
4 THE COURT: What page?
5 MR. GOLDENBERG: It is Page 3, your Honor,
6 bottom of Page 3, the final clause at the end of the
7 first sentence of the final paragraph.
8 Q. And I'm going to read what you wrote,
9 Mr. Lavigna. You wrote, in connection with congressional
10 districts, I first examined whether the new district lines
11 could be justified by valid considerations based on
12 traditional redistricting principles, including
13 compactness, contiguity, population shifts, and keeping
14 counties, towns, and communities of interest together. Is
15 that an accurate description of what you wrote there?
16 A. Yes, it is.
17 Q. Did you consider those same factors and
18 redistricting principles with respect to your analysis of
19 the state Senate districts?
20 A. Yes, I did.
21 Q. One of the criteria or principles that you list
22 in the sentence I just read is, quote, population shifts;
23 is that correct?
24 A. Yes.
25 Q. And your reference to population shifts is

1 connected to the redistricting principle of population
2 equality; is that correct?
3 A. Yes.
4 Q. Do you agree that the Federal Constitution of
5 the United States requires that state legislative
6 districts be nearly as equal in population as practicable?
7 A. Yes.
8 Q. And do you agree that the state Constitution
9 also contains a similar requirement regarding equal
10 population?
11 A. Yes.
12 Q. I would like to direct your attention back to
13 Petitioners' Exhibit 1. This is the original report
14 submitted by Mr. Trende, and specifically I would direct
15 you to Page 25. I will represent to you, Mr. Lavigna,
16 that this chart that Mr. Trende submitted in his report is
17 a report on the current deviations from -- the current
18 population deviations from the appropriately sized Senate
19 district that would need to be created in '22 in the
20 current Senate districts as they now exist from 2012. Do
21 you see the data?
22 A. Yes, I do.
23 Q. And Mr. Trende reports this deviation both as an
24 absolute number and also as a percentage of the deviation
25 from the mean; is that correct?

1 A. Yes.
2 Q. Please take a moment to review this page. Would
3 you agree in looking at this chart that there are
4 significant populations in districts throughout the state?
5 A. Yes.
6 Q. And that under the current lines as drawn in
7 2012, certain districts are overpopulated and certain
8 districts are underpopulated; is that correct?
9 A. Yes.
10 Q. And I would direct your attention specifically
11 to the most overpopulated district, which is 25, and the
12 least populated district, which is 21 -- 51, five-one.
13 And am I correct that the total population difference
14 between these two districts as of now is 102,000 people,
15 slightly more than 102,000 people?
16 A. Yes.
17 Q. And as reflected in this chart that Mr. Trende
18 prepared, the total population deviation between these two
19 districts is 32 percent; is that correct?
20 A. Yes.
21 Q. Would you agree that a 32 percent total
22 population deviation between Senate districts is
23 unconstitutional?
24 A. Yes.
25 Q. And that is true under both the state and

1 federal Constitutions, correct?
2 A. Yes.
3 Q. Would you also agree that other than
4 District 31, every district between 5 and 38 in this chart
5 is presently overpopulated?
6 A. Yes.
7 Q. Would you also agree that after District 38
8 every district, without exception, is underpopulated?
9 A. Yes.
10 Q. Based on your familiarity with the New York
11 State Senate, are you aware that Districts 39 and above
12 are all districts located either in or north of
13 Westchester County?
14 A. Yes, I am.
15 Q. And in order to achieve population equality
16 among districts with different populations, it's necessary
17 to move population between districts; is that correct?
18 A. That's correct.
19 Q. And the more inequality you have, the more
20 people that need to be moved; is that correct?
21 A. Yes.
22 Q. You don't cite population data anywhere in your
23 report about the Senate, do you?
24 A. I do not.
25 Q. You don't mention population deviations under

1 the 2012 plan, do you?
2 A. No.
3 Q. You don't mention how population deviations have
4 changed under the 2022 plan, do you?
5 A. No.
6 Q. You never mentioned when discussing any specific
7 district whether that district needed to add or lose
8 people, do you?
9 A. I did not.
10 Q. And you never mention anything about what we've
11 observed in this chart, which is a regional
12 malapportionment and broad overpopulation of the districts
13 in and north of Westchester relative to the districts
14 south of Westchester; is that correct?
15 A. That's correct.
16 Q. You state on Page 9 of your initial report --
17 and you're welcome to look at it if you'd like to refresh
18 your recollection -- that, quote, it is highly likely that
19 the decision to pair Republican incumbents from
20 Districts 51 and 49 was motivated by partisan intent. Do
21 you recall saying that?
22 A. Yes, I do.
23 Q. You don't mention anywhere in your report that
24 District 51 is presently the most underpopulated district
25 anywhere in New York State, do you?

1 A. I do not.
2 Q. You also don't mention anywhere in your report
3 that nine of the ten most underpopulated districts in
4 New York at this time are represented by Republican
5 incumbents, do you?
6 A. I do not.
7 Q. You don't have any reason to believe that the
8 fact underlying that question, that nine of the ten
9 districts that are most underpopulated presently are
10 represented by Republicans, is inaccurate, do you?
11 A. No.
12 Q. I would also represent to you -- and we could go
13 through it if you'd like, but I will represent it to you
14 for the purposes of this question -- that every district
15 in New York State that is presently underpopulated by more
16 than 25,000 people, with the exception of District 53, is
17 represented by a Republican right now. That is not a fact
18 that is mentioned anywhere in your report, is it?
19 A. It is not.
20 Q. You identify a number of districts other than
21 the two I just asked you about in which population shifted
22 from one district to another, and you note that sometimes
23 the effect of increasing or decreasing population had the
24 effect of benefiting or working to the detriment of a
25 particular party; is that correct?

1 A. Yes.
2 Q. But, again, you never state for any of these
3 districts how much population they needed to add; is that
4 correct?
5 A. Correct.
6 Q. And you never evaluate in your report how
7 population changes in one district affected the population
8 and need for adjustment in surrounding districts; is that
9 correct?
10 A. Correct.
11 Q. One of the criteria that you reference in your
12 reply report in the sentence that I read back to you is
13 county splitting. Are you familiar, Mr. Lavigna, with the
14 constitutional principle -- this is a New York State
15 constitutional principle -- that a map drawer should try
16 to avoid splitting counties?
17 A. Yes.
18 Q. Would you agree that a neutral and established
19 redistricting principle in the State of New York is that
20 counties, to the extent possible, should not be split in a
21 legislative reapportionment plan?
22 A. Yes.
23 Q. I will represent to you that in your report and
24 analysis of the state Senate districts, you mention county
25 splits twice. You mention the Queens-Nassau split in

1 District 9 and the Erie-Niagara County split in
2 District 60. Do you recall referencing those county
3 splits?
4 A. Yes.
5 Q. We could go through the report if you'd like.
6 Again, for time and convenience to the Court and the other
7 parties, I will represent to you that I didn't see any
8 other reference to county splits. As you sit here today,
9 do you recall any mention that you made of whether
10 counties were split or made whole in the 2022 plan other
11 than those I just referenced?
12 A. No.
13 Q. You never once identify in your report counties
14 that were split in 2012 but are united in 2022; is that
15 correct?
16 A. Correct.
17 Q. You don't mention that the Legislature united
18 Delaware County in 2022, correct?
19 A. Correct.
20 Q. Or St. Lawrence County, correct?
21 A. Correct.
22 Q. Or Ulster County, correct?
23 A. Correct.
24 Q. Or Chenango County, correct?
25 A. Correct.

1 Q. Or Ontario County, correct?
2 A. Correct.
3 Q. Or Washington County, correct?
4 A. Correct.
5 Q. Or Tompkins County, correct?
6 A. Correct.
7 Q. In fact, in your report you criticize the
8 realignment of population in Tompkins County, but you
9 never mention that as part of that realignment, Tompkins
10 County, which had been split in 2012, is now whole in
11 2022; is that correct?
12 A. Correct.
13 Q. You testified on direct examination that one
14 example of a county split and change in the new plan that
15 suggests improper partisan intent is the Queens-Nassau
16 split in District 9 around the area of the Five Towns in
17 Far Rockaway; is that correct?
18 A. Yes.
19 Q. I believe you also testified on direct that this
20 county split was problematic, in your view, because it
21 took Jewish -- it combined, rather, Jewish areas in the
22 Five Towns, which is on the Nassau side of the border,
23 with territory in Queens that you represented was of a
24 different character; is that accurate?
25 A. Yes.

1 Q. Would you agree that the Queens neighborhood
2 adjoining this group of towns in Nassau County, the Queens
3 neighborhood in Far Rockaway, is, in fact, itself a
4 heavily Jewish neighborhood that is closely connected with
5 the communities directly to its east?
6 A. Not aware of that.
7 MR. GOLDENBERG: I'd like to mark for
8 identification Senate District (sic) 8. Your Honor,
9 this will be used solely for demonstrative purposes.
10 (Respondents' Exhibit S-8 was marked for
11 identification.)
12 MR. GOLDENBERG: May I approach?
13 THE COURT: You may. Thank you.
14 BY MR. GOLDENBERG:
15 Q. Mr. Lavigna, are you familiar with the internet
16 information resource Google Maps?
17 A. Yes.
18 Q. I assume on occasions in your life you've used
19 Google Maps either on a computer or on a phone.
20 A. Yes.
21 Q. I will represent to you that I entered a search
22 into Google Maps for synagogues near Far Rockaway, Queens,
23 and printed the results for this demonstrative exhibit
24 that you're looking at. As you look at this map,
25 Mr. Lavigna, there are, in fact, many synagogues and

1 Jewish institutions in this area of Far Rockaway, Queens,
2 which is immediately to the west of the Five Towns in
3 Nassau County, correct?
4 A. Yes.
5 Q. The New York State Constitution requires that
6 the map drawer try to keep cities whole where possible; is
7 that correct?
8 A. Yes.
9 Q. You don't mention anywhere in your report or
10 analysis of the Senate that New Rochelle was divided in
11 the 2012 plan but is united in the 2022 plan; is that
12 correct?
13 A. Correct.
14 Q. And same for the City of Auburn, correct?
15 THE COURT: City of what?
16 MR. GOLDENBERG: Auburn, your Honor.
17 THE COURT: Thank you.
18 A. Correct.
19 Q. On Page 10 of your initial report, you criticize
20 the Legislature for keeping the City of Rochester in only
21 two districts instead of three districts; is that correct?
22 A. Yes.
23 Q. But, in fact, avoiding the unnecessary division
24 of cities is a principle that the Constitution directs map
25 drawers to consider, correct?

1 A. Correct.
2 Q. On direct examination yesterday you identified
3 Districts 46 and 48 in the Senate plan as districts that
4 reflect improper partisan intent; is that correct?
5 A. Yes.
6 Q. District 46 in the 2022 map combines
7 Schenectady, Troy, and Saratoga Springs into a single
8 district; is that correct?
9 A. Yes.
10 Q. And you don't mention anywhere in your report
11 that all three of these cities outside of Albany were
12 split in the 2012 plan but are now kept whole in the 2022
13 plan; is that correct?
14 A. Correct.
15 Q. You allege that District 48 replaces some
16 Republican voters with Democratic voters from Ulster,
17 Dutchess, and Columbia Counties, and you suggest again
18 that those population moves were motivated by partisan
19 intent; is that correct?
20 A. Correct.
21 Q. But you don't mention in your report that these
22 districts were significantly underpopulated heading into
23 the 2022 redistricting process; is that correct?
24 A. Correct.
25 Q. You also don't mention in your report that

1 Ulster County was split across four Districts in 2012 and
2 is now whole in District 48; is that correct?
3 A. Correct.
4 Q. During cross-examination by my friend,
5 Mr. Chill, yesterday afternoon, you testified with respect
6 to the congressional districts that you did not consider
7 the Voting Rights Act when analyzing those districts; is
8 that correct?
9 A. Correct.
10 Q. Did you analyze the New York State
11 Constitution's new provision from 2014 regarding
12 minority -- racial and language minority voting rights
13 when you evaluated the congressional districts?
14 A. I did not.
15 Q. Did you consider the new provision from the 2014
16 constitutional amendment related to racial and language
17 minority voting rights when you evaluated the Senate plan?
18 A. I did not.
19 Q. So to go back to the example of Rochester, which
20 we talked about briefly a moment ago, you did not evaluate
21 when preparing your analysis of the Senate that the
22 portion of Rochester that had been cut out from the
23 southern part of the city in 2012 is a heavily black
24 population; is that correct?
25 A. Correct.

1 Q. And you've also rendered testimony yesterday and
2 also in your expert report regarding redistricting and
3 reconfiguration on Long Island; is that correct?
4 A. Correct.
5 Q. When you evaluated the 2022 Senate districts on
6 Long Island, you didn't consider the split directly
7 through the middle of the large Hispanic community in
8 Brentwood and its neighboring communities of
9 North Bay Shore and Baywood; is that correct?
10 A. Correct.
11 Q. And when you considered the redistricting of
12 Long Island, you also didn't consider the cracking of the
13 black and Hispanic communities in Wyandanch and
14 Wheatley Heights in 2012 that was corrected in 2022; is
15 that correct?
16 A. Correct.
17 Q. Are you familiar with the fact that the New York
18 State Constitution, beyond the redistricting rules that
19 apply to all legislative districts, contains specific
20 rules related to the apportionment of districts in the
21 New York State Senate?
22 A. I'm not.
23 Q. Are you familiar with the "town on border" rule?
24 A. Not in depth, no.
25 Q. When you say "not in depth" --

1 A. I mean, I've heard of it. I have not --
2 Q. So fair to say, Mr. Lavigna, that you've heard
3 of the rule, but you are not familiar specifically with
4 how the rule applies to redistricting of the Senate?
5 A. Correct.
6 Q. Are you familiar with the "block on border"
7 rule?
8 A. Same answer.
9 Q. Same answer you just gave for the "town on
10 border" rule, correct?
11 A. Yes.
12 Q. So is it fair to say that because you're not
13 familiar with the specifics or application of these rules
14 that you did not consider how they affected the
15 redistricting of the Senate in 2022; is that correct?
16 A. Yes.
17 Q. Are you familiar with the rule in the state
18 Constitution as it pertains to the state Senate that it is
19 prohibited for the map drawer to split a town unless that
20 town is too populous to fit within one district?
21 A. Yes.
22 Q. So you are familiar with the fact that beyond
23 the general principle that applies to counties and cities,
24 that you should avoid splitting them or you could avoid
25 splitting them, there is a stricter rule as it pertains to

1 the Senate with respect to splitting towns?
2 A. Yes.
3 Q. In 2012 the Town of Huntington on Long Island
4 was split between two districts, correct?
5 A. Yes.
6 Q. The new plan keeps the Town of Huntington whole;
7 is that correct?
8 A. Yes.
9 Q. And you would agree that if the Town of
10 Huntington is kept whole, that change affects the
11 population of surrounding districts and requires changes
12 to those districts, correct?
13 A. Correct.
14 Q. No town that was whole in the 2022 -- strike
15 that. No town that was whole in the 2012 plan is split in
16 the enacted plan, correct?
17 A. Not to my knowledge.
18 Q. So fair to say, as you sit here today, you are
19 not aware of any town anywhere in New York State that was
20 whole in 2012 and that the Legislature split in 2022?
21 A. Yes.
22 Q. And if I represent to you that there is no such
23 town, you would have no reason to doubt that, correct?
24 A. Correct.
25 Q. You testified on direct examination that

1 District 54 was a strong Republican district that added
2 even more Republicans in 2022, which you suggest is
3 evidence of packing and thereby partisan intent; is that
4 correct?
5 A. Yes.
6 Q. And you're welcome to look at the map of the
7 Senate which is attached as an exhibit to your report if
8 you wish to. Given your familiarity with the Senate, you
9 may also know this without reference to the map. But
10 District 54 is a Republican district right now in a part
11 of the state where there are many surrounding Republican
12 counties; is that fair to say?
13 A. Fair, yes.
14 Q. And District 54 was underpopulated by 26,059
15 voters in the 2020 census based on the 2012 lines, and I
16 am basing that number on the report submitted by
17 Mr. Trende that we have looked at. Is that correct, that
18 District 54 is presently underpopulated by 26,059 voters?
19 A. Yes.
20 Q. In 2012 Senate District 54 was one of six
21 Upstate districts that split Monroe County; is that
22 correct?
23 A. Yes.
24 Q. In the 2022 enacted plan, the Legislature
25 eliminated the split in which 54 goes into Monroe County;

1 is that correct?
2 A. Yes.
3 Q. In doing so, the Legislature further reduced the
4 population of District 54, thereby adding a need to
5 increase the population from elsewhere; is that correct?
6 A. Yes.
7 Q. District 54 also reassembled within the district
8 the County of Ontario, which was split among multiple
9 districts in 2012 and united in 2022; correct?
10 A. Yes.
11 Q. You don't mention that in your report when you
12 talk about Senate District 54, correct?
13 A. Correct.
14 Q. And you didn't mention that yesterday on direct
15 examination when you talked about Senate District 54,
16 correct?
17 A. Correct.
18 Q. In each of your reports, Mr. Lavigna, you
19 discuss a number of what you describe as communities of
20 interest; is that correct?
21 A. Yes.
22 Q. I'd like to direct your attention and the
23 Court's attention to the Trende reply affidavit. This is
24 the exhibit submitted yesterday as Petitioners' 2. And
25 specifically, Mr. Lavigna, I will direct your attention to

1 Page 19 of that affidavit. The first clause of the first
2 sentence in this report submitted by Mr. Trende states,
3 communities of interest are a notoriously difficult
4 concept to nail down as they typically have a vague
5 definition; is that correct?
6 A. Yes, it says that. Yes.
7 Q. And then he goes on to, you know, offer an
8 example of a definition that's provided in a Kansas State
9 redistricting document; is that correct?
10 A. Yes.
11 Q. Mr. Trende then goes on to say in the next
12 sentence, quote, that makes them, referring to communities
13 of interest, vulnerable to ad hoc reasoning. Do you see
14 where Mr. Trende says that?
15 A. Yes.
16 Q. Do you agree with Mr. Trende that defining
17 communities of interest inherently involves an element of
18 subjectivity?
19 A. Yes.
20 Q. Neither of your reports cites a fixed standard
21 for how you define a community of interest; is that
22 correct?
23 A. That's correct.
24 Q. And you don't cite any rule that establishes how
25 a community of interest is to be defined; is that correct?

1 A. Correct.
2 Q. You state on Page 11 of your reply that urban
3 centers like Mount Vernon and Yonkers in Westchester
4 County have close historical ties to wealthier areas to
5 the northeast like Larchmont, Mamaroneck, Rye,
6 New Rochelle, and Pelham; is that correct?
7 A. Correct.
8 Q. You don't cite any historical literature to
9 support the idea of this association, do you?
10 A. I do not.
11 Q. You don't cite any social science analysis to
12 support this association, do you?
13 A. I do not.
14 Q. You don't cite any demographic data, do you?
15 A. No.
16 Q. You don't cite any academic literature, right?
17 A. Correct.
18 Q. You're not telling this Court that you have the
19 only reasonable opinion of what constitutes communities of
20 interest in New York, are you?
21 A. No.
22 Q. I'd like to show you what we will mark as S -- I
23 believe we're up to 9.
24 (Respondents' Exhibit S-9 was marked for
25 identification.)

1 THE COURT: Can you identify it, please?
2 BY MR. GOLDENBERG:
3 Q. We've marked S-9 for identification and
4 demonstrative purposes. Mr. Lavigna, this is a map of
5 2012 congressional districts in Suffolk County, and I will
6 now describe what the red markings on the map relate to.
7 Before I do I just want to ask you, on Page 6 of your
8 reply, you identify a group of, quote, neighboring towns
9 and villages that, you state, have common interests on
10 Long Island?
11 A. Yes.
12 Q. And, Mr. Lavigna, just to avoid any confusion,
13 I'm now asking questions about the congressional plan and
14 not the state Senate plan and specifically your statements
15 with respect to the congressional plan. Is that
16 understood?
17 A. Yes.
18 Q. What we have done in this exhibit, Mr. Lavigna,
19 is marked in red by the census-defined territory the
20 cities, villages, or unincorporated areas that you
21 reference on Page 8 of your report.
22 THE COURT: I thought you said 6.
23 Q. Correction. Page 6.
24 MR. GOLDENBERG: That's correct, your
25 Honor.

1 Q. I would ask you, Mr. Lavigna, to please take a
2 moment to look at this map. Do the red markings on this
3 map reflect the communities that you referred to in your
4 report on Page 6?
5 A. Yes, they do.
6 Q. First, you state in your report that East Islip
7 was moved from Congressional District 1 to Congressional
8 District 2 in the 2022 plan. In fact, East Islip, as
9 reflected on this map, was already part of Congressional
10 District 2 under the 2012 plan; is that correct?
11 A. Yes.
12 Q. And with respect to the remaining areas
13 identified in this demonstrative exhibit which were part
14 of Congressional District 1 in 2012, is it fair to say
15 that these areas are dispersed across a fairly wide area
16 within Suffolk County?
17 A. Yes, it is.
18 Q. Southold, for example, is on the north fork
19 relatively close to Greenport in the east end of
20 Long Island; is that correct?
21 A. Yes.
22 Q. Riverhead is known as a community on the
23 North Shore of Long Island that is right at the point
24 where the forks split apart, again, towards the eastern
25 end of Long Island, correct?

1 A. Correct.
2 Q. Manorville is more towards the center of Suffolk
3 County but, again, to the east within the county, correct?
4 A. Yes.
5 Q. Hauppauge is the county seat of Suffolk County;
6 is that correct?
7 A. Yes, it is.
8 Q. That's where the county Legislature is based,
9 correct?
10 A. Correct.
11 Q. And other towns that you identify -- I'm
12 sorry -- not towns -- other villages or unincorporated
13 areas that you identify within the Town of Smithtown are
14 on the north fork further to the west than the other areas
15 identified in Suffolk County, correct?
16 A. Correct.
17 Q. And Brookhaven Village is all the way on the
18 South Shore of Suffolk County, correct?
19 A. Correct.
20 Q. Turning to Congressional Districts 8, 9, 10, and
21 11 located in Brooklyn in the first three instances and
22 Brooklyn and Staten Island in the fourth, you state in
23 both of your reports that the enacted plan, quote, cracks
24 Jewish and Russian voters in these communities; is that
25 correct?

1 A. Yes.
2 Q. Under the 2012 plan the Jewish communities that
3 you are referring to in your reports were split within
4 these same districts, correct?
5 A. I'm not aware they were split that far outside
6 of 11.
7 Q. You're not aware that the Jewish communities
8 were split that far out of 11?
9 A. Yes.
10 Q. Is that your testimony?
11 A. Yes, and that was referring to the communities
12 within Congressional District 11.
13 Q. If you'll give me just a moment. Turning your
14 attention, Mr. Lavigna, to Pages 8 and 9 of your reply
15 report -- if you could please look at that -- you refer
16 here to Jewish -- let me refer you specifically to the top
17 of Page 9 so there's no confusion. And you say, in the
18 2012 congressional map, Jewish neighborhoods in Flatbush,
19 Midwood, Park Slope, and Kensington were connected,
20 wrapped around Prospect Park in District 9. And then you
21 go on to say that now those communities are located in
22 District 11, but in your report you indicated that those
23 communities were located elsewhere; is that correct?
24 A. Correct.
25 Q. And are you aware that the community of

1 Borough Park, which is a large and prominent community in
2 Brooklyn, was located and remains located in Congressional
3 District 10?
4 A. Yes.
5 Q. The Jewish community in Midwood was previously
6 split between Districts 9 and 10; is that correct?
7 A. Correct.
8 Q. And now it's located and united entirely in
9 District 9?
10 A. Yes.
11 Q. You would agree that the Jewish communities that
12 you describe in your report as cracked or split are
13 different from one another in significant ways; is that
14 correct?
15 A. Can you repeat that, please?
16 Q. That the Jewish communities in Brooklyn are
17 different from each other in many significant ways.
18 A. Yes.
19 Q. So, for example, the highly secular community of
20 Jews in Park Slope is very different than Hasidic or
21 ultra-Orthodox Jews in Borough Park; is that correct?
22 A. Correct.
23 Q. And ultra-Orthodox or Hasidic Jews in
24 Borough Park are very different in many respects than
25 modern Orthodox Jews in Midwood; is that correct?

1 A. Correct.
2 Q. In fact, one difference that separates these
3 communities is that they don't all even speak the same
4 language; is that correct?
5 A. Yes.
6 Q. Are you aware specifically that in Borough Park
7 there is a large population of Yiddish-speaking Jews?
8 A. I am not.
9 MR. GOLDENBERG: Okay. I'd like to mark an
10 exhibit as Exhibit S-10.
11 (Respondents' Exhibit S-10 was marked for
12 identification.)
13 MR. GOLDENBERG: Your Honor, may I
14 approach?
15 THE COURT: You may. Thank you.
16 MR. GOLDENBERG: Your Honor, this is an
17 exhibit of concentration of Yiddish speakers in
18 Brooklyn that was prepared by our expert,
19 Dr. Ansolabehere. I am showing it to the witness
20 right now for demonstrative purposes only.
21 Dr. Ansolabehere can speak more specifically to how
22 he created the exhibit for purposes of seeking its
23 admission.
24 BY MR. GOLDENBERG:
25 Q. Mr. Lavigna, please take a moment to look at

1 this exhibit. Based on your knowledge of Brooklyn
2 communities, do you recognize that the area designated in
3 this exhibit as having a high concentration of
4 Yiddish-speaking people is in the Borough Park area?
5 A. Yes.
6 Q. And if you look to the east of Borough Park, in
7 Midwood, in fact, as shown in this exhibit, there is very
8 little, if any, Yiddish-speaking population, correct?
9 A. Correct.
10 Q. Now, at the top of Page 9 of your report where
11 we read a list of Jewish communities that you identify in
12 connection with the allegation that the Legislature did
13 something perhaps partisan-motivated in dividing
14 communities --
15 THE COURT: Are you referring to the
16 rebuttal report?
17 MR. GOLDENBERG: Yes, your Honor, top of
18 Page 9, rebuttal report.
19 Q. -- you're not suggesting in these reports that
20 Midwood, Borough Park, Park Slope, Bensonhurst, Flatbush,
21 and Kensington could all be put together in a single
22 district, are you?
23 A. No.
24 Q. And you're certainly not suggesting that all of
25 those communities could have been put together in a single

1 district with Russian speakers in neighborhoods like
2 Sheepshead Bay, Brighton Beach, Manhattan Beach, and
3 Coney Island, correct?
4 A. Correct.
5 Q. You state in each of your reports that the new
6 map enacted in 2022 divides the Asian community in
7 Sunset Park; is that correct, that you state that?
8 A. Yes.
9 MR. GOLDENBERG: I'd like to mark
10 Exhibit S-11.
11 (Respondents' Exhibit S-11 was marked for
12 identification.)
13 MR. GOLDENBERG: May I approach, your
14 Honor?
15 THE COURT: You may.
16 BY MR. GOLDENBERG:
17 Q. Mr. Lavigna, the exhibit that we've just marked
18 for identification as S-11 is a map of Asian population in
19 2012 and 2022 Brooklyn neighborhoods. This exhibit was
20 prepared, again, by our expert, Dr. Ansolabehere, using
21 data from the census. And I would direct your attention
22 to this exhibit. Do you see -- strike that. Mr. Lavigna,
23 would you agree, looking on the right side of this exhibit
24 at the districts designated in green as 2022 congressional
25 districts, that, in fact, the area with a higher

1 concentration of Asian population is not cracked and split
2 between 10 and 11?
3 A. Yeah. Correct.
4 Q. And if you go further south within Brooklyn,
5 from the area of Sunset Park, which is where you see the
6 heaviest concentration, right where the number 11 is
7 marked on this map, and you go down from there through
8 District 11, this district continues to maintain
9 continuity of the Asian population in this part of
10 Brooklyn; is that correct?
11 A. On the 2022?
12 Q. Correct.
13 A. Except for that one portion where the 11 is in
14 red on the 2012 --
15 Q. Yes.
16 A. -- because that is in --
17 Q. I'll represent to you that's Bensonhurst and
18 Bath Beach.
19 A. Right.
20 Q. So let me ask you this, Mr. Lavigna: In the
21 2012 districts that you just referred to, the southernmost
22 part of District 10 was bisected by District 11 and the
23 Asian communities in Bensonhurst and Bath Beach were
24 included in District 11; is that correct?
25 A. Yes. Yes.

1 Q. And in the 2022 map the community -- the Asian
2 population in these same areas is now united in
3 District 10; is that correct?
4 A. Correct.
5 MR. GOLDENBERG: I'd like to mark for
6 identification Exhibit S-12.
7 (Respondents' Exhibit S-12 was marked for
8 identification.)
9 MR. GOLDENBERG: May I approach?
10 THE COURT: Yes.
11 BY MR. GOLDENBERG:
12 Q. Mr. Lavigna, at various points in your reports
13 and, in particular, in your reply report, you cite to
14 testimony that was submitted to the Independent
15 Redistricting Commission in connection with its public
16 hearing and testimony process; is that correct?
17 A. Correct.
18 Q. And on Page 9 of your report, you specifically
19 cite the testimony submitted to the IRC by Dr. Wah Lee on
20 behalf of OCA New York, a community that advocates for
21 Asian Pacific Americans; is that correct?
22 A. Yes.
23 Q. I will represent to you that we printed this
24 exhibit using the link that you provided in your report
25 for where to find the testimony, and I would ask you,

1 Mr. Lavigna, does this testimony look consistent with the
2 testimony that you cite in your report and for which you
3 provided a link for others to find it? And what I'm
4 asking specifically, Mr. Lavigna, is -- your report at
5 Page 9 quotes, quote, public comment of Dr. Wah Lee
6 (July 29, 2021). And I'm asking you whether the exhibit
7 I've given you, which is a written statement by Dr. Wah
8 Lee dated July 29, 2021, is the testimony that you refer
9 to in your report.
10 A. It was.
11 MR. GOLDENBERG: Your Honor, I would move
12 for the admission of this written statement which is
13 specifically cited and relied upon by Mr. Lavigna and
14 which was printed from a link that he provided in his
15 report.
16 THE COURT: Petitioner?
17 MR. BROWNE: No objection, your Honor.
18 THE COURT: It's admitted.
19 (Respondents' Exhibit S-12 was received in
20 evidence.)
21 BY MR. GOLDENBERG:
22 Q. I'd like to direct your attention to the second
23 page of this document where Mr. Wah states, Position II:
24 Regarding Congressional Districts. The first sentence --
25 the first paragraph of that Position II states, CD 11

1 contains all of Staten Island and a small part of Brooklyn
2 which contains Bath Beach and divides Bensonhurst.
3 Bensonhurst and Bath Beach should not, all caps, be with
4 Staten Island. Rather, Bath Beach and the whole of
5 Bensonhurst should be kept together. Do you see where
6 Mr. Wah says that?
7 A. Yes.
8 Q. And did I correctly read the statement that he
9 submitted?
10 A. You did.
11 Q. The final paragraph of this section states,
12 quote, Staten Island does not share a similar
13 concentration of Asians nor the culture of Asian
14 businesses as Bath Beach/Bensonhurst nor do residents in
15 Bath Beach/Bensonhurst travel on a regular basis to
16 Staten Island and vice versa. Do you see where he says
17 that?
18 A. Yes.
19 Q. And in the last exhibit I showed you, we confirm
20 that Bensonhurst and Bath Beach are now included with the
21 Chinese American communities in the manner that Mr. Lee
22 recommends; is that correct?
23 A. Correct.
24 Q. In Position III, the final portion of text at
25 the bottom of this document, Mr. Wah advocates keeping the

1 Chinese American community in Sunset Park in Brooklyn
2 together with the Chinatown community in Manhattan. Do
3 you see where he says that?
4 A. Yes.
5 Q. And, in fact, District 10 as drawn in the 2022
6 enacted plan keeps Chinatown and Manhattan together with
7 Sunset Park as requested by Mr. Lee, correct?
8 A. Yes.
9 Q. You state --
10 THE COURT: Mr. Goldenberg, about how
11 much -- in about the next ten minutes. It's okay if
12 we go past that, but pick a place to take about a
13 ten-minute break.
14 MR. GOLDENBERG: I'm actually relatively
15 close, your Honor. I'd suggest that I power through
16 and then we take our break.
17 THE COURT: Very good.
18 Q. Mr. Lavigna --
19 MR. GOLDENBERG: I'm going to mark for
20 identification S-13.
21 (Respondents' Exhibit S-13 was marked for
22 identification.)
23 MR. GOLDENBERG: May I approach, your
24 Honor?
25 THE COURT: You may.

1 BY MR. GOLDENBERG:
2 Q. Mr. Lavigna, you state in both of your reports
3 that the enacted plan divides the Hispanic community in
4 Sunset Park; is that correct?
5 A. Yes.
6 Q. I'm showing you what's been marked for
7 identification as S-13. This is, again, an exhibit
8 prepared by our expert, Dr. Ansolabehere, of neighborhoods
9 in Brooklyn in a comparison between the 2012 and 2022
10 congressional districts. Again, he pulled this data from
11 United States census data. Mr. Lavigna, I would direct
12 your attention to the report -- rather, to the exhibit and
13 specifically to the portion of District 11 which runs
14 through Sunset Park. That is the area relatively close to
15 where 11 and 10 are marked on the right side of this
16 exhibit for 2022. Do you see that?
17 A. Yes.
18 Q. In fact, Mr. Lavigna, the Hispanic population
19 that had been united in Sunset Park in 2012 remains united
20 in Sunset Park in 2022, correct?
21 A. Yes.
22 Q. On Page 13 of your reply report -- and I would
23 like to turn your attention to that page -- you have a
24 table with Upstate congressional districts, and you
25 compare old District 21 to new District 21, correct?

1 A. Yes.
2 Q. And you compare old District 22 to new
3 District 22, correct?
4 A. Yes.
5 Q. Same for 23, right?
6 A. Yep.
7 Q. And same for 24, right?
8 A. Yep.
9 Q. You would agree that using the numbers of
10 congressional districts as they were named in 2012 and as
11 they're named in 2022 only go so far, right?
12 A. Yes.
13 Q. And particularly for Upstate New York because
14 Upstate New York lost a congressional district, right?
15 A. Correct.
16 Q. So if you were to try to go all the way to 27,
17 you'd hit a roadblock because 27 doesn't exist, right?
18 A. Right.
19 Q. The new districts that were drawn in the area of
20 Upstate New York had to cover the same geographic area but
21 with fewer districts both because New York went from 27 to
22 26 and also because Downstate gained significantly more
23 population than Upstate; is that correct?
24 A. Correct.
25 Q. And so because of that, you can't accurately

1 compare old districts to new districts just by using the
2 same number as they're designated Upstate; is that
3 correct?
4 A. Correct.
5 Q. Congressional District 24 in 2012 was the
6 district anchored in Syracuse, right?
7 A. Yes.
8 Q. 24 in the new map is not anchored in Syracuse,
9 correct?
10 A. Correct.
11 Q. That's District 22, right?
12 A. Right.
13 Q. And would you agree that most of the population
14 in new District 22 comes from what was District 24, that
15 Syracuse-based district in the 2012 plan?
16 A. Yes.
17 Q. So when your chart compares District 22 in the
18 new plan to District 22 in the old plan, it's really
19 comparing apples and oranges; is that fair to say?
20 A. The way everything was split, yes.
21 THE COURT: I missed that answer.
22 THE WITNESS: The way everything was split,
23 the numbering on that is problematic. Yes.
24 Q. And the most equivalent numbering with respect
25 to new Congressional District 22 would have been to

1 compare it to new -- to, rather, old Congressional
2 District 24, correct?
3 A. Yes.
4 Q. And same issue with Congressional District 24,
5 correct?
6 A. Yes. 22 and 24, yes.
7 Q. Yeah. So what is Congressional District 24 in
8 2022, in fact, draws more population from old District 27
9 than any other district in the 2012 plan. Would you agree
10 with that?
11 A. Yes.
12 Q. But, again, that's not the comparison in your
13 chart?
14 A. Right.
15 Q. Congressional District 23 in the 2022 plan is a
16 Southern Tier district; is that a fair characterization?
17 A. Yes.
18 Q. And there was also a Southern Tier district in
19 2012, correct?
20 A. Yes.
21 Q. And we've discussed the fact that one of the
22 sources of information you rely on is testimony and
23 submissions to the Independent Redistricting Commission;
24 is that correct?
25 A. Correct.

1 Q. And there was substantial testimony and
2 submissions to the Redistricting Commission concerning a
3 desire to keep Congressional District 23 as a
4 Southern Tier district; is that correct?
5 A. Yes.
6 Q. One thing that you criticize in your report is
7 the fact that this Southern Tier district in 23 picks up a
8 piece of Erie County; is that correct?
9 A. Yes.
10 Q. Do you agree that CD 23 under the congressional
11 plan of 2012, which is fundamentally the same District 23
12 in the new plan, so we don't have any apples-to-apples
13 issue that we had with respect to 22 and 24, CD 23 as it
14 exists today is the most underpopulated congressional
15 district in the State of New York. Are you aware of that?
16 A. Yes.
17 Q. And so District 23 needed to add population to
18 comply with the federal Constitution, correct?
19 A. Correct.
20 Q. And are you aware -- strike that. We discussed,
21 with respect to state legislative districts, state and
22 federal requirements regarding equal population, correct?
23 A. Correct.
24 Q. Are you aware that with respect to Congress, the
25 United States Supreme Court has established a stricter

1 standard for population equality?
2 A. Yes.
3 Q. So where you have a district like CD 23 under
4 the 2012 plan that is severely underpopulated, that
5 population has to be added from somewhere. It's not at
6 the discretion of the Legislature, correct?
7 A. Yes.
8 Q. Are you aware that both plans recommended by the
9 Independent Redistricting Commission to the New York State
10 Legislature include part of Erie County in their drawing
11 of Senate District 23?
12 A. I'm not aware of that.
13 Q. Do you have any reason to believe that is not
14 the case?
15 A. No.
16 Q. Did you look at the Independent Redistricting
17 Commission plans for Senate -- strike that -- for
18 Congressional District 23 when you evaluated the
19 District 23 that was enacted?
20 A. I did not look at the IRC plans.
21 Q. You didn't look at them at all, correct?
22 A. Yeah, not for this report because they weren't
23 enacted; they weren't passed.
24 Q. Okay. So just to be clear, then, with respect
25 to my specific question, you did not look at either IRC

1 Plan A or Plan B as it pertained to Congressional
2 District 23, correct?
3 A. Correct.
4 Q. And in your report you criticize the Legislature
5 for putting Tompkins County in Congressional District 22
6 instead of 23, correct?
7 A. Yes.
8 Q. But, again, you did not look at the fact that
9 IRC Plan A and IRC Plan B also put Tompkins County in
10 Congressional District 22, correct?
11 A. Correct.
12 Q. And in Congressional District 22, Tompkins
13 County, which is home to Cornell University, Ithaca
14 College, and other educational institutions, is combined
15 with Onondaga County, which is home to Syracuse
16 University, correct?
17 A. Yes.
18 MR. GOLDENBERG: I have no further
19 questions, your Honor.
20 THE COURT: Thank you, Mr. Goldenberg.
21 All right. I think this is an appropriate
22 place to take a break. We'll continue when we come
23 back. Fifteen minutes. Thank you.
24 (A recess was taken.)
25 THE COURT: All right. Is there going to

1 be any cross-examination, Ms. McKay?
2 MS. McKAY: No, nothing further.
3 THE COURT: Redirect?
4 MR. BROWNE: No, your Honor.
5 THE COURT: You can step down, sir.
6 MR. BROWNE: Your Honor, can we release
7 Mr. Lavigna from any further testimony? I don't
8 think any of the other parties have questions for
9 him.
10 MR. GOLDENBERG: No objection, your Honor.
11 MR. CHILL: No objection.
12 MS. McKAY: No objection.
13 THE COURT: All right. You're released,
14 sir.
15 THE WITNESS: Thank you, sir. Thank you.
16 (The witness was excused.)
17 THE COURT: Petitioners, next witness?
18 MR. BROWNE: Your Honor, we don't have any
19 further witnesses to call.
20 THE COURT: Okay. Respondents? Mr. Bucki?
21 MR. BUCKI: Yes, your Honor. The Speaker
22 of the Assembly and the Assembly Majority call
23 Michael Barber to the stand.
24 THE COURT: Thank you.
25 MICHAEL BARBER,

1 called herein as a witness, having been first duly sworn,
2 was examined and testified as follows:
3 THE DEPUTY: Can I get you to state your
4 name and spell it for the Court, please.
5 THE WITNESS: Michael, M-i-c-h-a-e-l,
6 Barber, B-a-r-b-e-r.
7 THE COURT: I'll ask you to keep your voice
8 up, Mr. Barber. It helps me hear. I know Mr. Bucki
9 speaks loud enough. I could hear him before, so...
10 MR. BROWNE: Your Honor --
11 THE COURT: Yes.
12 MR. BROWNE: -- I apologize for
13 interrupting. Sorry, Mr. Bucki. And I think it's
14 already occurred, but I just want to make sure that
15 we exclude any witnesses that are going to testify
16 for the respondents who aren't responding to
17 testimony from the petitioners or anything like that.
18 THE COURT: Yes. Respondents' witnesses
19 should be outside the room at this time.
20 MR. GOLDENBERG: Your Honor, we've
21 instructed them accordingly and they're not present.
22 THE COURT: All right.
23 MR. BROWNE: Thank you, your Honor.
24 THE COURT: Any of your witnesses that you
25 would plan on calling for rebuttal are allowed to

1 listen in.
2 MR. BROWNE: Thank you, your Honor.
3 THE COURT: Okay. Mr. Bucki?
4 MR. BUCKI: Thank you, your Honor.
5 DIRECT EXAMINATION
6 BY MR. BUCKI:
7 Q. Could you please describe your educational
8 background for the Court.
9 A. Yes. I have a Bachelor of Arts in International
10 Relations from Brigham Young University. I also have a
11 master's in political science -- or it's politics at
12 Princeton University and a PhD in American politics and
13 quantitative methods from Princeton University.
14 Q. So then I can call you Dr. Barber?
15 A. You can if you would like, yes.
16 Q. And where are you currently employed?
17 A. I'm an associate professor at Brigham Young
18 University in the Political Science Department.
19 Q. And could you describe for the Court the kind of
20 work that you do in the Political Science Department?
21 A. Sure. I teach a number of courses in American
22 politics as well as in statistics for use in the social
23 sciences. Beyond my teaching responsibilities I also
24 conduct research on a variety of topics in American
25 politics, topics related to elections, campaign finance,

1 representation, that sort of thing.
2 Q. Do you do any research with respect to
3 redistricting?
4 A. I include redistricting in many of the courses
5 that I teach. I have done research that uses legislative
6 districts. I have not published anything that is specific
7 to the topic of redistricting.
8 Q. But to what extent have you served as an expert
9 in the past in redistricting cases?
10 A. I've served as an expert in
11 redistricting-related cases in a variety of states, twice
12 in North Carolina, in the State of Ohio, and the State of
13 Pennsylvania, prior to this case.
14 Q. And could you describe for the Court your
15 background in statistics as well as political science?
16 A. Certainly. As part of my coursework in my PhD
17 program at Princeton, I was required to take what's known
18 as the quantitative methods sequence, which is a series of
19 courses in statistics and its application in the use of
20 social science data, required to pass a comprehensive exam
21 in that topic, and then I use those methods in my research
22 as a professor today.
23 I also teach our department's statistics course,
24 which takes students from basically no understanding of
25 statistics through a variety of topics that would allow

1 them to then proceed into a graduate -- you know, a
2 graduate program in statistics or social -- how would you
3 say it -- a data analysis program in the social sciences.
4 Q. How often have you published scholarly work?
5 A. I've published -- I think my CV lists around 20
6 peer-reviewed publications at this point.
7 Q. And to what extent do those peer-reviewed
8 publications rely upon statistical analysis?
9 A. I would say with near unanimity they all in some
10 way use quantitative methods.
11 Q. You were in court yesterday to hear the
12 testimony of Sean Trende, correct?
13 A. Yes, I was.
14 Q. Do you know Mr. Trende?
15 A. I do, yes.
16 Q. How do you know him?
17 A. He and I have been involved in redistricting
18 cases in other states, and so I've met him through those
19 interactions.
20 Q. And by "involved," what do you mean by involved?
21 A. We've both been experts in some of these cases.
22 Q. Do you recall how many of those cases?
23 A. I am reluctant to give the specific number
24 simply because there are some cases where I'm not entirely
25 aware of all of the experts that have been involved, but I

1 know of at least two.
2 Q. And those two cases are what?
3 A. A case that was recently finished in
4 North Carolina as well as a case in Ohio, and there was
5 actually the one in Pennsylvania. I know he also was an
6 expert in that case.
7 Q. So then that would make three cases, correct?
8 A. Yes, that's correct.
9 Q. And with respect to those three cases, were you
10 experts on the same side of the case or opposite sides of
11 the case?
12 A. In North Carolina and Ohio, we were on the same
13 side, and in Pennsylvania we were representing different
14 parties.
15 Q. And in those cases where you were involved and
16 Mr. Trende was involved, would it be possible to
17 characterize whether you were retained as an expert on
18 behalf of Democrats or Republicans in those cases?
19 A. In all three of those cases, we were retained on
20 the side of a Republican-leaning organization or the state
21 Legislature in some of those cases.
22 Q. And how about Mr. Trende in those cases?
23 A. Also the same.
24 Q. Republican organizations?
25 A. Yes. That's correct.

1 Q. Now, with respect to this proceeding today, who
2 retained you as an expert for this proceeding?
3 A. So in this case I have been retained by the
4 counsel for the New York General Assembly.
5 Q. And are you being paid for your testimony?
6 A. Yes.
7 Q. And the fact that you're being paid for your
8 testimony, does that have any kind of effect on the
9 opinions that you have with respect to this proceeding?
10 A. No, it does not.
11 MR. BUCKI: Your Honor, at this time I
12 would move the admission of Dr. Michael Barber as an
13 expert witness in the field of redistricting and
14 statistical analysis relating thereto.
15 THE COURT: I'm finding him qualified as an
16 expert.
17 MR. BUCKI: Now, as a matter of
18 housekeeping, your Honor, I do have before me a
19 document that has been marked as Respondents'
20 Exhibit B, and that was pre-marked before we began
21 testimony yesterday, but I understand that perhaps
22 now we are using a nomenclature whereby Senate
23 exhibits begin with S followed by a number and
24 Assembly exhibits begin with an A followed by a
25 number. Would the Court like this document to be

1 re-marked? Right now it says Respondents' Exhibit B,
2 but it could be re-marked, I believe, as A-2.
3 THE COURT: There's been other As, has
4 there not?
5 MR. BUCKI: At least one A.
6 THE COURT: Let's keep it A, then.
7 MR. BUCKI: Okay.
8 THE COURT: This would be what, A-2?
9 MR. BUCKI: So if the court reporter would
10 kindly re-mark that as A-2.
11 (Respondents' Exhibit A-2 was marked for
12 identification.)
13 MR. BUCKI: May I approach the witness,
14 your Honor?
15 THE COURT: You may.
16 BY MR. BUCKI:
17 Q. Mr. Barber, I'm now showing you what has been
18 marked as Respondents' Exhibit A-2 for identification. Do
19 you recognize this document?
20 A. Yes, I do.
21 Q. What is it?
22 A. It is a copy of the affidavit that I filed in
23 this case.
24 Q. In connection with your preparation of this
25 report, of this affidavit, so to speak, did you review the

1 expert report that was offered previously by Claude
2 Lavigna?
3 A. Yes, I did.
4 Q. And in connection with your preparation of this
5 affidavit, did you review the expert report of Sean
6 Trende?
7 A. Yes.
8 Q. And would you agree that this affidavit sets
9 forth your opinions, which we'll have some discussion
10 about, but that this sets forth your opinions that you're
11 rendering in this proceeding?
12 A. Yes.
13 MR. BUCKI: Your Honor, at this time I
14 would request that Respondents' Exhibit A-2 be
15 admitted into evidence.
16 THE COURT: Petitioners?
17 MS. DiRAGO: No objection, your Honor.
18 THE COURT: It's admitted.
19 (Respondents' Exhibit A-2 was received in
20 evidence.)
21 BY MR. BUCKI:
22 Q. Dr. Barber, I'd like you to refer to Exhibit A-2
23 from the respondents, Paragraph Number 7.
24 THE COURT: A-2, his --
25 MR. BUCKI: His report.

1 THE COURT: Page what?
2 MR. BUCKI: Paragraph 7, which is on
3 Page 4.
4 BY MR. BUCKI:
5 Q. I'd like to ask you specifically about the first
6 sentence wherein you write, scholarship in political
7 science has noted that the spatial distribution of voters
8 throughout a state can have an impact on the partisan
9 outcomes of elections when a state is, by necessity,
10 divided into a number of legislative districts. Did I
11 read that correctly?
12 A. Yes.
13 Q. What do you mean by that statement?
14 A. I simply mean that voters in a state or in the
15 country as a whole are not evenly distributed, both -- in
16 terms of how many of them live in particular parts of the
17 state, but beyond that, the partisan preferences of those
18 voters can vary dramatically based on where they live.
19 This is, of course, not unique to the State of New York.
20 It's common in all states in the United States and outside
21 of the United States as well. Because in New York and in
22 other states we use single-member districts in which we
23 draw geographic boundaries in which voters then are
24 assigned to districts one way or the other, that uneven
25 distribution of voters across the state as well as the

1 uneven distribution of their partisan preferences can have
2 significant impacts on what those districts look like once
3 those boundaries are drawn.
4 Q. And how would the manner in which those
5 districts would look be impacted?
6 A. Well, as you draw the districts and you
7 incorporate certain types of voters and you, you know,
8 exclude other types of voters, as the district lines fall
9 on the map, you could end up with districts that are --
10 well, they could run the entire gamut of partisanship.
11 You can have districts that end up being extremely
12 concentrated with both Democratic voters or with
13 Republican voters. You could also end up with districts
14 that are incredibly competitive that have a more or less
15 even distribution of voters that prefer Republicans or
16 Democrats. It's incredibly idiosyncratic in that it
17 really depends on how voters in a particular state or even
18 region of the state are distributed.
19 Q. You mentioned that you had an opportunity to
20 review the expert report that was offered by Claude
21 Lavigna, and did you listen to his testimony here in this
22 proceeding also?
23 A. Yes.
24 Q. And based upon your review of Mr. Lavigna's
25 expert report and also having listened to his testimony,

1 what conclusion do you offer with respect to the opinions
2 that Mr. Lavigna has made?
3 A. Well, as I state in my report, it's incredibly
4 difficult to draw any conclusions from his report given
5 the lack of data or evidence to substantiate many of
6 the -- or all of the claims that are made in the report.
7 There's not -- there's not a lot to work with.
8 Q. So let me ask you a different question, then.
9 Would it be possible to characterize Mr. Lavigna's report
10 as a qualitative analysis rather than a quantitative
11 analysis?
12 A. Yes. I use that characterization in my report,
13 in that a quantitative analysis uses data, whether those
14 are election data or voter registration data, whatever
15 data may be most appropriate for the question that we're
16 analyzing, and then lays out a systematic standard by
17 which those data will be evaluated ahead of time. At that
18 point the data are then analyzed using that standard, and
19 the results are then presented based on that analysis.
20 Q. Based upon your review of Mr. Lavigna's report,
21 what kind of standard was used in his qualitative
22 analysis?
23 A. I could not identify any standard.
24 Q. Should a standard have been used as part of that
25 qualitative analysis?

1 A. Yes.
2 Q. And so how would you characterize Mr. Lavigna's
3 qualitative opinions in the absence of, as you said, the
4 standard that you think it should have had?
5 A. I believe in my report I describe it as a casual
6 observation.
7 Q. And what do you mean by "casual observation"?
8 A. I use that phrase to simply mean that given a
9 lack of particular standard or methodology by which the
10 evaluation is going to take place, there's -- it doesn't
11 meet the definition of social science.
12 Q. And what would that definition of social science
13 be?
14 A. It would be as I described earlier, a
15 predetermined standard by which an evaluation is going to
16 be made; the use of data of some form, qualitative or
17 quantitative, and evaluation of the data using that
18 standard; and then a description of the results given the
19 data and standard that had been outlined ahead of time.
20 Q. And in your view, does Mr. Lavigna's report have
21 any of this?
22 A. No.
23 Q. Now let's move on to Mr. Trende's report and his
24 testimony. You were present in court to hear the
25 testimony from Mr. Trende, correct?

1 A. Yes.
2 Q. Do you recall Mr. Trende's testimony that he ran
3 a variety of simulations on a computer with respect to
4 preparing his conclusions?
5 A. Yes.
6 Q. Did you run any simulations as part of your work
7 as an expert in this case?
8 A. Yes, I did.
9 Q. What kind of simulations did you do?
10 A. So I attempted to conduct a simulation analysis
11 that mirrored as closely as possible that which Mr. Trende
12 did using the same software program, similar data, that
13 sort of thing.
14 Q. And why did you try to replicate as closely as
15 possible the simulations that Mr. Trende said that he did?
16 A. Well, I was specifically asked to evaluate the
17 conclusions that Mr. Trende came to in his report. I was
18 not given the report that he filed and the information
19 contained in the report. I was unable to exactly
20 replicate the analysis that he had conducted, and so my
21 attempt in my report was to get as close as possible given
22 the information that was contained in his report.
23 Q. What computer program did you use to run your
24 simulations?
25 A. I used the software program R and specifically

1 the simulation program redist in the program R.
2 Q. And based on your having heard the testimony of
3 Mr. Trende and read his report, did he use R also?
4 A. Yes.
5 Q. Did he use redist?
6 A. Yes.
7 Q. We had some discussion yesterday about a
8 Professor Imai, I-m-a-i, and his role in working on
9 simulations. Can you tell us who Professor Imai is?
10 A. Professor Imai is currently a professor of
11 political science at Harvard University. Prior to that he
12 was a professor of political science at Princeton
13 University. He was an advisor on my dissertation
14 committee when I was a graduate student at Princeton.
15 Q. So how well would you say that you know
16 Mr. Imai?
17 A. I would say I know him quite well.
18 Q. And to what extent was he a teacher to you in
19 the course of your graduate program?
20 A. He was an incredibly influential impact -- he
21 had an incredibly influential impact on my graduate
22 education.
23 Q. Now, when you run these simulations, as we heard
24 yesterday, there's a variety of different maps that are
25 generated by the simulations, and sometimes the map that's

1 generated can be very similar to the map that is enacted
2 by the Legislature for redistricting, and sometimes the
3 simulation can turn out to be very different from the map
4 that is enacted by the Legislature. In a case in which
5 the simulation run ends up with a map very similar to the
6 map that's enacted by the Legislature, what does that tell
7 you as an expert?
8 A. Well, it can indicate a number of things. The
9 first thing it could indicate is that the similarity
10 exists simply by random chance. There is always that
11 possibility. We shouldn't rule that out. Beyond that, it
12 could indicate that the decisions that were made in
13 programming the algorithm reflect very similarly the
14 decisions that were made in drawing the map that was not
15 drawn using the simulations.
16 Beyond that, it could also represent -- or
17 reflect, I'm sorry, the geography of the location that
18 you're drawing the -- where you're drawing the map. So if
19 you're dealing with a location in which there are very few
20 voters or very few precincts and so, as a result, the
21 simulations don't have a lot of options, if that makes
22 sense, there's not a lot of different ways that a map
23 could be drawn. That might also lead to a similarity
24 between the simulations and the map that was drawn not
25 using simulations.

1 Q. Now, what about the case when the enacted map
2 ends up being very different from the simulation map that
3 you receive from the computer? What does that tell you?
4 A. So, again, it could be due to a number of
5 factors. As I said prior -- previously, the first thing
6 we should always consider is that it happened purely by
7 random chance. The other possibility is that there were
8 other factors that went into the drawing of the map that
9 did not use simulations, that were not reflected in the
10 choices made in drawing the simulations. There's a whole
11 host of those factors that we could talk about.
12 Beyond that, again, it could reflect the
13 difficulty of the geography that you're using or that
14 you're working with in drawing the map. So if you have a
15 state or a -- sometimes these simulations are used in
16 other contexts, but in this case we're talking about a
17 state. If you have a state that contains a really large
18 number of precincts, that exponentially increases the
19 difficulty of drawing these maps, and so that could also
20 lead to the differences that you observe.
21 Q. How many possible maps could be drawn for 26
22 congressional districts in New York State?
23 A. I don't know that anyone could prove
24 mathematically the actual number. There are mathematical
25 proofs that show that the number of maps grows at a rate

1 so fast that when we're talking about thousands of
2 precincts into 26 districts, there's more possibilities
3 than there are atoms in the universe.
4 Q. So would that be billions of possibilities?
5 A. Billions would be a vast understatement.
6 Q. Trillions of possibilities?
7 A. Somewhere in that ballpark.
8 Q. So given these trillions of possibilities that
9 you could have in terms of how the map would look, how is
10 it determined which kinds of maps should be spit out when
11 the simulations are done?
12 A. So the user sets -- the user tells the computer
13 how many maps to produce. Obviously no one is going to
14 request the computer produce trillions of maps. The
15 computer would break. And so there's some number that is
16 chosen.
17 Once that number is determined, the user then
18 inputs a number of -- or the user then determines a number
19 of parameters that they want to tell the computer, more or
20 less how to draw the maps or which things to give priority
21 to, how to weight various factors and considerations. All
22 of those things go into the algorithm. That then
23 determines the types of maps that are drawn. And then at
24 the end of the day, the user is relying on the program to
25 produce a representative set, a representative sample, of

1 maps that would reflect that broader population of maps
2 that we discussed earlier.
3 Q. I'd like to refer you again to Respondents'
4 Exhibit A-2, your affidavit, Paragraph Number 14 on
5 Page 6. That paragraph begins, however, a major factor in
6 the validity of the simulated maps is whether or not they
7 constitute a representative sample of the trillions of
8 legally valid possible maps that could be drawn. Did I
9 read that correctly?
10 A. Yes.
11 Q. What do you mean by a "representative sample"?
12 A. So I think the best way to talk about this is
13 actually outside of the context of redistricting and in
14 the context of survey research. I think that's something
15 that people tend to be more familiar with. If you're
16 going to conduct a survey of the United States and you
17 want to understand the opinions of people who live in the
18 United States, you're obviously not going to speak to
19 every person in the country. That is just practically
20 impossible. And so you're going to draw a sample. That's
21 what surveys are. They're samples of the population.
22 But it's important that your sample reflect the
23 broader population that you're interested in studying. If
24 I conducted a survey entirely in the City of Bath,
25 New York, and then claimed that that survey was

1 representative of the broader population of New York
2 residents or even United States residents, no one would
3 take me seriously; you know, my survey wouldn't go very
4 far. So it's important that the sample that you're
5 dealing with is representative or looks like, reflects
6 broadly the population that you're interested in studying.
7 That same principle applies to the use of these simulated
8 maps. The sample that you're using, because we never have
9 the full population, we rely on that sample to be
10 representative of the broader population of maps that we
11 could draw.
12 Q. And when you were running your simulations which
13 you testified you were trying to make as close to
14 Mr. Trende's simulations as you possibly could, how did
15 you go about coming up with a representative sample?
16 A. In his report Mr. Trende outlines a number of
17 decisions that he made with regards to how he programmed
18 the algorithm, and so I tried to reflect or follow those
19 decisions as closely as possible in programming the
20 algorithm to produce the simulations that I used. And
21 those programming decisions, those parameters that are
22 chosen, are going to change the population that you're
23 looking at. So if you alter the -- if you alter the
24 program and tell it to do -- you know, give more weight to
25 a certain parameter, that's changing the population of

1 maps that you're going to draw from.
2 Q. I'd like to refer you to Paragraph 16 of your
3 affidavit on Page 7. You write at the beginning of
4 Paragraph 16, generating a representative sample of maps
5 requires ensuring that the algorithm drawing the maps is
6 following the legal criteria that govern the redistricting
7 process. The Constitution of New York states that the
8 following redistricting criteria shall be considered. Did
9 I read that correctly?
10 A. Yes.
11 Q. And you agree with that statement?
12 A. Yes.
13 Q. So let's go through those criteria. So the
14 first criterion is that districts shall not be drawn to
15 have the purpose of nor shall they result in denial or
16 abridgment of racial or language minority voting rights.
17 How did you program the computer to account for that
18 required consideration?
19 A. So I did not see any indication that Mr. Trende
20 considered that factor in his simulations, and so I also
21 did not consider that in drawing my maps.
22 Q. And the reason for that was...
23 A. Again, I was trying to produce simulations that
24 reflected as closely as possible the decisions that
25 Mr. Trende had made.

1 Q. The second characteristic, that districts shall
2 contain an equal number of inhabitants, what, if anything,
3 did you do in your simulations to control for that
4 variable?
5 A. So in this case Mr. Trende indicated that he did
6 set the -- he did instruct the algorithm not to draw
7 districts in the -- I should be clear. I'm only referring
8 to the congressional --
9 Q. Yes.
10 A. -- map. He instructed the algorithm to draw
11 districts within, I believe, a 1 percent bound in terms of
12 deviations from the target population, that is, the equal
13 population standard, and so I also programmed my
14 simulations -- in my case I instructed the computer to
15 allow for a 1/2 of 1 percent deviation on either side, so
16 that would lead to a total of 1 percent from the lowest
17 possible deviation to the highest possible deviation.
18 Q. And so just to be clear, with respect to the
19 state Senate maps, did you evaluate the state Senate maps
20 at all?
21 A. No, I made no evaluation of the Senate maps.
22 Q. So your evaluation is only with respect to the
23 proposed congressional map for New York for 2022?
24 A. Yes. That's correct.
25 Q. Next, the requirement that each district needs

1 to consist of contiguous territory, did Mr. Trende control
2 for that?
3 A. He did. The algorithm does -- actually does not
4 allow you to draw noncontiguous districts. That's hard --
5 it's the term hard coded into the program. It's not at
6 the discretion of the user.
7 Q. And so did your simulations have contiguous
8 districts also?
9 A. Yes.
10 Q. Next, the consideration of having each district
11 be as compact in form as practicable. How did you control
12 for compactness as far -- as practicable?
13 A. So the algorithm contains a parameter that the
14 user specifies that instructs the computer to draw
15 districts with greater or less weight to geographic
16 compactness. So we heard some testimony yesterday from
17 Mr. Trende about that choice. The user puts a number into
18 the algorithm, and that number -- higher numbers
19 indicate -- or instruct the computer to draw more compact
20 districts. Lower numbers instruct the computer to draw
21 less compact districts.
22 I chose the number 1 in my simulations, and I
23 don't know -- or, actually, no. I'm sorry. Mr. Trende
24 doesn't indicate in his original report the number that he
25 chose, so I chose the number 1 based on my experience in

1 using the algorithm in the past.
2 Q. And what in your experience told you that 1
3 would be a good number to choose rather than 1/2 or 1 1/2
4 or something else?
5 A. So the authors of the program recommend the use
6 of the parameter 1 because they -- I don't recall the
7 exact words that they use, but they basically indicate
8 that the algorithm will perform better if that number is
9 chosen. In my experience in using the algorithm, that's
10 correct. Using a number aside from 1 tends to lead to the
11 algorithm struggling to draw districts in terms of the
12 amount of time it takes to complete the program as well as
13 in the ability of the program to sample a representative
14 set of maps as well.
15 THE COURT: Didn't Mr. Trende testify that
16 he used Number 1 also? Were you listening?
17 THE WITNESS: I believe that's what he
18 said. Yes.
19 Q. The next characteristic, the districts shall not
20 be drawn to discourage competition or for the purpose of
21 favoring or disfavoring incumbents or other political
22 candidates or political parties. What did you do before
23 you ran your simulations, if anything, to control for that
24 characteristic?
25 A. So in this case the way to account for this is

1 by not giving the computer information about the
2 partisanship or voting behavior of voters when the
3 algorithm is conducted, and so the model does not know
4 about the partisan preferences of the precincts that it's
5 assigning to the different districts.
6 Q. So are you saying you did not include that in
7 your model before you ran the simulations?
8 A. Yes. That's correct.
9 Q. And did Mr. Trende do likewise?
10 A. I believe so. Yes.
11 Q. The next characteristic is that the Legislature
12 and the commission are to consider the maintenance of
13 cores of existing districts. To what extent did your
14 simulations account for that?
15 A. So in my read of Mr. Trende's original report,
16 there was not any consideration of that factor, and so I
17 likewise did not include any consideration in my
18 simulations.
19 Q. And then, finally, there's a characteristic that
20 it is necessary to consider preexisting political
21 subdivisions, including counties, cities and towns, and
22 communities of interest. What, if anything, did you do in
23 setting up your simulations to control for that variable?
24 A. So my understanding or my read of Mr. Trende's
25 report was that he instructed the algorithm to avoid

1 splitting county boundaries. I did not see any indication
2 of consideration of the other political subunits, cities,
3 towns, or communities of interest. The algorithm has a
4 variety of ways of accounting for political subdivision
5 boundaries, and so you can instruct the algorithm to split
6 whichever boundary you are dealing with.
7 And so in this case I instructed the algorithm
8 to avoid splitting county boundaries as -- or to avoid it
9 as much as possible. There's a little bit of slippage in
10 that there are a few ways to account for that in the
11 algorithm. And so I was uncertain as to how Mr. Trende
12 exactly accounted for that parameter, but I used one of
13 the various options available in the algorithm, to
14 instruct it to avoid the division of county boundaries as
15 much as possible.
16 Q. But cities and towns, did Mr. Trende do anything
17 to try to avoid splitting those up?
18 A. Not from my read of his original report, no.
19 Q. And so did you do anything in your simulations
20 to try to avoid that?
21 A. No, I did not.
22 Q. How many simulations did you run?
23 A. I ran 50,000 simulations.
24 Q. Were you present in the court to hear Mr. Trende
25 say that he ran 5,000 simulations?

1 A. Yes.
2 Q. Why did you run 50,000 simulations?
3 A. The choice of the number of maps to draw is at
4 the discretion of the user. The algorithm is quite
5 efficient, and so, you know, it doesn't take -- it does
6 take a long time. In the kind of modern computer
7 language, it takes a few hours to run. I chose 50,000
8 simply because I wanted a set of maps that, you know,
9 there could be no question that we were drawing a very
10 large number of maps, and so 50,000, in my mind, meets
11 that description.
12 Q. Do you think the 5,000 threshold doesn't
13 necessarily meet that description?
14 A. I mean, 5,000 is certainly many fewer than
15 50,000. Given the size of the state, given the number of
16 precincts that we're dealing with, New York is an
17 especially complex problem for the computer to deal with.
18 And my experience has been that the more, the better, and
19 so I've typically used 50,000 -- or I used 50,000 in this
20 case, and I've used 50,000 in other situations as well.
21 Q. So you said the computer ran for a couple of
22 hours and it produced these 50,000 simulations. Then what
23 did you do?
24 A. So at that point we have more or less 50,000
25 different maps, each containing 26 districts, that are

1 geographically contiguous, of roughly equal population, so
2 on and so forth, all of those criteria that we just
3 discussed. At that point you can then analyze that set of
4 maps based on whatever criteria you are interested in
5 looking at. In this case we're looking at the
6 partisanship of the maps, and so at that point you
7 reintroduce partisanship by basically tallying up the
8 number of votes cast for Republicans and Democrats in a
9 particular set of elections that you choose.
10 You then aggregate those votes from the precinct
11 level up to the district based on what those districts
12 look like. Obviously each simulated map looks different,
13 and so you're aggregating those precincts together in a
14 different way for each of the 50,000 simulations. But at
15 the end of the day, what that does is it gives you a
16 picture of the partisan lean of each of those 26 districts
17 in each of the 50,000 simulations.
18 Q. What election data did you rely upon in this
19 analysis?
20 A. I used a number of statewide election results
21 over the past several years aggregated together to measure
22 the partisanship of each of the districts.
23 Q. Do you recall which years those were?
24 A. I believe it's 2016, 2018, and 2020, are the
25 years. It's in my report if we need to look for sure.

1 Q. And so then, once you input this election data
2 from these statewide races -- before I ask that question,
3 why did you use data from statewide races rather than
4 from, say, down-ballot races for Congress, state Senate,
5 state Assembly, local races, and the like?
6 A. So there's a few reasons I did this. The first
7 is that it's the most -- it's the standard practice among
8 people who use these redistricting algorithms to use
9 statewide elections, and the reason is that when you're
10 drawing these districts, you're drawing districts that
11 span, you know, the entirety of the state and, as a
12 result, you want to account for or, if possible, eliminate
13 from the consideration the idiosyncrasies that may occur
14 in these down-ballot races.
15 So a congressional district -- if we were to use
16 congressional races in our analysis of these simulated
17 districts -- well, a congressional race is isolated to a
18 particular region of the state -- if we draw a bunch of
19 simulated districts, they're going to split that
20 congressional district up into a bunch of different
21 pieces, and so then all of the idiosyncrasies associated
22 with that congressional race, the candidates, the
23 fundraising, the issues they raise , you know, all of
24 those things, are going to then get dispersed across those
25 simulated districts unevenly, which is then going to make

1 the comparison across these simulated districts really
2 difficult. And so to avoid that, practitioners typically
3 use statewide races, and the virtue of these statewide
4 races is that the idiosyncrasies of the race are constant
5 throughout the geography, and so in that way we don't have
6 to worry about particular candidate features factoring
7 more into some of the simulated districts than the others
8 because the candidate is held constant across the
9 simulation.
10 Q. So you input the data from these statewide
11 races, and to what degree of detail do you input it? Do
12 you put it on a congressional level or a county level or
13 something smaller?
14 A. So the data are at the smallest level at the
15 precinct, measured at the precinct, and so you look at
16 each of the simulated districts and you take all of the
17 precincts contained in that district. You then add up the
18 number of votes cast for Republican candidates and then
19 the number of votes cast for Democratic candidates in
20 those statewide races in each of the districts.
21 Q. And then what calculations do you do after that?
22 A. At that point you conduct a simple average, and
23 that's a measure of the average partisan performance of
24 the statewide candidates in those districts.
25 Q. Now, in terms of calculating partisanship, you

said you used averages. Did you use a gerrymandering index like what Mr. Trende described in his report and in his testimony?

A. No, I did not.

Q. Why not?

A. There's a few reasons. The first is that I'm unaware of any other cases in which this particular gerrymandering index that Mr. Trende uses has been used. I suspect the reason for that is that -- I don't find that particular index to be especially helpful for a few reasons. The first reason is that in generating this aggregate index, you lose any indication of where differences from between the maps and -- the simulated maps and the enacted map are coming from, and so as a result, it doesn't really give much -- it doesn't provide much information to the user.

Q. Are there any other reasons why you prefer averaging to using the gerrymandering index that Mr. Trende used?

A. The other reason is that the particular way in which the index is constructed gives weight to larger deviations than smaller deviations. My view is that a deviation is a deviation. I don't think we should give priority to larger deviations any more than -- they already contain greater weight given that they're larger.

1 Q. Since we're on the subject of deviations, you
2 said that you reviewed Mr. Trende's report in anticipation
3 of your testimony?
4 A. Yes.
5 Q. I'd like to refer to Mr. Trende's report which
6 has been admitted into evidence. If you could open it up,
7 please. And in particular, I would direct you to Page 12
8 of the report, Footnote Number 2. That footnote begins,
9 there are any number of ways to calculate partisanship.
10 The simulation approach tends not to be as sensitive to
11 the choice of elections as other metrics unless political
12 coalitions in a state vary radically from election to
13 election. So would you agree that the measure of
14 partisanship can differ based upon the election data that
15 you are choosing?
16 A. Yes.
17 Q. And would you have any comment or opinion as to
18 whether elections in New York can vary radically from
19 election to election?
20 A. I certainly think that it's the case that
21 elections in New York do tend to vary pretty substantially
22 or can.
23 Q. How so?
24 A. Republicans and Democrats in New York -- there
25 tends to be a pretty large, in comparison to other states,

1 swing between particular races and how Republicans and
2 Democrats perform in New York.
3 Q. I'd like to refer specifically to the
4 gubernatorial election in 2018 in the State of New York,
5 and isn't it true you used that as one of the elections
6 that provided the data for your partisanship analysis?
7 A. Yes. That's correct.
8 Q. And that was the election involving Democrat
9 Andrew Cuomo and Republican Marc Molinaro, correct?
10 A. Yes.
11 Q. Did you do any analysis that would bear upon
12 whether in a given congressional district the Democrat did
13 better or the Republican did better?
14 A. Yes. So as I said, you aggregate these election
15 results at the precinct level up to the district level
16 after the simulations are finished. At that point you can
17 look at them either all together in a kind of average or
18 you could look at them at a kind of race-by-race level as
19 well if you wanted to.
20 Q. Would you know or are you aware -- and if you
21 don't, say that you don't. Are you aware, in how many of
22 New York's congressional districts did Andrew Cuomo, the
23 Democrat, outperform Marc Molinaro, the Republican, in
24 2018?
25 A. I believe it was 20, I think is the number.

1 Q. And that's out of 27?
2 A. Out of -- yes. That would be the case.
3 Q. Now, you said you also relied upon statewide
4 election data from 2016, correct?
5 A. That's correct.
6 Q. And isn't it true that there was a United States
7 Senate race in New York in 2016?
8 A. Yes.
9 Q. And did you evaluate based upon that data how
10 well the Democrat, Chuck Schumer, performed in the
11 congressional districts versus his Republican opponent?
12 A. So in that case he won the majority in all of
13 the -- all 26, because in this case I was drawing 26
14 simulated districts. So in all 26 of the districts, he
15 won the majority.
16 Q. So in other words, we have a 2018 statewide
17 election where the Democrat won in 20 districts, but we
18 also have a 2016 statewide election where the Democrat won
19 in all 26 districts?
20 A. Yes. That's correct.
21 Q. Would you say that this encapsulates the kind of
22 variation that you were just describing?
23 A. Yes. That's correct.
24 Q. And so in view of this variation, why is it that
25 using an average would be preferable to using a

1 gerrymandering index to measure partisanship?
2 A. Well, as we can see, there can be substantial
3 variation in how these candidates perform. By averaging
4 their performance across all of the different races, that
5 helps to, again, remove these idiosyncrasies that we're
6 not particularly interested in. We don't want the
7 idiosyncrasies of particular candidates to go into these
8 analyzes because these statewide races are acting as
9 proxies. They're acting as our best estimate of how these
10 districts are going to perform going forward. And so the
11 average tends to place as -- you know, the average places
12 less weight on any one of the particular elections that
13 are included in that average.
14 Q. So you input your data. You run the
15 simulations. You come up with your 50,000 simulated maps
16 that are compared with the actual congressional map that
17 was enacted by the Legislature. Then what did you do in
18 your analysis?
19 A. So at that point I simply looked to see how many
20 of the districts in the enacted plan were carried by
21 Democrats. And when I say "carried," I mean how many of
22 those districts contained a majority of votes for
23 Democrats across -- in this average of these statewide
24 races.
25 I then do the same analysis for each of the

1 50,000 simulations. Of course, across those 50,000
2 simulations the number of districts that are carried by
3 Democrats is going to vary, and so that produces a
4 distribution. And so I then compare the distribution of
5 those simulations to the number in the enacted map.
6 Q. And so would it be correct to say that you would
7 characterize a Democratic district as one in which the
8 Democrat, over the course of your averages, achieves 50
9 percent of the vote plus 1?
10 A. That's correct.
11 Q. And a Republican district would be one in which,
12 as a result of the averages among all of these seven
13 statewide races, the Republican captures 50 percent plus 1
14 of the vote?
15 A. Well, it would be 49 percent -- 49.9 percent or
16 less.
17 Q. Or less?
18 A. Less, yeah.
19 Q. Now, do you recall testimony from Mr. Trende in
20 which he made reference to not using a number at 50
21 percent to determine whether a district is Democratic or
22 Republican but rather using a number that would be more
23 like 55 percent, I seem to recall?
24 A. Yes, I do remember that.
25 Q. And what would be your opinion concerning his

1 methodology?
2 A. Well, I wouldn't -- I would not use 55 or any
3 other number aside from 50. 50 percent is pretty
4 conventional. This is, you know, the majority of the
5 votes for one party. I'm going to label that as the party
6 carried that district. So it has the virtue of reflecting
7 more or less the way in which we elect candidates in real
8 life.
9 Beyond that, what's really happening is we're
10 really -- the discussion yesterday and what we're talking
11 about right now is really a reflection of the fact that
12 these simulations and these measures of partisanship,
13 they're really acting as proxies. They're our best
14 estimates of what's going to happen, and I really want to
15 emphasize estimate. We are not making perfect
16 predictions. If we were, we wouldn't be in here; we'd --
17 you know, we'd be advising candidates and making lots of
18 money because our predictions would be perfect. But
19 that's not the case. We're making estimates based on
20 previous election results to project future election
21 results.
22 Q. Now, according to this metric of determining
23 whether a Democrat or Republican would carry a
24 congressional district based upon the statewide election
25 results from 2016, 2018, 2020, how many of the 26

1 districts in your various simulations would have been
2 carried by a Democrat rather than a Republican?
3 A. So if we turn in my report, we can look and see
4 that distribution. The specific numbers are not something
5 I have committed to memory.
6 Q. Would this be Paragraph 33 on Page 12?
7 A. It would. It might be helpful to simply look at
8 the picture on Page 13 --
9 Q. Certainly.
10 A. -- as well, which is -- they're talking about
11 the same thing.
12 Q. Certainly.
13 A. So this --
14 Q. So what did you find?
15 A. Oh, I'm sorry.
16 Q. What did you find?
17 A. So this figure displays what I've been
18 discussing, which is the distribution of a district
19 carried by the Democrat candidates in the simulations. So
20 the gray -- the very thick, gray bars show the number of
21 districts carried by Democrats, and so we can see that in
22 17 percent of the simulations, Democrats carried 22
23 districts; in 40 percent of the simulations, Democrats
24 carried 23 districts; in 36.1 percent of the simulations,
25 Democrats carried 24 districts; and in 6.7 percent of the

1 simulations, Democrats carried 25 percent of the
2 simulations; and in less than 1/2 a percent of the time,
3 Democrats carried all 26 of the simulated districts.
4 Q. So then what would be the most frequent number,
5 or the mode, in terms of your simulations, as to how many
6 of the 26 districts would have been carried by Democrats?
7 A. So the most frequent outcome in the simulations
8 was 23 districts.
9 Q. And pursuant to the enacted plan, how many
10 congressional districts would a Democrat carry?
11 A. 22.
12 Q. And 22 is fewer than 23?
13 A. It is.
14 Q. So with respect to the plan that was enacted,
15 would you call that plan an outlier or representative of
16 the kind of simulated maps that you would expect?
17 A. I would not call it an outlier. I would --
18 there's a variety of definitions that a person could use
19 as to what constitutes an outlier or not. By none of
20 those definitions would I call this an outlier.
21 Q. And so this result with 22 districts out of 26
22 carried by a Democrat, there was likewise the same result
23 in 17 percent of your simulations, correct?
24 A. That's correct.
25 Q. And, in fact, is it true, am I reading the graph

1 correctly, that in the remaining 83 percent of the 50,000
2 simulated maps, actually the Democrat would have carried
3 even more than 22 congressional districts out of 26?
4 A. Yes. That's correct.
5 Q. Do we know based upon Mr. Trende's testimony and
6 his report how many of the districts in his 5,000
7 simulations would have been carried by Democrats or
8 Republicans?
9 A. There's no chart that looks like the chart that
10 I have put in my report, but we can draw very similar
11 inferences based on the chart that he included in his
12 report.
13 Q. And by "similar inferences," what do you mean?
14 A. I mean that we can look at the chart. He draws
15 a line across the chart at 50 percent. We can then look
16 across the 26 districts at the number of times the
17 simulations generate a district that is above the 50
18 percent line or below the 50 percent line, and then we can
19 add those up across the chart.
20 Q. So then what can we extrapolate from the data he
21 does give us with respect to whether the 26 districts in
22 his simulations would have been carried by Democrats in 22
23 or 26 instances or more than that?
24 A. It looks very similar to what I presented here
25 in my report.

1 Q. You'll recall that there was a requirement in
2 the state Constitution about maintaining the old cores of
3 previous districts in accomplishing the redistricting to
4 the extent that that would be practicable. Did Mr. Trende
5 consider the need to evaluate keeping the cores of old
6 districts together, as far as you can tell?
7 A. In the original report, no. In his reply report
8 Mr. Trende indicates that he did something in the
9 algorithm to account for previous district cores, but I'm
10 not aware of the specifics of how that is implemented.
11 Q. How about Mr. Lavigna? Can you tell if he
12 considered that criterion?
13 A. No. I don't believe he did.
14 Q. Now, did you do a comparison of the 2012
15 districts versus the proposed 2022 districts in view of
16 the extent to which the 2022 proposed map that was enacted
17 maintains the cores of old districts under the 2012 map?
18 A. Yes.
19 Q. And what did your analysis entail?
20 A. So basically I'm comparing the old districts
21 used in the previous decade to the new districts and
22 simply allocating population from the old districts into
23 the new districts. And so there's been a number of --
24 people have talked about this today. And, oh, you know,
25 given the fact that we're moving from 27 districts to 26

1 districts and the fact that the population has shifted
2 throughout the state in the last decade, the old districts
3 are not going to perfectly reflect the new districts. As
4 a result, you can imagine kind of overlaying those two
5 maps on top of one another and simply allocating people
6 based on where they lived in their old districts into the
7 new districts and what proportion go between each of those
8 maps, those two maps.
9 Q. With respect to the 2022 plan, to what extent --
10 if you were able to measure it quantitatively, to what
11 extent did the 2022 map that was enacted maintain the
12 cores of old districts from the 2012 congressional map?
13 A. I believe that in all but one case a majority of
14 people are kept from an old district into a new district.
15 Q. Can you comment about the one case where that
16 did not happen?
17 A. My understanding is because, again, as the state
18 is losing a district, that's going to be incredibly
19 disruptive in terms of how the boundaries are drawn. That
20 old district is gone, and as a result, you have to
21 reallocate all of those people into new districts, and so
22 in that one case you're going to end up with quite a bit
23 of disruption as opposed to the other situations, where
24 that's not the case.
25 Q. So is that something you would expect to see

1 when you're losing a district from one plan to the next?
2 A. Yes. I think in states where the number of
3 districts is changing, you would expect to find places
4 where it's especially large. Numbers of people are being
5 shifted from one district to another because in that case
6 you have a pretty radical disruption in terms of how the
7 districts are going to be drawn in that region.
8 Q. And so given all of this analysis concerning the
9 2022 congressional map that was enacted, do you have an
10 opinion to a reasonable degree of your professional
11 certainty with respect to its compliance with the
12 requirements that had to be considered?
13 A. Yes, I do.
14 Q. And what is your opinion?
15 A. It is my opinion that it does not qualify as a
16 partisan gerrymander.
17 Q. And why is that?
18 A. I think that in terms of the partisanship of the
19 enacted plan, it aligns with the partisanship that we
20 observe in the simulations even though the simulations, as
21 we've noted, are not extensively considering all of the
22 criteria that are required to be considered in the
23 Constitution; on top of that, the fact that we have a lot
24 of population moving over the last decade; on top of the
25 fact that we're losing a district in New York. All of

1 those things combined suggest to me that it just does not
2 qualify as a partisan gerrymander.
3 MR. BUCKI: May I have a brief moment, your
4 Honor?
5 THE COURT: Yes. I'd like you to pick a
6 spot. I don't know if you're just about done,
7 Mr. Bucki, but in the next ten minutes, I'd like to
8 break for lunch.
9 MR. BUCKI: My hope is that I can be done
10 in the next ten minutes.
11 THE COURT: Okay.
12 BY MR. BUCKI:
13 Q. One last set of questions to clarify some
14 testimony that you had earlier. You talked about how you
15 used statewide elections from 2016, 2018, and 2020 in
16 terms of doing your analysis of the partisanship of the
17 various districts in the simulations of the enacted
18 congressional plan. Why did you use those statewide races
19 rather than, say, others from 2014 or 2012 or other years?
20 A. The further back in time you go, the less
21 reflective these elections are going to be of the
22 contemporary political landscape. And so as I noted, the
23 statewide races, again, they're acting as best estimates.
24 They're acting as proxies for how voters might behave in
25 the future. And so as a result, you would want to give

1 priority to more recent elections. You wouldn't, of
2 course, only want to use 2020 because then you're subject
3 to the problem of having the idiosyncrasies of a
4 particular election cycle or even a particular election
5 itself. So there's some balance there in terms of using
6 past elections to help account for that, but you don't
7 want to go too far back because at that point those
8 elections kind of lose their relevance in terms of, you
9 know, being a good reflection of the contemporary politics
10 of the state.
11 Q. How did the statewide election data that you
12 used for your analysis compare to the statewide election
13 data that Mr. Trende used for his?
14 A. So I believe we used the same elections with the
15 exception of -- I think there are two additional elections
16 in my analysis that are not included in Mr. Trende's.
17 Q. Do you recall what those are?
18 A. I believe they're the state comptroller
19 elections.
20 Q. But otherwise they were the same?
21 A. But otherwise they are the same.
22 Q. And then I have a further clarifying question
23 about the line of demarcation that you use at 50 percent
24 to determine whether a district is carried by a Democrat
25 or carried by a Republican. Is this the line of

1 demarcation that's used only by you, or is it used by
2 other people in the political science field who study
3 redistricting?
4 A. So it's -- this is the, I would say, most common
5 practice in terms of displaying how simulations produce or
6 how to interpret the results of these simulations.
7 Additionally, I chose 50 percent, I think as I said
8 earlier, because it reflects the reality of how elections
9 are conducted, you know, in our country.
10 And then beyond that, as I said, I was trying to
11 reflect as closely as possible the decisions that
12 Mr. Trende used in his analysis. In looking at the figure
13 in his chart, we can see that he also demarcates 50
14 percent as the cut point at which something becomes a
15 Democratic-leaning versus a Republican-leaning district.
16 Q. And that's true notwithstanding the discussion
17 we had in his testimony about going up to 55 percent or
18 some other number different from 50 percent?
19 A. That's correct.
20 MR. BUCKI: I have nothing further at this
21 time, your Honor.
22 THE COURT: Thank you, Mr. Bucki.
23 This is an appropriate place to stop for
24 lunch. We'll start at 20 to 2:00, okay, 20 to 2:00.
25 You can step down, sir. Thank you.

1 THE WITNESS: Thank you.
2 (A recess was taken.)
3 THE COURT: Dr. Barber, you're still under
4 oath.
5 And I have a note that Attorney Reich and
6 Attorney Chill will be leaving around 2:30. Is that
7 correct? But Mr. Bucki will hold the fort; is that
8 correct?
9 MR. CHILL: Thank you, your Honor.
10 MS. REICH: Thank you, your Honor.
11 MR. BUCKI: Yes, your Honor.
12 THE COURT: All right. Very good.
13 Then you'll probably be going right out
14 that door --
15 MR. CHILL: Thank you, your Honor.
16 MS. REICH: Thank you, your Honor.
17 THE COURT: -- or wherever the security
18 will guide you.
19 All right. Who's going to be doing
20 cross-examination of Dr. Barber?
21 MS. DiRAGO: I will, your Honor.
22 THE COURT: Ms. DiRango?
23 MS. DiRAGO: DiRago.
24 THE COURT: DiRago. I'm sorry.
25 MS. DiRAGO: Yep. No N. That's okay.

1 THE COURT: How do you spell that?
2 MS. DiRAGO: D-i-R-a-g-o.
3 THE COURT: Thank you.
4 MS. DiRAGO: You're welcome.
5 CROSS-EXAMINATION
6 BY MS. DiRAGO:
7 Q. Okay. So, Dr. Barber --
8 MS. DiRAGO: Oh, and, Judge, if you can't
9 hear me, let me know. I guess this is working well.
10 THE COURT: Will do.
11 MS. DiRAGO: I don't have a booming voice
12 like some of my predecessors up here.
13 Q. So, Dr. Barber, you just heard me introduce
14 myself. My name's Molly DiRago. I am an attorney for the
15 petitioners.
16 I'm just going to sort of jump right into your
17 testimony. So -- and from your report you used what you
18 refer to as simulated districting analyses, right?
19 A. That's right.
20 Q. Okay. So you created your own ensemble of
21 simulated maps for that, right?
22 A. Correct.
23 Q. And you used some -- the same program and
24 statistical software as Mr. Trende?
25 A. That's correct.

1 Q. And in so doing, to the best of your ability,
2 you used Mr. Trende's programming decisions, right?
3 A. Correct.
4 Q. So that the simulation methodology used in
5 creating your ensemble very closely mirrors that of
6 Mr. Trende's, correct?
7 A. Correct.
8 Q. But you had created 50,000 simulated maps using
9 this methodology, correct?
10 A. That's correct.
11 Q. And in generating your simulated maps, you took
12 into -- I'm sorry. Strike that, please. Your report
13 explains that any conclusions about the enacted map
14 depends on the validity of the simulations produced,
15 right?
16 A. Correct.
17 Q. But I didn't see anywhere in your report where
18 you opine that Mr. Trende's simulations were invalid. Is
19 that right?
20 A. I don't believe that I make that exact
21 statement.
22 Q. Okay. And the result of your 50,000 simulations
23 align with the results of Mr. Trende's simulations, right?
24 A. That's correct given that I was choosing to
25 mimic the parameters that he had chosen.

1 Q. Right. And 50,000 was, what you said in your
2 testimony, a large number of simulations?
3 A. That's correct.
4 Q. Your expert opinion is that according to your
5 approach and Mr. Trende's approach, the enacted
6 congressional map is not the product of gerrymandering
7 and, if anything, leans slightly to the Republican party,
8 right?
9 A. Correct.
10 Q. And your reasoning is that the enacted map gives
11 more seats to the Republicans than some or even most of
12 the ensemble maps, right?
13 A. Correct.
14 Q. Nothing else is taken into consideration when
15 you make that expert conclusion, correct?
16 A. I'm not sure what you mean exactly by that.
17 Q. Well, you're looking at the number of seats
18 generated by the ensemble maps for Republicans, and then
19 you're comparing that to the number of seats generated by
20 the enacted map, and you're comparing just that number of
21 seats?
22 A. In my report, yes. That's correct.
23 Q. Right, and in making your conclusion that the
24 enacted map is not a statistical outlier?
25 A. Correct.

1 Q. So whether a seat is classified as Democrat or
2 Republican is based on what you call the partisan index,
3 right?
4 A. Yes. That's correct.
5 Q. And according to you, this partisan index is the
6 proportion of the two-party vote share cast for the
7 Democratic candidate across all of these seven statewide
8 elections that you analyzed, and you talked about those
9 statewide elections, so I'm not going to go over that
10 again right now.
11 A. Yes. That's correct.
12 Q. And it's averaged across those elections?
13 A. That's correct.
14 Q. Okay. So if a district has a partisan index
15 greater than 50 percent, you call it Democrat, and if it
16 has a partisan index less than 50 percent, you call it
17 Republican, right?
18 A. Yes.
19 Q. Okay. So in using that approach, a seat that is
20 50.1 percent is Democrat, and a seat that is 49.9 percent
21 is Republican, right?
22 A. Yes. That's correct.
23 Q. But there's just a miniscule difference there
24 using the statewide average of those seven elections,
25 correct?

1 A. That's correct, yes.
2 Q. And so under this binary view a seat that is,
3 say, 70 percent Democrat is the same as a seat that is
4 50.1 percent Democrat, correct?
5 A. Yes. So as I said in my direct testimony, we
6 have to make some sort of decision as to where to classify
7 a district, and that reflects the reality of how people
8 are elected in congressional districts.
9 Q. Right. So that's a common way to compare the
10 results, I guess, right?
11 A. That's correct. It's very common, yes.
12 Q. But you also said in your testimony that you're
13 not really predicting who's going to win the seat, right?
14 A. I believe you're referring to where I said these
15 are proxies -- proxy measures of how a district is going
16 to likely perform in the future.
17 Q. Right. Right, and you said something about if
18 you could predict it, you'd be making a lot more money
19 and, you know, the other witnesses --
20 A. Right.
21 Q. Right. Okay. So I remember that because of
22 that colorful explanation and that was helpful.
23 So I -- you know, so you're saying this is a
24 good way to compare the seats, but you're not actually
25 predicting who's going to win, right?

1 A. I'm not predicting that nor do I think anyone
2 can, with any great amount of certainty, make those
3 predictions.
4 Q. Okay. So let's go back to this Democrat versus
5 Republican because that label is obviously very important
6 to your conclusion. So a map that had, let's say, five
7 seats that were 49.9 percent Democrat, so that means just
8 under the 50 percent line, five of those seats, and then
9 had four seats that were, say, 70 percent Democratic, so,
10 you know, way over that 50 percent line, according to your
11 logic, that would be five Republican seats and four
12 Democrat seats, right?
13 A. That's correct. Yes.
14 Q. So a map like that would also lean Republican,
15 right?
16 A. Yes. That's correct.
17 Q. Okay. I don't want to repeat anything that's
18 already been said, so I'm just looking through this for a
19 minute. And you don't really believe that a seat that is
20 at the 50.1 percent mark is just as likely to elect a
21 Democrat as a seat that is at that 70 percent mark, right?
22 A. No.
23 Q. And you don't agree that a seat that's at the
24 50.1 percent mark -- I'm sorry. Strike that. You would
25 agree that a seat at the 50.1 mark would be more

1 competitive than a seat at the 70 percent mark, right?
2 A. Yes.
3 Q. And actually, the closer you get to that 50
4 percent line, the more competitive the seat is, right?
5 A. Yes. That's correct.
6 Q. So the partisan index that you discuss in your
7 report does not take into account how far above or below
8 the 50 percent line the seat is, right?
9 A. So the index does because it's a continuous
10 measure. Is that what you're asking?
11 Q. That makes sense. I understand, yeah. I
12 understand what you're saying.
13 So -- but the label you put, Democrat or
14 Republican, does not depend on how far above or below the
15 50 percent line it is?
16 A. That's correct. It's a dichotomous measure.
17 Q. Okay. So your expert opinion does not take into
18 account the competitiveness of any districts in the
19 enacted map, right?
20 A. Correct.
21 Q. And you actually didn't analyze the
22 competitiveness of any of those seats in the enacted map,
23 right?
24 A. Correct.
25 Q. But you're aware that the New York Constitution.

1 Expressly states that maps shall be drawn to --
2 I'm sorry -- shall not be drawn to discourage competition,
3 right?
4 A. Yes.
5 Q. And that -- and you looked at that, and I can
6 tell because in your report at Page 8, you actually cite,
7 you know, the Constitution where it states that districts
8 shall not be drawn to discourage competition.
9 A. Correct.
10 Q. So for this New York constitutional requirement
11 on whether the enacted maps discourage competition, you
12 don't have an expert opinion, do you?
13 A. I'm not offering an opinion on that particular
14 point.
15 Q. And you did say that you were asked to evaluate
16 Mr. Trende's conclusions, but you didn't evaluate his
17 conclusions that some of the seats were made less
18 competitive by gerrymandering, right?
19 A. As I said, I did not evaluate the
20 competitiveness of particular districts.
21 Q. And you didn't evaluate the dot plot analysis at
22 all that Mr. Trende created, right?
23 A. So I do believe that in my report I make
24 reference to that figure, so I want to just be accurate,
25 that I do think there is a reference to that figure in my

1 report.
2 Q. I believe you referenced it, but you didn't
3 analyze it using your expert opinion, right?
4 A. I mean, we would have to go look at what exactly
5 I had to say about it. I just don't want to say that I
6 didn't consider it if it is, in fact, a part of the
7 report.
8 Q. Okay. I understand.
9 You didn't create your own dot plot index,
10 though?
11 A. That's correct.
12 Q. And so because you don't have an expert opinion
13 on this constitutional requirement of discouraging
14 competition, you really cannot say whether or not the
15 enacted map favors Democrats due to discouraging
16 competition, can you?
17 MR. BUCKI: Your Honor, I would object. I
18 disagree with the characterization that Counsel makes
19 at the start of her question.
20 THE COURT: Overruled.
21 You can answer.
22 A. I'm sorry. Could you state the question?
23 MS. DiRAGO: Can you repeat it?
24 (The record was read back by the court
25 reporter.)

BY MS. DiRAGO:

A. I would not characterize it in that way because I think that discouraging competition is a different concept than favoring one party or the other, and so I don't think that one necessarily leads to the other. I think they are two separate things that could, in fact, be very different from one another.

Q. Okay. So you've told me here today that you do not have an expert opinion on whether competition was discouraged, but I guess I'm -- if I understand you correctly, you're saying that you cannot extrapolate from that to say whether it was favoring Democrats or not?

A. I think that's --

Q. I'm just not understanding your answer.

A. Let me restate.

Q. Thank you.

A. I think that you could look at a variety of maps, not even in New York, but you could be presented with a variety of maps and you could say, well, this map is less competitive than this other map, but it could also favor one party or the other. You could also have a map that encourages competition, that's highly competitive, but still favors one party or the other. So all I'm saying is that competition and partisan favoritism are discrete concepts that could be orthogonal to one another.

1 Q. Okay. But what I'm asking you is that, you
2 cannot say whether or not the map favors Democrats based
3 on a reduction of competition within certain seats, right?
4 A. I think I understand what you're asking. I
5 think you can make evaluations of whether the map favors
6 one party or the other separately from --
7 Q. But I'm asking, you are not offering that
8 opinion; you're not refuting that opinion?
9 A. I'm sorry. When you say "that opinion," what
10 exactly do you mean?
11 Q. The thesis that -- the map favors Democrats
12 because it reduces competition in certain seats is the
13 thesis, and because you didn't look at competition within
14 certain seats, you can't refute that thesis?
15 A. Insofar as we're talking only about competition,
16 that is correct. I was simply saying I think there are
17 other ways to evaluate the partisan fairness of a map
18 outside of a question solely isolated on the question of
19 competition.
20 Q. Okay. Right. So there's other ways, but
21 competitiveness is one of those ways, right?
22 A. It's certainly one of a variety of factors you
23 could consider.
24 Q. Okay. We're in alignment. That's good.
25 Okay. Can you look at Mr. Trende's chart on

1 Page 15 of his report?
2 THE COURT: His original report?
3 MS. DiRAGO: Yes.
4 Q. And I think I asked you this: You didn't make a
5 chart showing the partisan index for each district in the
6 simulation maps that you used, right -- or that you
7 created? I'm sorry.
8 A. That's correct.
9 Q. Okay. And so looking at this chart, it shows
10 that the enacted map has four Republican seats and using
11 Republican under your definition. Do you see that?
12 A. Yes.
13 Q. Would you agree that this chart shows that the
14 four Republican seats contain a higher percentage of
15 Republican voters than any of those seats in the ensemble
16 congressional maps?
17 A. Yes. That's correct.
18 Q. Okay. And then let's look at the next five
19 seats, so this is districts numbered 5 through 9. And I
20 recognize this is not the actual district, but it's how
21 they're labeled on this chart, so I'm going to refer to
22 them as how they're labeled on the chart. So Districts 5
23 through 9, you would label these seats, 5 through 9, as
24 Democrat seats, right?
25 A. Yes. That's correct.

1 Q. And that's because they fall above the 50
2 percent partisan index line, right?
3 A. Yes, that dashed line that runs across the
4 figure that changes the color of the dots. Yes.
5 Q. Okay. And you would agree that this chart shows
6 that those five Democrat seats have a higher percentage of
7 Democrat voters than any of those districts do in any of
8 those ensemble maps, right?
9 A. Yes.
10 Q. And then let's look at the next four seats,
11 Districts 10 through 13. Now, you would agree that the
12 chart shows that these seats, while matching some ensemble
13 congressional maps, are still at the very high end of the
14 percentage of Democratic votes vis-à-vis the ensemble
15 congressional maps, right?
16 A. They are at the higher end, yes.
17 Q. Okay. So let's look at District Number 5, for
18 example. You agree that this district in the enacted map
19 is less competitive than any district in any of the
20 ensemble maps, right?
21 A. Correct.
22 Q. The same is true for District 6. This district
23 is less competitive than any of the districts in any of
24 the ensemble maps -- I'm sorry. Let me start over.
25 District Number 6 is less competitive in the enacted map

1 as in any of the ensemble maps?
2 A. I'm sorry. We were talking about District 6 --
3 Q. Yes.
4 A. -- or, I'm sorry, ordered District 6?
5 Q. Yes, ordered District 6.
6 A. Yes. That looks like that's the case.
7 Q. The same is true for Number 7, District 7,
8 right?
9 A. Correct.
10 Q. The same is true for District 8, right?
11 A. Correct.
12 Q. The same is true for District 9, right?
13 A. Correct.
14 Q. And then looking at the Republican seats, the
15 same is true for District 1?
16 A. Correct.
17 Q. The same is --
18 A. I'm sorry. Just to note, in the opposite
19 direction.
20 Q. Right. But it's made less competitive?
21 A. Less -- oh, I'm sorry. I thought -- yes. I
22 thought we had -- you were asking me about less
23 Democratic.
24 Q. Okay.
25 A. But it's in the opposite direction --

1 Q. Right.
2 A. -- so that would be --
3 Q. Okay. And so Number 2 is less -- the enacted
4 map is less competitive than any of the maps in the
5 ensemble, right?
6 A. Correct, in this case now in the Republican
7 direction. Yes.
8 Q. Right. And same for Number 3?
9 A. Correct.
10 Q. And same for Number 4?
11 A. Correct.
12 Q. But then an interesting thing happens because
13 after you get past these Districts 1 through, you know, 11
14 or 12 or so, now the enacted map dots fall pretty much
15 within -- and there's a little bit of variance -- but fall
16 pretty much within the range of the ensemble maps; is that
17 right?
18 A. I think that in some cases, yes. However, there
19 are districts in which the enacted map falls at the edge
20 of the simulations even in some of these higher numbers in
21 the ordered districts. So, for example, I'm looking at
22 District 22 or District 18.
23 Q. Now, for Number 22 -- I need my glasses -- and
24 even 18, they're still within the ensemble maps' -- the
25 range that the ensemble maps created, right?

1 A. That's correct. I maybe misunderstood you. I
2 just thought you were asking about being at the edge of
3 the ensemble.
4 Q. Okay. Yeah. No, that's okay.
5 So the only places where the enacted map is an
6 outlier from the ensemble maps is Districts 1 through 9,
7 right?
8 A. That's correct. Yes.
9 Q. Okay. And would you characterize those that are
10 closer to the 50 percent line as more competitive seats?
11 A. Yes.
12 Q. Do you know what packing means in the
13 gerrymandering context?
14 A. Yes. I've heard the term. I'm very familiar
15 with it.
16 Q. Yeah. I would imagine.
17 So this is my definition, and you can tell me if
18 you disagree with my definition: It's concentrating the
19 opposing party's voting power in one district to reduce
20 their voting power in another district -- in other
21 districts, plural. Do you agree with that as a definition
22 for packing?
23 A. Yeah. I think that's a serviceable definition.
24 Q. And you didn't analyze whether the enacted
25 congressional map shows evidence of packing, did you?

1 A. No. I don't think that packing -- and I imagine
2 we might move on to cracking -- are necessarily very
3 useful terms when it comes to analyzing maps because
4 packing is in some degree a matter of perspective.
5 Packing can also happen independently of the map drawer.
6 I have made note in my report of geographic packing that
7 can occur simply by virtue of where voters live. So it's
8 a term that gets used a lot. I think often it loses its
9 meaning because it gets used so frequently to mean so many
10 different things.
11 Q. Okay. So you don't have an expert opinion,
12 then, as to whether Republican voters were packed into
13 those first four districts in order to reduce their voting
14 power in the other districts, namely, you know, 5 through
15 13, right?
16 A. No, I don't know that that's the case.
17 Q. And you don't refute that thesis either?
18 A. Correct.
19 MS. DiRAGO: Thank you. That's it.
20 THE COURT: Redirect (sic)?
21 MR. HECKER: A few questions. Yeah.
22 CROSS-EXAMINATION
23 BY MR. HECKER:
24 Q. Good afternoon, Dr. Barber. Eric Hecker from
25 Cuti Hecker Wang. How are you?

1 A. I'm doing well.
2 Q. I only have a few questions, I believe. On your
3 direct you mentioned that you served as an expert in the
4 North Carolina cases recently?
5 A. Yes.
6 Q. I just -- one of them was Harper v. Hall?
7 A. That's correct. Yes.
8 Q. I want to read you a quote. It's a reasonably
9 long quote, three or four sentences, from the trial
10 court's opinion dated January 11th of this year in that
11 case. I'm going to ask you if you take issue with any of
12 it or if you agree with it. The Court in that case held
13 Dr. Barber's method is not without limitations. Because
14 it is impossible for a redistricting algorithm to account
15 for all nonpartisan redistricting goals, which can be
16 idiosyncratic and district specific, differences between
17 the range of his simulated plans and the 2021 plans may be
18 the result of nonpartisan goals the algorithm failed to
19 account for rather than of partisan goals. In
20 Dr. Barber's opinion, there is no way, then, to be sure
21 that differences in partisan effects from simulated plans
22 versus legislatively enacted plans result from partisan
23 intent rather than from nonpartisan goals the algorithm
24 was not programmed to achieve. This means that the
25 simulation method can be indicative on the question of

1 partisan intent but not necessarily dispositive, and under
2 Dr. Barber's analysis it is plausible that the 2021 plans
3 were prepared without partisan data or considerations. Do
4 you recall the trial court saying that in its opinion?
5 A. I do, yes.
6 Q. Do you agree with that, or do you take issue
7 with it?
8 A. No, I agree with that. The very first sentence
9 that says, Dr. Barber's method, just to be clear, they're
10 referring to a set of simulated districts that I performed
11 in North Carolina. And in that case, as well as in this
12 case, I think it's important to recognize that the
13 simulations only get you so far. They only get what you
14 put in them. And we've heard lots of people today and
15 yesterday talking about a whole host of factors that are
16 important in redistricting. We heard about mountain
17 ranges and watersheds and all sorts of other factors that
18 are legitimate considerations that aren't present in the
19 simulations. And so it's important to recognize these are
20 useful tools, but they aren't the only tool and they can
21 only go so far.
22 Q. And in this case you have at least some general
23 familiarity with the redistricting criteria information
24 that Mr. Trende did and did not run through the
25 simulations, correct?

1 A. That's correct, yes.
2 Q. You know that he used compactness but just with
3 a single number setting, right?
4 A. Yes. That's probably the case -- the parameter
5 that we know the most about because we know he used the
6 number 1, but there were other parameters that I think I
7 stated in my direct that I'm not completely certain what
8 he did.
9 Q. And, well, you know because he told you he
10 didn't take into account communities of interest at all,
11 right?
12 A. Correct. Yes.
13 Q. It came out on your cross-examination that you
14 did say in your report that you don't endorse Mr. Trende's
15 methodology necessarily, right?
16 A. I believe so. Can you say that again? I want
17 to make sure you don't get a double negative.
18 Q. I'll just ask you this way: You don't
19 necessarily endorse his methodology, right?
20 A. I -- that's correct.
21 Q. And opposing Counsel asked you a couple minutes
22 ago if you said in your report affirmatively that you
23 don't, right?
24 A. I see. Yes. That's correct.
25 Q. So let me just ask you the question that she

1 didn't then follow up with. Given the redistricting
2 criteria information that Mr. Trende did and did not run
3 through his simulations in this case, in your professional
4 opinion, can Mr. Trende's simulations enable us to infer
5 whether the actual map drawers did or did not draw the
6 lines in 2022 with partisan intent?
7 A. I do not believe that we can make that inference
8 from the information we have.
9 Q. And same question about the competitiveness of
10 any of the districts.
11 A. The answer would be the same.
12 Q. And so a few minutes ago when opposing Counsel
13 was taking you through the chart on Page 15 of
14 Mr. Trende's original report, were you opining on what
15 Mr. Trende's charts show about each district or what they
16 purport to show based upon the inputs that he used?
17 A. So my statements to opposing Counsel were simply
18 reflections of what the chart says, not why the chart
19 looks the way it does.
20 MR. HECKER: Okay. Thank you. I have
21 nothing further.
22 THE COURT: Doctor, let me ask you a
23 question. Are you -- I'm trying to get to whether
24 you're saying that it's Mr. Trende's methodology or
25 his interpretation of the results of his methodology

1 that you don't believe in. Can you answer that?
2 THE WITNESS: Yeah. Yeah. Absolutely. So
3 the analogy that I would use is that these
4 redistricting simulations are very powerful, and
5 they're in some ways like driving a very -- a very
6 high-powered, expensive car. If you put me in that
7 car, I could probably drive it but probably not very
8 well and I wouldn't know how to use all the various
9 features that are in that car and all the buttons and
10 things that you could do.
11 And these redistricting simulations are
12 very similar. There are a whole host of parameters
13 that the user has to select when running them, and
14 those parameters can really change how the program
15 runs or how well it runs. We just don't know what
16 choices were made in many of these cases, the choices
17 Mr. Trende made in making -- in running these models,
18 and so there's just a very high degree of uncertainty
19 as to how those choices impacted the outcome or the
20 output of the models.
21 THE COURT: So I don't know if that answers
22 my question. I think I gleaned from what you said
23 that you question the methodology, the input into the
24 methodology.
25 THE WITNESS: The methodology -- whether or

1 not the methodology was used correctly.
2 THE COURT: Well, your ensemble came fairly
3 close to Mr. Trende's?
4 THE WITNESS: That's correct. I
5 deliberately chose to try and mirror the choices that
6 he made as closely as possible.
7 THE COURT: Okay. Well, that similarity,
8 does that mean you and he were somewhat on the same
9 track? You were able to mirror pretty much what he
10 did.
11 THE WITNESS: I think it shows that I was
12 able to infer the choices he made in most of the
13 situations. It doesn't necessarily mean that those
14 are the choices that I would have used if I was asked
15 from the beginning to create a set of redistricting
16 simulations that mirrored the requirements set
17 forward in the New York Constitution.
18 THE COURT: So if you used basically the
19 same inputs into the algorithm and came up with
20 similar to Dr. (sic) Trende's ensemble, I'm still not
21 quite sure if you're challenging the methodology or
22 the interpretation of the results of the methodology.
23 THE WITNESS: I think what I'm saying is if
24 you were to use different choices that perhaps better
25 reflected the constitutional requirements in the

1 state, that you could get very different results than
2 what Mr. Trende produced, and I chose to follow the
3 choices that he made so that we were looking at the
4 same or at least a similar set of simulations. But
5 that does not answer the question of how using a
6 different choice in terms of these parameters that
7 are designed to mimic the requirements of the state
8 Constitution, how making different choices would lead
9 to very different results.
10 THE COURT: Redirect?
11 MS. DiRAGO: Yes, I do have one question on
12 redirect --
13 MR. BUCKI: Actually, your Honor --
14 MS. DiRAGO: -- I mean on recross.
15 MR. BUCKI: -- wouldn't I have an
16 opportunity to redirect first?
17 THE COURT: Oh, I'm sorry. I thought
18 Mr. Hecker was doing redirect.
19 MR. HECKER: Your Honor, it's not my
20 witness, so Mr. Bucki will redirect.
21 THE COURT: Go ahead, Mr. Bucki.
22 MR. BUCKI: Thank you, your Honor.
23 REDIRECT EXAMINATION
24 BY MR. BUCKI:
25 Q. So, Dr. Barber, jumping off the questions that

1 Justice McAllister had for you, what was it that you were
2 asked to do in undertaking this engagement on behalf of
3 the Assembly Majority?
4 A. So I was specifically asked to consider the
5 simulation results conducted by Dr. -- or, I'm sorry,
6 Mr. Trende and to evaluate whether those simulation
7 results produced an outcome that reflected -- you know,
8 how well they reflected the question of partisan fairness.
9 Q. So was your assignment to try to create your own
10 simulation using your own parameters that you chose based
11 upon your value judgment, or was your assignment to try to
12 create simulations that would replicate as nearly as
13 possible what Mr. Trende had done?
14 A. The latter. In many cases experts exchange data
15 and code and we're able to exactly replicate one another's
16 results. That's not the process that is being used here,
17 and so because of that I needed to more or less start from
18 scratch, following his report to produce something that
19 would resemble his report as closely as possible.
20 Q. And to be clear, you do not -- do you purport
21 that any of the simulations that you did were intended to
22 insert your own value judgments for how different
23 parameters should be calculated?
24 A. No.
25 Q. Are there other ways to measure partisanship

1 besides the method of doing these simulations?
2 A. Yes. There are as many ways as there are
3 political scientists.
4 Q. Could you give some examples?
5 A. So sometimes people look at voter registration
6 information. Sometimes people look at not only statewide
7 races, but you could look at a variety of other election
8 results. Sometimes people look at the -- rather than
9 taking the average of the votes, you could take the
10 average of who won the election, so just looking at
11 outcomes as opposed to vote totals. You could look at --
12 I mean, I could go on and on. There's a lot of ways to
13 measure partisanship in American politics.
14 Q. Were you asked to use any of these other
15 measures of partisanship aside from performing simulations
16 as close as possible to what Mr. Trende performed?
17 A. No.
18 Q. And if another expert were to come here and say
19 that that expert would prefer to use one of these other
20 mechanisms, other than simulations, would you agree that
21 there's more than one way to measure the partisanship,
22 depending on what the expert prefers?
23 A. Yes. Absolutely. Each of them have their
24 virtues and shed light on different aspects of
25 partisanship and partisan competition.

1 Q. So with respect to the simulations that you did
2 run, you acknowledged on cross-examination that the
3 analysis of whether a district leans Democrat or leans
4 Republican is a dichotomous choice. I think that's the
5 word that you used.
6 A. Yes.
7 Q. And why is it that you use that dichotomous
8 choice rather than some other that would permit more than
9 one choice than just two?
10 A. So the first reason is that it's the -- I would
11 say, the common -- the most common method in which experts
12 in redistricting have done this. And so, you know, I've
13 done this in prior litigation. Other experts in these
14 cases have done the same thing, the cases that I've been
15 involved in in North Carolina and Ohio and Pennsylvania.
16 I can't speak to other locations. But it's a very common
17 practice, first of all.
18 And then, secondly, it reflects the reality of
19 the way in which we elect representatives, which is
20 through a first-past-the-post system. And so, you know,
21 at the end of the day, we elect a Republican or Democrat
22 to each of these districts.
23 Q. Now, you mentioned that Professor Imai was your
24 doctoral advisor and you've had quite a bit of
25 experiencing learning his methods and techniques, correct?

1 A. That's correct.
2 Q. Are you aware, when Professor Imai does this
3 analysis of going through the simulations, does he use
4 likewise the same dichotomous choice between districts
5 that lean Democrat versus districts that lean Republican
6 or are carried Democrat versus carried Republican?
7 A. Yes. So he and I were involved in a case in
8 Pennsylvania in which he -- both he and I -- we were on
9 opposite sides. We presented our results in the same way.
10 Q. And what is his line of demarcation to determine
11 whether a district is carried by a Democrat versus carried
12 by a Republican?
13 A. So, again, it was the aggregate or the average
14 of statewide elections. Obviously the particular
15 elections are going to differ between Pennsylvania and
16 New York. But, again, the average of a variety of
17 statewide elections and then which party carried the
18 majority of the votes in each of those districts.
19 Q. So is 50 percent the line of demarcation?
20 A. Yes, the majority of the two-party vote share.
21 Q. The same one that you used here?
22 A. Yes.
23 Q. I'd like to refer again to the chart that is
24 produced in Mr. Trende's initial report dated February 14,
25 2021 (sic), at Page 15. Do you have that chart in front

1 of you?
2 A. Yes.
3 Q. And opposing Counsel for the petitioners went
4 into detail in terms of asking you whether or not
5 particular districts, based upon your reviewing of this
6 graph -- this dot plot, were competitive or not, correct?
7 A. Correct.
8 Q. Was that -- were your answers to those questions
9 based upon what you see here in this chart, or were they
10 based on an objective matter, as in it must be that this
11 district is competitive or not?
12 A. My answers are simply in response to what we see
13 in the chart. Is the dot closer or farther from the line?
14 It's simply a statement of what we objectively observe on
15 the page.
16 Q. And if the person running the simulations
17 inputted a parameter that was incorrect or forgot to
18 account for a certain parameter, would it not be true that
19 the data that you would get on the chart would then change
20 prospectively?
21 A. Yes. That's exactly right. So all of the
22 smaller dots, the blue and red dots, reflect the results
23 of the simulations. However, as I said, changing the
24 parameters in the model could drastically change the
25 results of where those blue and red dots fall on the page.

1 Q. So, for example, Mr. Hecker noted on his brief
2 cross-examination that Mr. -- you acknowledge that
3 Mr. Trende did not control for considering communities of
4 interest in terms of how the maps were to be drawn; is
5 that correct?
6 A. Yes. That's correct.
7 Q. And if Mr. Trende had controlled for that
8 constitutional requirement of taking into account
9 communities of interest, how would the data that appears
10 on the graph have changed?
11 A. Aside from saying that it most certainly would
12 change, I don't know that we can really say one way or
13 another what would happen until we observed it.
14 Q. But the data would have changed, would it not?
15 A. Yes, it would have changed. The algorithm would
16 have changed. What we would see on the page as a result,
17 we don't know until we are actually able to conduct that
18 exercise.
19 Q. And wouldn't it be true also that the measure of
20 alleged competitiveness in a particular district would
21 change as the data would change?
22 A. Yes. Absolutely. The measure of
23 competitiveness is entirely based on the data, where the
24 data fall.
25 Q. So would you agree with me or not that this

1 particular chart -- if communities of interest or other
2 parameters that needed to be considered had been
3 considered that there would be a change not only in the
4 dots that you see on the chart but also in the measure of
5 competitiveness that would apply to any particular
6 district?
7 A. Yes.
8 Q. So in other words, would it be accurate that
9 this chart, in view of determining competitiveness, is
10 limited by the data that was used to determine that
11 measure?
12 A. Yes. Absolutely. The conclusions you draw are
13 entirely based on the validity of the data you're using.
14 MR. BUCKI: Nothing further at this time,
15 your Honor.
16 THE COURT: Thank you, Mr. Bucki.
17 Ms. DiRago?
18 MS. DiRAGO: Yes. Thank you.
19 RECROSS EXAMINATION
20 BY MS. DiRAGO:
21 Q. Okay. So you've spent a lot of time talking
22 about whether, you know, changing the parameters affect --
23 would affect the results of the ensemble maps, right?
24 A. That's correct.
25 Q. And I heard you say that changing those

1 parameters would affect the results of the ensemble maps,
2 correct?
3 A. That's correct.
4 Q. And you said that you created ensemble maps, but
5 you were using Mr. Trende's methodology, right?
6 A. When you say "methodology," are you talking
7 about the particular program, or are you talking about the
8 parameter choices in the program itself?
9 Q. Well, I think both are true, are they not?
10 A. Well, I know for certainty we used the same
11 program, the redist program.
12 Q. Okay. So I should have qualified it. You tried
13 the best as you can to try to replicate his methodology?
14 A. That's correct.
15 Q. But you didn't create your own ensemble maps
16 using a methodology that you would believe is more valid,
17 did you?
18 A. No. I was not asked to do that.
19 Q. Okay. So all these parameters that opposing
20 Counsel was saying, oh, that would have affected the
21 results, that would have affected the results, you didn't
22 create your own ensemble using the results that you think
23 are right, did you?
24 A. Correct. I was not asked to do that.
25 MS. DiRAGO: Okay. Thank you.

1 THE COURT: You can step down, sir.
2 THE WITNESS: Thank you.
3 THE COURT: Thank you.
4 (The witness was excused.)
5 THE COURT: Okay, Mr. Chill. Thank you.
6 MS. REICH: Thank you, your Honor. I
7 appreciate it.
8 THE COURT: Thank you, Ms. Reich.
9 We'll wait one second while they exit.
10 (Mr. Chill and Ms. Reich left the room.)
11 MR. CUTI: Your Honor, can we take five
12 minutes? We need to file papers, and we're having
13 some technical problems.
14 THE COURT: We can.
15 MR. CUTI: Thank you, your Honor.
16 (A recess was taken.)
17 THE COURT: Respondents, next witness?
18 MS. REITER: Your Honor, the Senate
19 respondents call Stephen Ansolabehere.
20 STEPHEN D. ANSOLABEHERE,
21 called herein as a witness, having been first duly sworn,
22 was examined and testified as follows:
23 THE DEPUTY: Thank you. Have a seat, and
24 please state and spell your name for the Court.
25 THE WITNESS: Good afternoon. My name is

1 Stephen Daniel Ansolabehere. My last name is spelled
2 A-n-s-o-l-a-b-e-h-e-r-e.
3 THE COURT: Ms. Reiter?
4 MS. REITER: Good afternoon.
5 DIRECT EXAMINATION
6 BY MS. REITER:
7 Q. Good afternoon, Dr. Ansolabehere.
8 Have you ever been to New York?
9 A. Yes. Many times.
10 Q. Approximately how many?
11 A. I can't count. It's thousands.
12 Q. Do you have any family in New York?
13 A. Yes. My wife's entire family is from New York.
14 She was born in Queens, Flushing, and grew up in Ossining.
15 Q. Have you ever lived in New York?
16 A. Yeah. I've done sabbatical in 2011 and 2012 and
17 lived in New York that year.
18 Q. Do you pay taxes in New York?
19 A. I do.
20 Q. Can you tell us a little bit about your
21 educational background?
22 A. I went to the University of Minnesota, received
23 my BS in economics and BA in political science and then
24 went to Harvard University for my PhD in government and
25 completed that in 1989.

1 Q. And following your PhD, can you tell us a bit
2 about your academic employment background?
3 A. My first job, I was an assistant professor at
4 UCLA, had a postdoctoral fellowship at the Hoover
5 Institution, moved to MIT, was a professor of political
6 science there, held the Elting Morison Chair in political
7 science, and then moved to Harvard in 2007, 2008, where I
8 hold the Frank G. Thompson Chair in government.
9 Q. Can you describe some of the classes that you
10 teach relating to redistricting and election analysis?
11 A. I teach an undergraduate class on elections and
12 a PhD-level class on elections. I've taught, both at NYU
13 Law School and at Harvard Law School, courses on election
14 law that mainly focus on the interplay between social
15 sciences and the law. I'm not trained as a lawyer, so I
16 don't really teach them how to be lawyers in that regard.
17 I teach graduate and undergraduate classes in American
18 government generally, and a lot of that errs on elections,
19 democracy, representation.
20 Q. And approximately how many peer-reviewed
21 publications have you authored or co-authored, if you can
22 estimate?
23 A. A hundred.
24 Q. And what -- in particular, can you name a few
25 peer-reviewed articles relating to the issues in this

1 case, redistricting, apportionment, elections analysis,
2 that you've published?
3 A. I've done work on redistricting, per se, and
4 specifically on the effects of redistricting on electoral
5 competition. I've done work on voting rights, minority
6 representation both in law reviews and in social science
7 journals. I've done work on statistical analyses
8 pertaining to the tools we use in cases like this and
9 other situations. I guess the most prominent piece I've
10 published is in the Journal of the Royal Statistic
11 Society, which is the chief journal in the field of
12 statistics. I can keep going but...
13 Q. No. I think that's sufficient for now.
14 In addition to your academic work, do you engage
15 in other work that involves elections analysis?
16 A. I'm a consultant to CBS News on election night,
17 and we call the elections every election, primary and
18 general election, in the US.
19 Q. How long have you been doing that?
20 A. I started doing that in 2006.
21 Q. So how many cycles have you been a CBS election
22 night analyst?
23 A. Every election -- every federal election since
24 2006.
25 Q. Okay. So --

1 A. So some of them are not on cycle. If there's a
2 special election in Georgia, for example, I'll cover that
3 too, so...
4 Q. Understood. So at least --
5 A. Ten or -- yeah.
6 Q. So at least eight?
7 A. Yeah.
8 Q. Sorry. Go ahead.
9 A. Go ahead.
10 Q. Have you ever been tasked with calling New York
11 elections for CBS?
12 A. Yeah. We rotate through the states on our team,
13 and half the time I'll get New York just by way of how
14 things are assigned.
15 Q. And what was the most recent one or two -- what
16 were the most recent one or two elections you've called
17 for New York?
18 A. I called the New York elections in 2020 and
19 2018.
20 Q. And what goes into that? How do you prepare to
21 call a New York election?
22 A. We have a set of facts that we collect about
23 every district in every race that's being run, so if it's
24 a Senate election, a governor election, and so forth.
25 Those facts include things like the demographics of the

1 state, past voting behavior. We construct a kind of
2 normal voting score, the normal partisan division in the
3 jurisdiction we're looking at, either a House district or
4 a governor election or a Senate district.
5 Q. How many times have you testified as an expert
6 in a case like this?
7 A. Fifteen or so.
8 Q. Have you ever not been qualified as an expert?
9 A. No.
10 Q. Have you been retained for your testimony in
11 this case?
12 A. I have.
13 Q. And by whom have you been retained?
14 A. By Counsel.
15 Q. For the Senate Majority Leader?
16 A. Senate Majority.
17 Q. And are you being paid for this retention?
18 A. I am.
19 Q. Does your compensation rely in any way on the
20 outcome of this case?
21 A. No.
22 MS. REITER: The Senate -- Respondent
23 Senate Majority Leader tenders Stephen Ansolabehere
24 as an expert witness in the fields of political
25 science, election analysis, and reapportionment.

1 THE COURT: I'm qualifying him as an
2 expert.
3 MR. BROWNE: Your Honor, Petitioners would
4 just ask that the Court note the objection we raised
5 in the reply brief to the petition about him not
6 being -- I'm objecting to his qualification not on
7 what he's been qualified -- or what was offered that
8 he be qualified for but in terms of testifying as to
9 any type of expertise on New York political geography
10 or political landscape.
11 THE COURT: You're objecting to his
12 qualifications to testify on New York elections?
13 MR. BROWNE: New York political geography
14 and landscape, not elections. Geography and
15 landscape.
16 MS. REITER: I think we did just establish,
17 your Honor, that Dr. Ansolabehere has extensive
18 experience in learning about and studying and
19 analyzing New York's political geography and
20 landscape.
21 THE COURT: He testified the 2020, 2022 --
22 or two elections in New York. I'm qualifying him,
23 sir.
24 MR. BROWNE: Thank you, your Honor.
25 THE COURT: Your objection is noted,

1 though.
2 BY MS. REITER:
3 Q. Dr. Ansolabehere, I'd like to show you what has
4 previously been marked for identification as Exhibit S-7.
5 I think it should be there on your table. Do you
6 recognize this document? Take a moment to review it.
7 A. Yes.
8 Q. What is it?
9 A. This is my expert report in this case responding
10 to Mr. Lavigna and Mr. Trende.
11 Q. Were you able to notarize this report at the
12 time that it was submitted on February 24th?
13 A. No.
14 Q. Do you swear now that its contents are entirely
15 truthful and accurate?
16 A. I do.
17 MS. REITER: Your Honor, I'd like to offer
18 Exhibit S-7 into the record.
19 THE COURT: Petitioners?
20 MR. BROWNE: No objection, your Honor.
21 THE COURT: It's admitted.
22 (Respondents' Exhibit S-7 was received in
23 evidence.)
24 BY MS. REITER:
25 Q. Dr. Ansolabehere, have you seen any of the maps

1 generated by Mr. Trende's simulations in this case?
2 A. No, I have not.
3 Q. Why is that?
4 A. To my knowledge, they're not public. They're
5 not posted on any websites that I've seen reference to.
6 Q. Are you aware if they have been entered into the
7 record in this case?
8 A. I am not aware of that.
9 Q. What would you do if you were able to look at
10 them?
11 A. Well, I'd look to see how closely they align to,
12 say, the past map core retention, whether districts like
13 CD 10 that were created by a federal district court in the
14 past were retained, and so forth.
15 Q. Is it unusual to be in a case like this where
16 simulations are being offered and the maps are not in the
17 record and you can't look at them?
18 A. The two other cases where simulations have been
19 offered, Florida and Wisconsin, were cases where maps were
20 in the record from the simulators.
21 Q. In those cases what kind of analysis was
22 available to you because the maps were included?
23 A. Anything we could do to one of the official maps
24 we did to all the simulated maps.
25 Q. And what is your opinion of the usefulness of

1 using simulations to try to infer the intent of the people
2 who actually draw maps?
3 A. Simulations can be used to help to understand
4 what the effect of a map is. This is a fairly new
5 science. Like simulations didn't really exist before the
6 2010 election cycle in the academic sphere. The science
7 hadn't really been vetted thoroughly. Over the past
8 decade there have been a lot of advances in the technology
9 for demonstrating simulations and improvements in the
10 accessibility and availability of that technology, but
11 it's still an area that's evolving, and there's still a
12 lot of disputes about what the right way to do this is.
13 So it's something we use as a guide for judging effects
14 and -- but -- or to establish -- unless you're inferring
15 intent from effect.
16 Q. Understood.
17 And are there -- because this is an evolving
18 area of research, as you say, are there limitations to
19 what we can use it for?
20 A. Yeah. The simulator's very dependent and very
21 sensitive to what the inputs are. And if you have a
22 complicated constitutional set of criteria like New York
23 does, you have to program all those inputs, and if you
24 don't program all those inputs, you're essentially saying
25 that the value assigned to that input is 0 and the

1 simulator will just ignore it. And that's one of the
2 things that happened, for example, in the Wisconsin case.
3 Simulators didn't have all the criteria, and it looked
4 really bad on some of those things that were not
5 programmed in.
6 So it's very important to get the -- a real
7 close fit between the criteria in the law and the inputs
8 you're using, and that's one piece that's very difficult
9 to get right. So it requires understanding what the
10 criteria are, what the metrics are. Like something like
11 compactness, there are multiple measures of what
12 compactness constitutes, and using the metric that's
13 accepted in that state's courts is very important to
14 getting just compactness right. And then when you get to
15 things like communities of interest, it can be very
16 complicated to get that piece of it square.
17 Q. So is it fair to say that not only is choosing
18 the inputs important, but the relative weight that a
19 simulator gives to a particular input is significant in
20 whatever effects might be shown by its simulations?
21 A. Right. So a simulator might have a default of
22 all things you checked are equally valued, but state law,
23 like in Florida, might have Tier 1 and Tier 2 criteria,
24 the Tier 1 criteria predominant, and you'd have to make a
25 judgment as to what predominance means and so forth. It's

1 a bit of like the cart before the horse sometimes because
2 those value judgments we think are ultimately made by,
3 say, a court or state Legislature and the analyst has got
4 to make value judgments about those, what's the relative
5 weight. So it's very difficult to get it trained just
6 right.
7 Q. I want to hone in on something you just said,
8 which is, I think, that by putting a particular value into
9 a simulation, the analyst is, in effect, I think, is it
10 fair to say, putting his or her thumb on the scale of what
11 balance and weight to attribute to a particular value for
12 that criterion?
13 A. Yeah. The most extreme example would be, if you
14 don't include something, you're essentially giving zero
15 weight to it. But even if it's like something should be
16 weighted more, if you create an equal weight, that'll
17 greatly shape the set of plans that are generated by the
18 simulator. They wouldn't look like the set of plans that
19 you'd generate with a simulator had you given a different
20 weight or a different set of inputs. If you'd given
21 something that was not included in the simulation some
22 weight, suddenly you'd get a completely different set of
23 maps.
24 Q. And is it unusual to have generated simulations
25 produced and then subsequently assign an ex-post

1 adjustment to the conclusions drawn from those
2 simulations?
3 A. No. Usually you do the simulations and those
4 are your inputs. Like if you're using partisan fairness
5 as an input, you've got a metric of what that is and you
6 put that in there and you wouldn't do an adjustment
7 afterward. I've never seen any academic research that
8 does ex-post adjustments to the set of maps that are
9 generated in simulations.
10 Q. Are you familiar with the regression analysis
11 that Mr. Trende has used in this case?
12 A. I am.
13 Q. What's your view of it?
14 A. So this is a kind of analysis one might
15 hypothetically imagine doing in, say, predicting an
16 election, which is, I think, the exercise that he's
17 engaged in. Like what do we predict the next set of
18 congressional elections to be given the underlying voting
19 patterns? At CBS we try out lots of different models to
20 see what works, and this is a kind of model that doesn't
21 work. It doesn't work for predicting future elections
22 because it does something that statisticians call
23 overfitting; that is, as a forecast of what the next
24 election's going to be, it's too dependent on what
25 happened in the past elections and the congressional

1 elections. So it's too dependent on who ran, how much
2 money they spent, who was in a scandal, all these other
3 things, and so it's not going to be a good predictor of
4 future elections.
5 The specification itself has some obvious
6 problems when you just look at the -- when you look at the
7 formula. The formula is for a straight line. Nothing
8 wrong with a straight line. I use them all the time in my
9 work. But if you just look at the formula, it doesn't
10 actually make sense on its face. This formula has a slope
11 of 1.1 and an intercept of minus .06. So if you just draw
12 that line out, that means that if you're in a district
13 that's 100 percent Democratic -- and you've got some
14 districts that are pretty close to that -- if you're in a
15 district that's 100 percent Democratic, you plug in 100
16 percent times 1.1 and then subtract off .06, it predicts
17 that the Democrat's going to win 104 percent of the vote
18 in that district, which is an impossible number, so we
19 know it's an impossible regression. It can't be the true
20 line that describes the underlying voting behavior.
21 Now, it might be some other specifications could
22 fit that better, but that's not the specification that was
23 used. And it's notable because being off by 4 percent is
24 roughly the magnitude of the adjustment that Mr. Trende's
25 applying to the data ex-post. So I'd be very, very

1 careful using -- this is just not something we'd want to
2 do.
3 In addition, the specification -- when we study
4 congressional elections, we traditionally put in a few
5 variables to capture what we know happens in congressional
6 elections. One of the most important is incumbency. We
7 know that incumbents tend to run better when there's an
8 incumbent running than -- the party runs better when
9 there's an incumbent running than when there's an open
10 seat.
11 We also tend to weight by turnout or size. So
12 if there's a district that has no turnout in it and I
13 treat it the same as a district that has a lot of turnout,
14 I'm giving that district a lot of weight in trying to
15 apply a kind of statewide correction, which is what is
16 being done here, or correction across all districts. So
17 I'm saying what happened in that really low-turnout
18 district is informing what's happening in this really
19 high-turnout district, and in this particular case that's
20 a concern because the problem with the last election in
21 New York in 2020 was that you had a lot of
22 malapportionment. In other words, you had some districts
23 that had a lot of people in them, some districts that had
24 relatively few people in them. And that
25 malapportionment's going to kind of knock the adjustment

1 off, so it's giving all the -- it's not weighting for the
2 size of the populations or the size of the turnout across
3 the districts properly.
4 Q. Are there limitations to the ability of this
5 retrogression analysis -- regression analysis, my
6 apologies, that Mr. Trende has used to provide a basis to
7 infer alleged partisan intent?
8 A. So -- well, first of all, I wouldn't use this
9 ex-post adjustment. But the limitation is you're
10 inferring from one district what's happening in another
11 district assuming that there's no change in the districts.
12 And we know the districts are about to change based on
13 their populations, so it's going to have to be adjusted
14 upward, and the lack of that adjustment means he's
15 probably getting the magnitude of the adjustment wrong,
16 whatever the adjustment is.
17 Q. So is it fair to say that as a result of that,
18 Mr. Trende's regression analysis overstates the Republican
19 vote?
20 A. So looking at the correction, I know that the
21 line is wrong and it's an impossible line. And the
22 question is, why is the line off that much? And one
23 hypothesis would be, you know, the different sizes of the
24 districts.
25 So I just calculated what percentage of the vote

1 statewide was won by Democrats in congressional elections
2 of the Democratic plus Republican vote, and that's across
3 the three elections, 2016, 2018, 2020. So three elections
4 he's using as the inputs. That's 65.8 percent. So
5 Democrats won 65.8 percent of the two-party vote, and the
6 statewide election data across all those is 64.9 percent,
7 so they're pretty close to each other. As opposed to 3
8 points off, it's 1 point and in the other direction. So
9 that suggested to me there was a size or weighting problem
10 that's skewing the regression away from a prediction that
11 would be consistent with the actual election results.
12 Q. I'd like to talk for a bit about population.
13 A. Okay.
14 Q. Did New York populations change between the 2010
15 census and 2020 census?
16 A. The State of New York grew about 4 percent over
17 the course of the decade, and it cleared 20 million
18 people.
19 Q. And can you explain a little bit about how that
20 population growth was distributed across the state?
21 A. So there are two aspects to this. One is the
22 population growth in the State of New York across
23 different areas and also the population of the State of
24 New York relative to the nation. The nation grew much
25 faster than that, and as a result, New York lost a

1 district. So in the reapportionment it's going to need to
2 do some correction somewhere, and so the question is,
3 where would you correct? And wherever you have the
4 biggest population deficit, if it's sufficiently large, is
5 where you're going to need to correct.
6 Upstate New York, so the counties above Ulster
7 to the north and all the way to the west, to Buffalo and
8 so forth, are underpopulated, taking the totality of those
9 districts, by about 540,000 people. That's 70 percent of
10 the district. So that's where your district loss is
11 likely to come. The other three regions of the state that
12 we typically use as strata when we call elections are
13 what's conventionally referred to as the different regions
14 of the state politically.
15 The Mid-Hudson Valley, or the north suburb -- we
16 call it the north suburb at CBS -- Long Island, and the
17 City are also in a population deficit relative to what is
18 needed to have equal populations in the congressional
19 districts. The biggest deficits, the four districts in
20 Long Island, 1, 2, 3 and 4, in the old map and in the new
21 map, and those are under by about 150,000. That's a
22 considerable amount to make up, so those boundaries are
23 going to need to move a lot to take up the slack.
24 The north suburban, or Mid-Hudson, districts are
25 also underpopulated about -- those three districts, 16, 17

1 and 18, are underpopulated by 48,000, so those are going
2 to need to move as well. The 11 City districts are
3 underpopulated by 40,000 total. Now, some of them are
4 overpopulated, and some of them are underpopulated, so
5 there's going to need to be a lot of movement inside the
6 City to accommodate that.
7 Q. You mentioned the approximately 540,000 fewer
8 people Upstate that led to -- well, and that you concluded
9 that was where the district would come from. What is the
10 effect of eliminating a district where there's that
11 deficit?
12 A. So if you eliminate a district or rearrange
13 boundaries to make up that deficit, it's going to have an
14 immediate effect on the neighboring districts. So it's
15 going to have a pretty big effect on those neighboring
16 districts, but it'll have ripple effects throughout.
17 In this case there are two ripple effects. One
18 is how the boundaries of all the surrounding districts are
19 going to be changed to accommodate the loss of a district.
20 The other ripple effect is that you kind of
21 counterintuitively get a surplus.
22 So the district size here is 776,000 people.
23 You're short 539,000 in this area, so you make up that by
24 taking apart a district. In this case old CD 22 gets
25 taken apart. Okay. Now you've taken care of 539,000 of

1 the 776,000. Oh, now I've got a surplus of over 200,000
2 voters that somehow needs to get absorbed elsewhere in the
3 state. But since all the other areas in the state are in
4 deficit, we have to shift the boundaries and kind of shift
5 the population. We're not moving people. We're just
6 moving the boundaries to accommodate those.
7 There are two ways you could go to kind of grab
8 the population and accommodate it and put it into
9 districts to the south of Upstate. Well, 16, 17, and 18
10 need 50,000 of those voters. They don't need all of them.
11 Those districts need to shift northward just to get the
12 population that's required under the Constitution.
13 But somehow you need to change the boundaries of
14 the Long Island districts so they get 150,000 of those
15 extra people, but those people are north of the City.
16 They're up in the northern part of the City. So the two
17 routes you can go are through the City or around the
18 outside around like where the Legislature put 3. So they
19 moved 3 up to accomplish that population shift.
20 THE COURT: Into Westchester?
21 THE WITNESS: Into Westchester, yeah.
22 A. So the other way is to go through the City,
23 which doesn't really have a big deficit. Total it's only
24 a 40,000-person deficit. Going through the City has got a
25 lot of complications because you've got districts that

1 were created, like CD 10, for some other purpose, like
2 another kind of community, and it would involve a lot more
3 shuffling around. Those are the two big -- at a macro
4 level those are the two big choices the Legislature faced
5 for making up for the deficit on Long Island, either go
6 around Westchester or go up through the City.
7 Q. I'd like to show you what's been marked for
8 identification as S-14.
9 (Respondents' Exhibit S-14 was marked for
10 identification.)
11 MS. REITER: May I approach, your Honor?
12 THE COURT: Yes.
13 BY MS. REITER:
14 Q. Dr. Ansolabehere, do you recognize this table?
15 A. I do.
16 Q. What is it?
17 A. This is a table of the district populations
18 under the new lines and the district -- the census 2020
19 population under the old lines.
20 Q. And did you create this document?
21 A. I did.
22 Q. How did you do that?
23 A. I took the data from LATFOR.
24 THE COURT: Mr. Browne?
25 MR. BROWNE: Your Honor, I would object to

1 this whole line of questioning. This was nowhere in
2 Dr. Ansolabehere's report. It's an entirely newly
3 created document, has not been submitted to the Court
4 or to the petitioners. I would object to the whole
5 line of questioning on this document.
6 MS. REITER: Your Honor, first of all,
7 there were many references to population deficits in
8 Dr. Ansolabehere's report. This is a table that
9 shows the census numbers for the districts, for each
10 district, in an easy-to-read and clear way.
11 Dr. Ansolabehere has just testified to various
12 numbers of deficit and surplus in various districts.
13 We thought it would be useful and helpful for the
14 Court to see this data in this way, and it relates
15 entirely and directly to the information included in
16 his report.
17 THE COURT: Well, is it new information,
18 though?
19 MS. REITER: It's data taken from public
20 sources.
21 THE COURT: Is it in his report?
22 MS. REITER: The table is not in his
23 report, but the information was referenced in his
24 report and clearly establishes the position and what
25 we're discussing in response to the testimony of

1 other experts that have testified.
2 THE COURT: Are you saying that all the
3 information on here is in his report?
4 MS. REITER: Not every single number, but
5 it's census data taken from a public website.
6 THE COURT: Objection sustained.
7 BY MS. REITER:
8 Q. Dr. Ansolabehere, when you analyzed the enacted
9 congressional plan, what data -- did you use data?
10 A. Yes, I did.
11 Q. And what data did you use?
12 A. I used the census and election data available on
13 LATFOR. I used data from the census itself, data from the
14 ALARM Project. I used information from the City of
15 New York on neighborhood boundary definitions.
16 Q. And you said you've used election data. So
17 what -- did you choose a particular race to -- or
18 elections to include in your data set?
19 A. I analyzed the 2016 and 2020 presidential
20 elections, the 2016 and 2018 Senate elections, and the
21 governor and attorney general elections from 2018.
22 Q. And why did you choose these particular
23 elections?
24 A. These are the standard elections we look at when
25 we do election analysis for New York but also for

1 virtually every state.
2 Q. Is it reliable, these elections that you've put
3 in your data set?
4 A. Yes. These are the indicators we use to measure
5 kind of the underlying partisan orientation of districts.
6 Q. Is there a reason that you didn't include
7 congressional elections in your collection of elections?
8 A. A couple reasons. One is congressional
9 elections are not always complete. There are a lot of
10 uncontested races, so you'd have missing data problems.
11 Another problem with using congressional elections is that
12 incorporating members of Congress' own election
13 performance in is somehow factoring incumbency in, and the
14 state's Constitution has a principle regarding
15 protection -- or not favoring or disfavoring incumbents.
16 Q. And why did you chose -- actually, I should ask,
17 did you -- how do you use these elections? How do you
18 incorporate the data and analyze it?
19 A. These elections set a baseline of what you'd
20 expect the election to be in an average year with an
21 average set of candidates. Some years are better for one
22 party or the other. Some candidates do worse or better
23 than expected. But on average this is about where we
24 expect elections to come out. So this sets an
25 expectation, and that's kind of -- in doing election

1 analyses in academic journals or on election night, this
2 is the baseline that we start with.
3 Q. Are you familiar with the Cook Partisan Voting
4 Index?
5 A. I am.
6 Q. And do you know what data they use to formulate
7 their index?
8 A. They use the two most recent presidential
9 elections, depending on what you're looking at. So for
10 2022 they're looking at the 2016 and 2020 presidential
11 elections.
12 Q. And is there any data that the CPVI includes
13 that is not included in your analysis?
14 A. No.
15 Q. Are statewide elections useful for predicting
16 the partisan character of a newly drawn congressional
17 district?
18 A. Yes, for a couple reasons. One is that the
19 presidential elections in the CPVI don't include any
20 information about what happens in midterm elections, and
21 midterm elections are half of all the congressional
22 elections. So the statewides, which are midterms, are
23 helpful to understand, like how much the presidential year
24 is going to differ typically from the midterm election.
25 Also the statewide elections often have correlates with

1 kind of local political factors that surface when it's no
2 national ticket. Like sometimes turnout drops
3 substantially in some communities and not in others. And
4 that's all going to be reflected in the state elections.
5 Q. Can you explain in a little bit more detail the
6 purpose, as you understand it, of the Cook Partisan Voting
7 Index?
8 A. So I consult a bit with David Wasserman and
9 Charlie Cook, who do this, and David Wasserman is an
10 advisor to the Cooperative Election Study that I run, and
11 so we talk a lot about how they do this, what they might
12 do better or differently. And the Cook Partisan Voting
13 Index, their interpretation, as I understand it, is this
14 is their starting point for the election season, so this
15 is like their baseline.
16 And they use the presidential because it sets a
17 national comparable number because that's -- in every
18 district the presidential election happened. This
19 particular Senate race didn't happen in that state, right,
20 this governor's election didn't happen in that other
21 state, and so forth, so they view that as the comparable
22 number across states. When we're looking at one state, we
23 can go deeper into looking at the statewide elections and
24 so forth. So that's their starting point.
25 And then over the course of the election cycle,

1 they reclassify races based on what's happening in the
2 election, like is there a strong challenger, did the
3 incumbent retire, was there a scandal, and all that, and
4 that's how they start to classify things as leaning one
5 way or another over the course of the election cycle. But
6 this is their prediction before any papers have been
7 filed, before candidacy, before any primary elections have
8 happened. This is your expectation about what's going to
9 happen in the election.
10 And the Cook Political Report classification
11 says their rough -- based on their own personal
12 experience, is -- their rough indicator is +5D to +5R is a
13 swing district. That means that it can go either way in
14 the elections, depending on what the tides are and who's
15 shown up for elections. And then outside of that they
16 classify as D or R, depending on how big the surplus is.
17 Q. So your understanding -- well, first let me ask,
18 have you used the CPVI previously in any work that you've
19 done?
20 A. We've used it occasionally. We use it as
21 actually part of the input to thinking about the election
22 process at CBS. We refer to it. It's a little hard to
23 use for our purposes, for figuring out which elections are
24 going to go which way, because the number itself is
25 calibrated to the national vote.

1 It's not like -- +5D doesn't mean that the
2 Democrats won by 5 percent in that district. It means
3 that in that district the Democrats ran 5 points ahead of
4 the national Democratic ticket. So if the Democrats won
5 the election nationally by 5 points like Biden did, that
6 means it's actually a 0 district -- or it's a +10 district
7 in that election and an R+5 would be a 0. So it's a hard
8 number to use to get an expectation about what this is
9 going to be because it depends on past election outcomes.
10 It depends on how -- what happened in the national
11 election last time. So like if it was a landslide like
12 Reagan in 1980, that's really, you know, way off, right,
13 because that's like almost a 20-point win for -- or is a
14 12-point win for Reagan. So a D+5 would actually be a D-7
15 in terms of the actual election outcome.
16 Q. And so just to go back to something you said a
17 moment ago about the way the Cook report or Cook
18 characterizes Cook's index, a number that -- a CPVI number
19 between D+5 and R+5, I think I heard you say, constitutes
20 generally a swing district. And what does that mean?
21 A. That's Cook's classification, and it's on their
22 website. It's in all their documentation of what they
23 consider -- how they treat this index. Practically
24 speaking, when we watch elections when there's a wave
25 year, any district that's in that interval and the wave is

1 moving away from that party, they're going to lose a lot
2 of seats. Like maybe they'll lose 60 percent of their
3 seats in this interval. They're not going to lose all of
4 them. They're going to lose a lot of them. And if it
5 goes back the other direction, the other party's going to
6 lose a lot. So these are the most vulnerable seats. This
7 is like -- we don't know -- any party can win these seats.
8 So it's kind of a toss-up, but it's a loose
9 classification. It's not like a firm prediction that
10 you'd put a probability number on.
11 Q. Are there limitations in using the CPVI alone to
12 infer partisan intent in a drawing of an actual map?
13 A. Yeah. It's very easy to misclassify districts
14 in terms of which party is actually winning the majority
15 of the votes in that district because it's relative to the
16 national vote and it's not going to capture the midterms;
17 it's not going to capture other local factors, like
18 turnout of swings in local areas.
19 Q. And I think you testified that the CPVI includes
20 two elections, two presidential elections. Is there a
21 limitation inherent in using only two races?
22 A. Well, our preference as analysts at CBS and my
23 preference in my scholarship is to use as many elections
24 as are available where I've got comparable candidates
25 across all the districts. So six elections is preferable

1 to two because there's just less random factors factoring
2 in, the stuff like a scandal or popular -- visited this
3 part of the state, didn't visit that part of the state,
4 that all just gets averaged out when you include more
5 elections rather than fewer.
6 Q. I'm going to move on for a bit to core
7 retention, which is a topic that you discuss in your
8 expert report. Can you explain its importance in
9 redistricting generally?
10 A. Traditionally it's an important principle, one
11 of the traditional, conventional principles. It's kind of
12 an unstated principle. It's also the starting point.
13 Legislatures, commissions, they don't usually start with a
14 blank slate the way, say, a simulator does. They start
15 with the old map, and they make adjustments from that.
16 Many states, in fact, include this as a principle
17 explicitly in their Constitution, and the State of
18 New York does as well.
19 Q. Are there different metrics used to assess a
20 particular map's level of core preservation?
21 A. There are a variety of metrics. The traditional
22 one is what I've used here, which is to say, what
23 percentage of the old districts remains in the analogous
24 district, both its area and its population?
25 Q. And in your opinion, how does the enacted

1 congressional map fare in terms of maintaining the cores
2 of existing districts?
3 A. It's quite a stable map. It has a -- it
4 maintains -- I think 75 percent of the old districts'
5 population remain in that analogous district and 77
6 percent of the area of the old districts remain in the new
7 district. Just as a baseline, like last time New York
8 was -- maintained about 68 percent of its population in
9 area from the old districts into the new districts, so
10 this is considerably higher than that.
11 Q. Have you observed any relationship between the
12 districts in the enacted congressional plan that may have
13 a relatively low core number in relation to the 75 and 77
14 percent averages you mentioned and the nature of the
15 change in partisan character of those districts?
16 A. So the districts that are on the lowest end of
17 that are, I think -- 19, I think, is the lowest -- 1, 27,
18 2 -- I'm just going up the list in my head -- 10, 7.
19 Those are all like in the 50s and -- 50 percent -- 53 or
20 62 percent range. And which way they go, half of them
21 go -- shift towards the Democrats; half of them shift
22 towards the Republicans. There's no pattern. There's no
23 correlation here between being underpopulated -- or
24 having -- sorry -- having low population retention and
25 being shifted toward the Ds or toward Rs.

1 Q. I think it's time to get a little bit more
2 specific in terms of going through some of the district
3 changes given the population shifts you described earlier,
4 so let's begin Upstate, as you did with the population
5 deficit that led to the loss of a district. Can you just
6 describe again or in further detail generally what the
7 effect on the Upstate districts was of this population --
8 of the population changes since the 2010 census?
9 A. So Upstate, the set of Upstate districts, lost
10 about 539-, 540,000 people, and the population loss was
11 disproportionately in the rural areas. Almost all the
12 counties were losing population up north but especially
13 the rural areas. And so there needed to be shifting of
14 the districts to accommodate that. The district that the
15 Legislature's map took apart was CD 22 to accommodate that
16 change. It left in place the Buffalo district, the
17 Rochester district, the Syracuse district, and an Albany
18 district, so it left kind of these urban-anchored
19 districts in place, but even those -- some of those were
20 underpopulated and needed to expand somewhat to account
21 for that.
22 It left the Southern Tier district, CD 23, in
23 place. And when you -- once you put in the Buffalo,
24 Rochester, and Syracuse districts and you keep the
25 Southern Tier, there's only one place to put another

1 district, which is along Lake Ontario in a rural area, so
2 that's what they did, because you can't take half that
3 district and change it unless you're going to cut the
4 Southern Tier district in half. So if you preserve the
5 Southern Tier district, you're going to have to put what's
6 now CD 24 where it is. And once you've done that, that
7 kind of defines where the other two districts go. CD 19
8 is roughly where it was. It had to change its location to
9 accommodate both the collapse of 22 but also the need to
10 shift population elsewhere in the state.
11 Q. I'd like to ask you about -- well, are you
12 familiar with the CPVI numbers assigned by Mr. Lavigna in
13 his report to the various changes across districts
14 Upstate?
15 A. I am, yeah.
16 Q. So for CD 21, for instance, are you familiar
17 with the core retention, roughly? I know I'm putting you
18 on the spot.
19 A. I have to remember what 21 was, what its core
20 retention was.
21 Q. Well, let me put it another way. I will
22 represent to you that in his chart Mr. Lavigna assigns a
23 change of CPVI from R+8 to R+12 for CD 21. How would Cook
24 characterize these CPVI numbers?
25 A. As Republican districts.

1 Q. And for, of course, the -- and I'm happy to show
2 you. I think you have it there. Just to refer, I think
3 it's Petitioners' Exhibit 4. Page 13 is a chart that I
4 would say attempts to show CPVI changes Upstate. Not all
5 the districts are there. And I would ask you to explain
6 to us what the loss of a district does to the numbering of
7 the districts Upstate.
8 A. So we're looking at Petitioner Exhibit 4?
9 Q. Uh-huh. Page 13.
10 A. Page 13.
11 Q. So I will restate the question, which is, can
12 you just explain how losing a congressional district might
13 affect the numbering of the districts?
14 A. So the population from which a district draws a
15 majority of its population is what I consider the
16 analogous district. So by virtue of losing a district,
17 the districts actually get renumbered. So old CD 22 is
18 the one that gets dismantled, and old CD 24 becomes new
19 CD 22; that is, 75 percent of old CD 24's population ends
20 up in what is now numbered CD 22.
21 So it's -- one effect is just the districts
22 shift their numbering. The effect on partisanship, then,
23 can be read kind of diagonally, according to Cook, going
24 from D+2, which would be a swing district, to D+6, which
25 would be -- Cook would call that either a swing or a D.

1 Q. So just to go back for a moment to what you said
2 about CD 19, did CD 19 adjoin old 22?
3 A. Yes.
4 Q. So is it fair to say that the elimination of
5 CD 22, a neighboring district, would have a significant
6 effect on what CD 19 needs to look like?
7 A. Yes. Also CD 19 was one of the three most
8 underpopulated districts in the state. And if you look at
9 the core retention numbers throughout and the
10 underpopulation numbers, the districts that change the
11 most in terms of core retention are the underpopulated
12 districts. So wherever you had severe underpopulation,
13 that's where you have core retention -- low core
14 retention, and that generally explains the flow of core
15 retention.
16 Q. Moving just a bit south to the Mid-Hudson
17 region -- for your reference, you can look at the same
18 exhibit, Page 10 -- Mr. Lavigna chose to divide the
19 districts a little bit differently than we have, but you
20 can see the three districts that you define as the
21 Mid-Hudson Valley. 16, 17, and 18 are in this table. Can
22 you just describe in a bit further detail how the
23 constraints you started to explain about the population
24 shifts in New York and the loss of a congressional
25 district framed what the map drawers had to do in drawing

1 Congressional Districts 16, 17, and 18?
2 A. So the population decreased in this region -- or
3 it didn't grow as fast as it needed to in order to
4 maintain parity with an equal population standard, so none
5 of these districts were overpopulated. All of them needed
6 to grab territory in order to get population. They could
7 have gone south, but that wouldn't have helped because
8 that would have been going into the City, so they went
9 north. So all of Ulster gets included here. They move up
10 into Dutchess and so forth. So the line shifts north
11 across the board in these districts. There were also
12 neighboring districts that were minority districts to the
13 south, 13, 14, 15, where they also couldn't shift in that
14 direction to avoid disrupting or diminishing minority
15 representation.
16 Q. And according to -- so a lot had to shift. And
17 can you comment on the geographic constraints that also
18 exist particularly in this area?
19 A. This is the funnel. This is the neck that's
20 coming down into the City, so it's pretty constrained by
21 the state boundary with New York and Connecticut and
22 New York and New Jersey, so we don't have a lot of room to
23 maneuver. And you can either go into the City or take
24 Westchester toward Long Island in order to accomplish that
25 population shift that's needed for Long Island.

1 Q. And as you testified before, New York City
2 itself was slightly underpopulated overall and Upstate
3 districts, once the district was lost, are moving
4 downward; is that right? The population needs to move
5 downward; is that right?
6 A. Right, in the sense that you're expanding the
7 border of the district to capture population. That's how
8 you shift the population. You can't move people.
9 Q. Yes, and that is a better way of explaining it.
10 So on this table on Page 10 in Mr. Lavigna's
11 report, let's just go through what the numbers are for
12 CPVI and how Cook would characterize them. So for CD 16
13 can you tell us what the table reads for the change in
14 CPVI?
15 A. 16 was a Democratic district and remains a
16 Democratic district.
17 Q. That's according to what Cook characterized?
18 A. According to the Cook characterization.
19 Q. How about for District 17?
20 A. It's a Democratic district, and it goes to a
21 swing district, or +5, -5 -- +5, +5, that interval. D+5,
22 R+5 is the swing interval.
23 Q. So according to your testimony about what Cook's
24 different classifications mean, that went from a more sure
25 Democratic district to a more competitive district; is

1 that right?
2 A. Yeah.
3 Q. And what about for District 18?
4 A. That's a swing district in both.
5 Q. Okay. So in your opinion, what is the -- if
6 you're looking at the Mid-Hudson region, 16, 17, and 18,
7 what is the overall partisan effect, if any, of the
8 enacted plans on the districts in this region?
9 A. You have a Democratic district that remains
10 Democratic, you have a Democratic district that goes to a
11 swing district, and you have a swing district that goes to
12 a swing district, so there's an increase in competition.
13 Q. Moving as we have been, Downstate and towards
14 Long Island, where the most significant remaining
15 population deficit exists, can you just tell us what
16 needed to happen in these districts based on their
17 populations?
18 A. In Long Island?
19 Q. Yes.
20 A. So Long Island, all of the districts are
21 underpopulated, each one of them. 4 is the closest to the
22 exact population. It's, again, geographically highly
23 constrained by the shape of the Island and the boundaries
24 of the state, and also it's politically constrained by the
25 minority districts that they -- like 3 and 4, but several

1 minority districts, 6, 5, 15, 14.
2 And so all of these -- these four districts need
3 to somehow shift. If you leave 4 alone, which is what the
4 Legislature did -- and it's the most stable of all the
5 districts on the map in terms of population retention. If
6 you shift, you've got to go kind of to the northwest into
7 Westchester or into Bronx, and that would mean splitting
8 up an Asian district, 6, or a black district, 5, or a
9 Hispanic district into Yonkers.
10 So it's like there are only so many places you
11 can go. If you're going to diminish -- you can diminish
12 minorities or go up to Westchester, which is the route
13 that they took. And I think the Legislature saw that
14 there was a coherent community to be reflected or coherent
15 interest to be reflected in 3, which is you got this big
16 coastal region that's got a set of common ecological,
17 governmental reasons for existing, which is to manage
18 things like the Bronx watershed and so forth. So that's
19 where they place CD 3. So CD 3 becomes this kind of north
20 coast of the Long Island island and up into the bend in
21 Westchester where the Bronx River and other watersheds
22 are, so it's got this kind of ecological purpose and
23 environmental purpose.
24 So then what do you do with 1 and 2? Now you've
25 got this population vacuum. You keep 2 reasonably stable.

1 In fact, the areas of these two districts are very stable.
2 The populations shift a bunch because the area between 1
3 and 2 has the highest-density population. 1 could either
4 go along the coast to the north or it could go through the
5 center of the Island. Those are the only two paths. If
6 it goes along the coast, it's disrupting 3, which you just
7 put in place as kind of one interest, so it extends
8 through the center, and then 2 is reoriented accordingly.
9 So that's roughly what the options were. You could take
10 one along the coast or in the center of the Island or you
11 could run 1 right into 2, but that would then be
12 disrupting 2's area as well as its population.
13 Q. And looking to the table on Page 5 of
14 Mr. Lavigna's reply, that does correspond to the districts
15 that we're talking about sort of, except, I guess, 4 isn't
16 there. Can you just run us through? So for Congressional
17 District 1 what is the change in CPVI numbers?
18 A. 1 goes from a Republican district to a swing
19 district.
20 Q. Is that how Cook would characterize it in his
21 CPVI?
22 A. Yes, that's how Cook would characterize it.
23 Q. And for CD 2 can you tell us what Cook would
24 characterize the change as?
25 A. He would characterize that as a swing district

1 to a Republican district.
2 Q. And for CD 3 how would Cook characterize the
3 change from D+2 to D+5?
4 A. As a swing district to a swing district.
5 Q. So overall what is the partisan effect, if any,
6 of the changes to the districts on Long Island?
7 A. The net effect is nothing. One district goes
8 from R to swing; one district goes from swing to R; the
9 other district remains swing, so it's kind of a net zero
10 change in terms of partisanship.
11 Q. Now moving on to the last of the strata, as you
12 mentioned, New York City, you've testified about several
13 of the issues that -- or constraints that arise with
14 respect to New York City districts in particular. With
15 respect to CD 10, which you've also mentioned, what needed
16 to happen population-wise for CD 10?
17 A. CD 10's overpopulated. It's got over 800,000
18 people, so it's going to go down by about 30,000. So it's
19 got to shed population somehow just at a minimum, but you
20 might have other things that need to happen with 10.
21 Q. Such as what?
22 A. 10 was drawn by a federal district court in
23 2012, and it's the least compact district in the map.
24 It's really quite un-compact by most of our measures, and
25 it goes from the west side of Manhattan and then cuts

1 across and cuts through Bay Ridge in Brooklyn and grabs
2 the Hasidic community in the middle of Brooklyn, so it's
3 like connecting these two regions. In doing so, it cuts
4 through the Asian population that spans Sunset Park to
5 Bensonhurst and Bath Beach, so it's chopping through the
6 middle of Chinatown. It's drawn for a purpose, which is
7 to respect a particular community, but it does have this
8 other effect.
9 Q. I'm going to show you what was previously marked
10 for identification only as S-11.
11 MS. REITER: Your Honor, may I approach?
12 THE COURT: Yes. What was that labeled,
13 11?
14 THE WITNESS: Yes, your Honor.
15 MR. BROWNE: Your Honor, the Petitioners
16 are objecting to this. The document is -- I know
17 it's not been offered into evidence yet, but if he's
18 going to testify about it, this was not in the
19 report. Again, the same situation as before. It
20 wasn't disclosed, hasn't been disclosed to the Court,
21 and I think any testimony about the document or from
22 it elicited by Counsel should not --
23 THE COURT: The cat's already out of the
24 bag, isn't it?
25 MS. REITER: It is, your Honor, and I

1 believe the objection's a bit premature. I was
2 actually going to ask Dr. Ansolabehere to
3 authenticate this exhibit, not to testify about it.
4 THE COURT: Go ahead.
5 BY MS. REITER:
6 Q. Dr. Ansolabehere, did you create this document?
7 A. I did.
8 Q. And how did you do that?
9 A. I used the 2020 census data, which asks people's
10 racial identifications, Asian, white, black, Native
11 American, other, and mapped that into the census blocks
12 and created a heat map showing the density. So the darker
13 color -- the shading is the higher-percentage Asian in
14 each census block there.
15 Q. Is the data you used to create this map -- these
16 two maps, is the data reliable, and is it used by experts
17 in the field to form a professional opinion?
18 A. Yes. This is the data we used for doing all
19 manner of work with the census, including understanding
20 minority and other cultural group patterns and the
21 demographics of different areas.
22 Q. And is the method you used to convert that data
23 you took into these maps standard and reliable?
24 A. Yes. We use the census as definitions of how to
25 do that translation.

1 MS. REITER: So, your Honor, I would offer
2 this exhibit into evidence.
3 THE COURT: Petitioners?
4 MR. BROWNE: Your Honor, we would object.
5 This is new. It's like a do-over. They're
6 submitting documents that were not in the original
7 report. He's offering testimony that wasn't in the
8 original report. We would object and ask that it be
9 stricken.
10 THE COURT: I'll let you, Ms. Reiter, talk
11 to him about what's been marked, but it isn't in his
12 report.
13 MS. REITER: Your Honor, may I reply
14 with --
15 THE COURT: Go ahead.
16 MS. REITER: -- just that he put in a
17 report in response to reports from experts that were
18 dramatically changed and included on reply, and so on
19 reply Petitioners' experts put in reports that
20 included new formulations, new information. And this
21 is a hearing, an opportunity for us to present --
22 THE COURT: But you had notice of it,
23 didn't you?
24 MS. REITER: Excuse me?
25 THE COURT: You had notice of it.

1 MS. REITER: And we're responding to it.
2 That's what this opportunity is, is for Respondents
3 to respond to the information and the arguments that
4 Petitioners have put forward.
5 THE COURT: The objection's sustained.
6 BY MS. REITER:
7 Q. Dr. Ansolabehere, let's wrap up our discussion
8 with Brooklyn with CD 11. You've just explained what
9 CD 10 needed to do and did, in fact, do based on the
10 court-drawn map that was in existence that needed to be
11 respected and the -- this demonstrative that shows --
12 well, may I ask you, what does this demonstrative show in
13 terms of what CD 10 does for the Asian communities?
14 A. It keeps the Asian community whole in this area.
15 Q. So what about CD 11? Does CD 11 adjoin CD 10?
16 A. Yeah. CD 11 is Staten Island and parts of -- it
17 has to take parts of this area to become a complete
18 district.
19 Q. And so can you explain a little bit about what
20 the options would have been for CD 11 when CD 10 might
21 have been -- was drawn the way it was in this map?
22 A. Given the location of CD 4 and the minority
23 districts in the area, the only direction to go is up,
24 keeping Bay Ridge whole, up through Sunset Park, and to
25 Park Slope. It's the only direction it can go.

1 Q. So based on all the evidence you've read of
2 Dr. -- of Mr. Lavigna's report and Mr. Trende's multiple
3 reports, do you have an opinion, a professional opinion,
4 on whether the enacted map demonstrates partisan bias?
5 A. Well, based on the simulations that Sean Trende
6 ran, there is no evidence of partisan bias because the
7 number of districts created that are Republican districts
8 is the same as the number that would be generated through
9 that approach. So based on all the evidence present, the
10 only evidence present, that's it, so that would indicate
11 that there's no partisan bias here.
12 MS. REITER: Your Honor, if I might just
13 have a moment to consult with my colleagues?
14 THE COURT: Yes.
15 Q. A couple more housekeeping items.
16 Dr. Ansolabehere, I would like for you, if you could, to
17 help me authenticate the other two exhibits that were
18 marked for identification only, so that's S-13 and S-10.
19 We can take them one by one.
20 MS. REITER: I'm authenticating these. I'm
21 not seeking to put them into the record, but I want
22 to have in the record the evidence of their
23 authentication by Dr. Ansolabehere.
24 Q. For S-10, Dr. Ansolabehere, did you create this
25 document?

1 A. I did.
2 Q. And how did you do that?
3 A. This is a heat map of Yiddish-speaking people in
4 Brooklyn, where the data come from the American Community
5 Survey, which is a census-conducted survey. It's the
6 five-year average of the data for the most recent
7 five-year average that's available ending in 2019. And
8 the census asks what language is spoken at home, and it
9 takes Yiddish as one of the indicators, so this is the
10 percent Yiddish-speaking in the area, and it shows where
11 there's the highest density of those people according to
12 ACS.
13 Q. And is the ACS data used by others in the field
14 to form their professional opinion? Is it a standard form
15 of data?
16 A. Yes. The ACS replaced what was called the long
17 form of the census, which is where we got more detailed
18 information. The long form was last used in 2000, and
19 then the ACS starts in 2005. So things like citizenship
20 numbers and so forth are used, and it's used in every
21 court where there's a question about citizenship.
22 Q. And is the method with which you used that ACS
23 data to convert it into this map also reliable?
24 A. Yes. We use the census data, the census files
25 for identifying which population goes into which census

1 areas.
2 Q. Moving on to what has been marked as S-13, can
3 you take a look at this and tell me what this document is?
4 A. This is a heat map showing Spanish --
5 Hispanic-identifying people. The census asks the
6 question, do you identify as Hispanic, separate from the
7 racial question, so this is a tabulation of the number of
8 people who identify as Hispanic, according to the census,
9 mapped into the local areas using the census files for
10 matching census areas to populations.
11 Q. And so similar to the document that was marked
12 S-11 for the Asian population data that also used census
13 data, is the data you used to create Document S-13 of a
14 reliable form that others in your field use to perform
15 professional opinions?
16 A. Yes, it is.
17 Q. And is the way that you -- the method that you
18 used to convert that data into this map also reliable?
19 A. Yes, it is.
20 MS. REITER: Your Honor, I heard -- I would
21 like to offer both of these exhibits into the record,
22 S-10 and S-13.
23 THE COURT: Mr. Browne?
24 MR. BROWNE: Your Honor, again, the same
25 objection. We're being sandbagged here. We didn't

1 have any notice of this. We didn't get a chance to
2 review it. It's being offered today. It's not
3 appropriate.
4 THE COURT: Sustained.
5 MS. REITER: Your Honor, I would just seek
6 to reiterate both that Petitioners had an opportunity
7 to put in their reply papers, to which this is our
8 opportunity to respond. They have a
9 cross-examination opportunity that they can ask
10 Dr. Ansolabehere any questions they would like both
11 about these exhibits and any of his testimony.
12 Dr. Ansolabehere has already established that his
13 conclusion on partisanship is in part based on his
14 response to Mr. Trende's report. And so, you know, I
15 offer that the newness of the information is the
16 opportunity to respond to the arguments that have
17 previously been made and that Respondents are
18 entitled to their opportunity to rebut reply
19 arguments made by Petitioners in this hearing.
20 That's it.
21 THE COURT: I already ruled. Thank you,
22 Ms. Reiter.
23 BY MS. REITER:
24 Q. Dr. Ansolabehere, one question: You had said
25 that your conclusion is based on -- your partisanship

1 conclusion is based on Mr. Trende's report; is that right?
2 A. Yes.
3 Q. Is your opinion about whether the enacted map
4 demonstrates partisan bias also informed by your review of
5 the population shifts, core retention, and other election
6 data in this case?
7 A. Yes, because I was trying to understand what
8 drove the configuration of the districts as they were
9 configured, and what appears to be the predominant factor
10 is the need to equalize population and the difficulty of
11 doing that across a pretty vast geography.
12 MS. REITER: No further questions, your
13 Honor.
14 THE COURT: Cross?
15 MR. BROWNE: Your Honor, could I make a
16 suggestion just to take a few-minute break just so I
17 can get organized? And, honestly --
18 THE COURT: In ten minutes we'll start.
19 MR. BROWNE: Thank you, your Honor.
20 (A recess was taken.)
21 THE COURT: Mr. Browne?
22 MR. BROWNE: Thank you, your Honor.
23 CROSS-EXAMINATION
24 BY MR. BROWNE:
25 Q. Professor, my name is Robert Browne. I'm an

1 attorney on behalf of the petitioners.
2 I want to talk to you quickly today. I honestly
3 don't have a lot, but I want to ask you a couple quick
4 questions about your experience in your CV. You worked as
5 a consultant for the Brennan Center; is that correct?
6 A. Correct.
7 Q. Are you aware that an attorney for the Brennan
8 Center opined about the 2022 congressional district maps
9 that it's not good for democracy and, because it's a
10 master class in gerrymandering, taking out a number of
11 Republican incumbents very strategically? Are you aware
12 of that?
13 A. No.
14 Q. And I'd also like to have you look at
15 Petitioners' Exhibit 1, which is Mr. Trende's report, if
16 you could. Before you were testifying with Counsel about
17 Mr. Wasserman, I believe.
18 A. Yeah, David Wasserman.
19 Q. And you're familiar with him, that's correct?
20 A. Yeah.
21 Q. And do you know him personally?
22 A. I do.
23 Q. Okay. Could you look on Page 10 of the Trende
24 report? Do you see that?
25 A. Page 10, yes.

1 Q. Yeah. And, Professor, could you look at the
2 bottom? And there's a bullet point at the bottom.
3 A. Yes.
4 Q. Could you read that out loud to everyone?
5 A. After the Assembly passed the map, David
6 Wasserman, US House editor of the Cook Political Report
7 and one of the premier elections analysts in the country,
8 called it a, quote, first step towards NY Democrats
9 passing their 22D-4R gerrymander.
10 Https://twitter/redist/status/1488940238177 --
11 Q. That's fine. Thank you.
12 And that's the same David Wasserman you
13 testified about earlier; is that right?
14 A. Yep.
15 Q. And that's someone you respect their opinion?
16 A. Of course.
17 Q. And there's some further language -- well,
18 actually, let me back up. It says the 22D-4R gerrymander.
19 Do you see that?
20 A. Correct.
21 Q. Is that the same conclusion that Mr. Trende came
22 to in his report?
23 A. I believe so.
24 Q. Thank you.
25 And if you could look a little further in that

1 bullet point, there's another quote from Mr. Wasserman.
2 Could you read that as well?
3 A. How far down?
4 Q. It says, upon its signature. It's the last
5 sentence in that bullet point.
6 A. Upon its signature into law, he observed
7 New York becomes the thirtieth state to adopt a new
8 congressional map, and Dems' gerrymander could lead to the
9 single biggest seat shift in the country (19D-8R to
10 22D-4R).
11 Q. Thank you.
12 And, again, that's Dr. Wasserman that you're
13 familiar with?
14 A. Yeah. That's his assessment, yeah.
15 Q. Also in your CV, Professor, you state you have a
16 particular expertise in statistical methods and social
17 science and survey research methods; is that correct?
18 A. Correct.
19 Q. I want to talk to you about your report a little
20 bit. In your report starting at Paragraph 77, if you want
21 to turn to that.
22 A. Hang on for a second.
23 Q. And it was S-7, was the exhibit.
24 A. Paragraph what?
25 Q. 77, please. And actually -- I'm sorry to do

1 this -- just back up to Paragraph 65. There's no page
2 numbers, which makes it difficult.
3 THE COURT: 65?
4 MR. BROWNE: Yeah, Paragraph 65.
5 Q. And I want you to acknowledge that this section
6 starting on -- right above Paragraph 65 is discussing
7 communities of interest. Is that correct?
8 A. Correct.
9 Q. Okay. Thank you.
10 And let's turn to Page -- or Paragraph 77. Do
11 you have it?
12 A. Yes.
13 Q. Thank you.
14 Paragraph 77 of your report, you state, Jewish
15 communities in this part of Brooklyn are concentrated in
16 Borough Park and Midwood; is that correct?
17 A. Correct.
18 Q. And you cite -- have a citation there at the end
19 of that sentence; is that right?
20 A. Correct.
21 Q. And it's -- the first part of the citation is to
22 an article in The New York Times; is that right?
23 A. Correct.
24 Q. Did you read this article?
25 A. I did. It's been a while since I looked at it.

1 Q. And the article's entitled New York Threatens
2 Orthodox Jewish Areas With Lockdown Over Virus, correct?
3 A. Correct.
4 Q. Isn't it true that this article doesn't identify
5 that the Jewish communities in this part of Brooklyn are
6 concentrated in Borough Park?
7 A. I don't recall.
8 Q. Additionally, you cite another article in that
9 footnote, another New York Times article, to support your
10 contention that Midwood is a concentrated Jewish area?
11 A. Correct.
12 Q. Did you read the article that you cite there?
13 A. I did.
14 Q. And the article is entitled Where Prosperity
15 Breeds Proximity, correct?
16 A. Correct.
17 Q. And it's an article on the real estate market in
18 Midwood, correct?
19 A. Correct.
20 Q. The article's actually over 12 years old, right?
21 A. Right.
22 Q. It was from 2009?
23 A. Yes.
24 Q. Okay. Is that the kind of data that you
25 typically support an expert opinion with?

1 A. It's describing that Midwood is a historically
2 Jewish community, so it's --
3 Q. But is it saying it's a concentrated Jewish
4 community?
5 A. My reading of the article said it was a
6 historically Jewish community.
7 Q. If we could turn to Paragraph 49 in your report.
8 And just for clarity, this portion of your report, is it
9 talking about Mr. Lavigna's claims?
10 A. Specific partisan claims?
11 Q. Yes.
12 A. Yes.
13 Q. Thank you.
14 Let's look at Paragraph 49, and it states -- and
15 tell me if I get this right -- first, 2022 (sic) CD 1 is
16 not a strong Republican district.
17 A. In quotes, yes.
18 Q. Yes, and then you conclude that sentence, if
19 anything -- or that paragraph. Sorry -- if anything, CD 1
20 has a slight lean to the Democrats; is that correct?
21 A. Correct.
22 Q. The support for your conclusion in this
23 paragraph that CD 1 has a slight lean to the Democrats is
24 data from the statewide races that you analyzed and then
25 aggregated -- or averaged? Excuse me. Is that right?

1 A. Correct, and the conclusion is if anything. I'm
2 not saying there is much of a lean here at all.
3 Q. But you said there's a lean?
4 A. If anything, CD 1 has a slight lean.
5 Q. And that's for the 2022 CD 1; is that correct?
6 A. Correct.
7 Q. And are you -- I'm sorry. Were you going to say
8 something?
9 A. Sorry. Is it the 2022 or the 2012? The 2012
10 CD.
11 Q. Sorry. That was my confusion. I apologize.
12 So 2012 CD 1 had a slight Democratic lean?
13 A. Correct.
14 Q. And the 2022 CD 1 has a Democratic lean now; is
15 that correct?
16 A. This is just characterizing the Lavigna claim
17 that there's a strong Republican district, CD 1.
18 Q. Right, but I'm asking about the 2022 CD 1. Is
19 there a Democratic lean in that district now?
20 A. I think that is -- I don't remember what the
21 number is, but it's more Democratic than it was.
22 Q. Thank you.
23 And you're aware that a Republican has been the
24 representative of CD 1 since 2015; is that correct?
25 A. Correct.

1 Q. Let's go to Paragraph 50. Do you see that?
2 A. Yes.
3 Q. Okay. And it states there -- or you state in
4 your report, 2012 CD 2 is not a sure Republican district?
5 A. Correct.
6 Q. CD 2 was a Democrat-leaning district; is that
7 correct?
8 A. Correct.
9 Q. And that's referring to the 2012 CD 2?
10 A. Correct.
11 Q. Again, you use statewide races, average them,
12 and determine that there was a Democratic lean to that
13 district; is that correct?
14 A. Correct.
15 Q. And would you agree that 2022 -- the 2022 CD 2
16 leans more Democratic now?
17 A. 2022 CD 2, I believe that shifts towards the
18 Republicans.
19 Q. And are you aware that the Republican -- that a
20 Republican holds that seat in CD 2 and has held that seat
21 since 2013?
22 A. Yes.
23 Q. And Paragraph 55, let's move to that. And in
24 that paragraph you state, in 2012 CD 11 Democrats, on
25 average, won 51.1 percent of the vote and Republicans won

1 47.1 percent of the vote, and Democrats won the majority
2 of the vote in four out the six statewide elections in the
3 precincts in the 2012 version of CD 11; is that correct?
4 A. Correct.
5 Q. And you state, none of these are Republican
6 districts; is that correct?
7 A. Correct.
8 Q. Again, you used statewide races and averaged
9 them to come to that conclusion; is that correct?
10 A. Correct.
11 Q. And would you agree that CD 22 -- or, excuse me,
12 the 2022 CD 11 now leans more Democratic in the 2022 map?
13 A. Correct.
14 Q. And you're aware that a Republican has been the
15 representative of CD 11 for the last seven out of the nine
16 years; is that right?
17 A. Correct.
18 Q. And then Paragraph 59 of your report, do you see
19 that?
20 A. I do.
21 Q. You state there that, CD 19 was a
22 lean-Democratic district in the 2012 map and remains so in
23 the 2022 map?
24 A. Correct.
25 Q. And, again, you used statewide races and

1 averaged them to come to that conclusion; is that correct?
2 A. Yes.
3 Q. And you would agree that the 2022 CD 19, as you
4 said, leans more Democratic?
5 A. Correct.
6 Q. And you're aware that a Republican has been the
7 representative for CD 19 for the last six out of the nine
8 years; is that correct?
9 A. Correct.
10 Q. And then Paragraph 61, do you see that?
11 A. Yes.
12 Q. In Paragraph 61 you state that comparing the
13 election results in 2012 CD 24 to those of 2022 CD 22
14 reveals that, in fact, there was very little change in the
15 electoral performance of the Syracuse district in both
16 maps; is that correct?
17 A. Correct.
18 Q. And the district is a Democratic district?
19 A. Correct.
20 Q. And, again, you used the statewide races and
21 averaged them out to come to that conclusion?
22 A. Exactly.
23 Q. And you're aware that a Republican has held the
24 CD 22 seat for the last seven out of nine years?
25 A. Correct.

1 Q. Professor, I want to talk a little bit about
2 your analysis of Mr. Trende's report for a few minutes.
3 You responded to Mr. Trende's report in your analysis; is
4 that right?
5 A. I did.
6 Q. And if we could look specifically at
7 Paragraphs 41 through 47. Do you see that, sir?
8 A. I do.
9 Q. You critique Mr. Trende's simulations in these
10 paragraphs; is that correct?
11 A. Yes. Some of it's recounting what the
12 simulations do, so yeah.
13 Q. Sure. But the point of those paragraphs is that
14 you critiqued his simulations; is that correct?
15 A. Part of it's critique, and part of it's
16 interpretation, yeah.
17 Q. Understood.
18 Did you run your own simulations?
19 A. No.
20 Q. Why not?
21 A. I didn't -- like there was -- I wasn't asked to.
22 It wasn't something that was directed by Counsel to do,
23 and I didn't -- the question was like, what do we make of
24 these simulations? I generally don't run simulations when
25 I analyze elections. It's not my approach.

1 Q. But you were asked to respond to Mr. Trende's
2 report; is that right?
3 A. That's correct.
4 Q. You told us earlier that you have particular
5 expertise in statistical methods in social science; is
6 that right?
7 A. Yes.
8 Q. So you're capable of running these types of
9 simulations?
10 A. Yes, and I have for other purposes.
11 Q. Thank you.
12 But, again, you didn't run the simulation; is
13 that right?
14 A. No.
15 MR. BROWNE: Can I have just a minute, your
16 Honor?
17 THE COURT: Yes.
18 Q. Just one last question.
19 A. Sure.
20 Q. Professor, is it your professional opinion that
21 the Democratic party of the Legislature did not use
22 partisan gerrymandering, especially in the Long Island
23 area, Districts 1, 2, 3, 4, to favor Democrats in this
24 2022 map?
25 A. I don't see any evidence that indicates that

1 there's a systematic shift in Long Island toward the
2 Democrats that would be consistent with that claim, so I
3 don't see an effect. I don't know anything about intent
4 in the sense of like having read through the record or
5 anything like that. So just based on the effect, I don't
6 see any evidence of an effect that would justify
7 concluding there was an intent.
8 MR. BROWNE: Thank you.
9 THE COURT: Redirect?
10 MS. REITER: No, your Honor.
11 THE COURT: Thank you. You can step down,
12 sir.
13 THE WITNESS: Thank you very much.
14 (The witness was excused.)
15 THE COURT: I'm trying to figure out if
16 this would be an appropriate place. Do you have
17 another witness ready?
18 MR. MULLKOFF: We do. We could begin
19 qualifying Kristopher Tapp.
20 THE COURT: We can at least qualify him and
21 take it from there. I'd like to end around 4:30 if
22 we can.
23 MR. MULLKOFF: That's fine, to do the
24 initial.
25 THE COURT: Mr. Hecker?

1 MR. HECKER: I was just going to say, can
2 we take five minutes to get our exhibits ready, and
3 then --
4 THE COURT: Let's do that.
5 MR. HECKER: -- we can qualify him?
6 THE COURT: Five minutes.
7 MR. HECKER: Yes. Thank you.
8 (A recess was taken.)
9 (Respondents' Exhibit S-15 was marked for
10 identification.)
11 THE COURT: Next witness?
12 MR. MULLKOFF: Your Honor, the Senate
13 respondents call Kristopher Tapp.
14 KRISTOPHER R. TAPP,
15 called herein as a witness, having been first duly sworn,
16 was examined and testified as follows:
17 THE DEPUTY: State your name and spell it
18 for the Court, please.
19 THE WITNESS: Kristopher Tapp. Kristopher
20 is spelled with a K, K-r-i-s-t-o-p-h-e-r, and Tapp is
21 T-a-p-p.
22 THE DEPUTY: Have a seat right here, sir.
23 THE COURT: Dr. Tapp, have a seat.
24 MR. TSEYTLIN: Your Honor, briefly --
25 THE COURT: Yes.

1 MR. TSEYTLIN: -- just to note for the
2 record, we do have a motion to strike a portion of --
3 THE COURT: I understand.
4 MR. TSEYTLIN: I know we're arguing it
5 tomorrow morning, but I just wanted to --
6 THE COURT: We will argue it in the
7 morning. I'm going to at least let them --
8 MR. TSEYTLIN: Of course.
9 THE COURT: -- qualify him, and we'll argue
10 that in the morning.
11 MR. MULLKOFF: Thank you, your Honor.
12 DIRECT EXAMINATION
13 BY MR. MULLKOFF:
14 Q. Good afternoon, Dr. Tapp.
15 A. Good afternoon.
16 Q. Could you please give us a sense of your
17 educational background?
18 A. Yes. I got my Bachelor's of Arts from Grinnell
19 College, and I got my PhD in mathematics from the
20 University of Pennsylvania.
21 Q. After you received your PhD, what has your
22 academic employment consisted of?
23 A. I have taught at a variety of universities. I
24 taught at Haverford College and SUNY Stony Brook and
25 Williams College and Bryn Mawr College and University of

1 Pennsylvania and Suffolk University and now Saint Joseph's
2 University.
3 Q. How long have you been a professor at Saint
4 Joseph's University?
5 A. About 12 years.
6 Q. What is your current title there?
7 A. I am a full professor and the chair of the
8 Mathematics Department.
9 Q. When did you become the chair of the Mathematics
10 Department?
11 A. This is my fourth year.
12 Q. And how did you come to have that role?
13 A. It's a position that's voted on by members of
14 the department and approved by the provost.
15 Q. In your capacity as a math professor at Saint
16 Joseph's, what are some of the classes you've taught in
17 recent years?
18 A. I've taught a large variety of upper-level and
19 lower-level classes, all mathematics. I have very
20 recently taught actuarial probability. It's an
21 upper-level class for actuary students preparing for a
22 probability standardized exam. I've taught Calc 1,
23 Calc 2, Calc 3. I recently taught Real Analysis, which is
24 a math major class that is designed to really make
25 calculous more rigorous. I've taught lower-level stuff --

I love expository stuff -- so math classes to introduce non-math majors, non-STEM majors to the beauty of mathematical thinking.

Q. Have you published any books?

A. Yes. I've published three books, and two of them are in second edition.

Q. What books are those?

A. My first book, Matrix Groups for Undergraduates, is like a topic that is right between advanced undergraduate mathematics and beginning graduate school mathematics. It is an attempt to basically take a graduate school topic and make it a little bit more accessible at the undergraduate level. And the second book about differential geometry is really the same thing, taking a beginning graduate-level topic and making it accessible to the advanced undergraduate student.

Q. And what about the third book?

A. The third book, Symmetry, is for non-STEM majors. I use it for a class in which I just try to inspire history majors and English majors to love mathematics and to appreciate mathematical thought.

Q. Have you presented your work in any conferences or other forums in different locations?

A. Yes. I've been invited to speak at a long list of conferences in many countries.

Q. Approximately how many times, if you had to estimate?

A. Maybe 50.

Q. Have you published articles in peer-reviewed journals?

A. Yes. I think I have 24 publications in peer-reviewed journals.

Q. What types of topics have those publications involved?

A. Most of my career I worked in Riemannian geometry, which is an abstract field of mathematics that's related to physics. And just within the last about four years, I pivoted and just got really excited about the mathematics that relates to redistricting.

Q. How did you come to be interested in that topic?

A. I read some recent papers and I found them fascinating, and I just got sucked in and read more and more and more papers. I think I was ready for a change.

Q. And have you specifically published articles regarding redistricting?

A. Yes. I have three papers I've written related to redistricting. The first was mostly about the efficiency gap, and it was published in the American Mathematical Monthly, which is the most widely read math journal in the world.

1 And then the second is about clustering. It was
2 essentially using ensemble methods that we've been talking
3 about this week to quantify the idea of clustering, how a
4 particular political party is clustering, like, for
5 example, Democrats packed into cities and so on and how
6 that affects election outcome and to do it in a rigorous
7 enough way that you can prove that certain levels of
8 clustering imply certain things about how the elections
9 will turn out.
10 And then my third and most recent paper is
11 really a pure math paper in the area of graph theory, but
12 it has an important application to redistricting. In some
13 sense it explains why the algorithms that are currently in
14 use, including the ones we talked about this week, spit
15 out maps with compact districts without needing to be
16 directed to do so.
17 Q. So that paper discusses simulation algorithms or
18 different types?
19 A. No. My second paper did. That paper's not so
20 much about simulations, at least not centrally. But, yes,
21 the application of redistricting, it intertwines with
22 that.
23 Q. So when you were talking about the application
24 of redistricting, are simulation algorithms what you were
25 referring to?

1 A. Yeah. Exactly. It's a paper about spanning
2 trees, but spanning trees are the mathematical heart of
3 the algorithms.
4 Q. Would it be accurate to say that paper touched
5 on the mathematics behind simulation algorithms?
6 A. Yeah. Exactly. What I'm most interested in is
7 the mathematics that sort of is underneath the hood of
8 these algorithms that have been used by Trende and Barber
9 this week and others in redistricting litigation.
10 MR. MULLKOFF: Your Honor, may I approach
11 the witness?
12 THE COURT: You may.
13 MR. MULLKOFF: I am handing the witness,
14 for identification, an exhibit that's been pre-marked
15 as S-15. It's already been filed in this case. It's
16 Dr. Tapp's curriculum vitae.
17 Q. Dr. Tapp, do you recognize this document?
18 A. Yes.
19 Q. What is it?
20 A. This is my CV.
21 Q. Is this up to date?
22 A. Yes. I believe so.
23 Q. Does it accurately describe the progression of
24 your career and disclose your publications up to date?
25 A. Yes.

1 Q. Dr. Tapp, are you being compensated for your
2 work in this case?
3 A. Yes.
4 Q. Does your compensation depend in any way on what
5 expert opinion or testimony you provide?
6 A. No.
7 Q. Does your compensation depend in any way on the
8 outcome of the case?
9 A. No.
10 MR. MULLKOFF: At this time Respondent
11 Senate Majority Leader tenders Dr. Kristopher Tapp as
12 an expert witness in the fields of mathematics and
13 mathematical analysis of redistricting.
14 THE COURT: Petitioners wish to be heard?
15 MS. DiRAGO: No objection, your Honor.
16 THE COURT: I'm qualifying him as an expert
17 in mathematics and how it relates to redistricting.
18 MR. MULLKOFF: Your Honor, I know we have
19 an eye on the clock. My next section is rather
20 lengthy, so this would probably be a logical place to
21 stop.
22 THE COURT: This is where we'll break for
23 the day. We'll meet again at 9:30 in the morning to
24 argue the three orders to show cause. Thank you.
25 *Certified to be a true and accurate transcript.*

1 _____
Tara D. MacNaughton, CSR, RPR, NYACR
2 Official Court Reporter
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TRANSCRIPT OF BENCH TRIAL, DATED MARCH 16, 2022 [2945 - 3180]

1 SUPREME COURT OF THE STATE OF NEW YORK

2 COUNTY OF STEUBEN : SUPREME CALENDAR

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3 **TIM HARKENRIDER, GUY C. BROUGHT,**
4 **LAWRENCE CANNING, PATRICIA CLARINO,**
GEORGE DOOHER, JR., STEPHEN EVANS,
5 **LINDA FANTON, JERRY FISHMAN, JAY**
FRANTZ, LAWRENCE GARVEY, ALAN NEPHEW,
6 **SUSAN ROWLEY, JOSEPHINE THOMAS, AND**
MARIANNE VIOLANTE,
7
Petitioners,
8
-versus- Index No:
9 E2022-0116CV
GOVERNOR KATHY HOCHUL, LIEUTENANT
10 **GOVERNOR AND PRESIDENT OF THE SENATE**
BRIAN A. BENJAMIN, SENATE MAJORITY
11 **LEADER AND PRESIDENT PRO TEMPORE OF THE**
SENATE ANDREA STEWART-COUSINS, CARL
12 **HEASTIE, NEW YORK STATE BOARD OF**
ELECTIONS, AND THE NEW YORK STATE
13 **LEGISLATIVE TASK FORCE ON DEMOGRAPHIC**
RESEARCH AND REAPPORTIONMENT,
14
Respondents. BENCH TRIAL
15

16
Steuben County Courthouse
17 Bath, New York
March 16, 2022
18
P r e s i d i n g :
19
THE HONORABLE PATRICK F. McALLISTER
20 Judge

21 A p p e a r a n c e s :

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1 I N D E X T O W I T N E S S E S

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10 I N D E X T O E X H I B I T S

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1 THE COURT: Let's note appearances for the
2 day.
3 Petitioner?
4 MS. DiRAGO: Molly DiRago on behalf of
5 Petitioners.
6 MR. BROWNE: Your Honor, Robert Browne on
7 behalf of Petitioners.
8 MR. WINNER: George Winner on behalf of
9 Petitioners.
10 MR. TSEYTLIN: Misha Tseytlin on behalf of
11 Petitioners.
12 THE COURT: On behalf of the Governor and
13 Lieutenant Governor?
14 MS. McKAY: Yes. Heather McKay and Muditha
15 Halliyadde from the New York State Attorney General's
16 Office.
17 THE COURT: Thank you.
18 On behalf of the Majority Leader, Senate
19 Majority Leader?
20 MR. HECKER: Eric Hecker from Cuti Hecker
21 Wang.
22 THE COURT: Thank you, Mr. Hecker.
23 MR. CUTI: John Cuti from the same firm.
24 MR. GOLDENBERG: Alexander Goldenberg, Cuti
25 Hecker Wang.

1 MS. REITER: Alice Reiter, Cuti Hecker
2 Wang.
3 THE COURT: On behalf of the Speaker of the
4 Assembly?
5 MR. MULLKOFF: Daniel Mullkoff, Cuti Hecker
6 Wang.
7 THE COURT: Thank you.
8 On behalf of the Speaker of the Assembly?
9 MR. BUCKI: Craig Bucki from Phillips Lytle
10 LLP in Buffalo on behalf of the Speaker.
11 THE COURT: Thank you, Mr. Bucki.
12 All right. First thing this morning, we're
13 going to address the three orders to show cause
14 brought by the petitioners. I think the best way to
15 handle this is have all three argued at the same time
16 and then responses.
17 Who'd like to start? Mr. Tseytlin? Just
18 all I ask you to do is tell me when you're switching
19 gears from one to the next order to show cause.
20 MR. TSEYTLIN: Thank you, your Honor. I'm
21 going to talk this morning about our motion to strike
22 a portion of the expert report submitted by Dr. Katz
23 and Dr. Tapp, and I will then talk about our motion
24 for supplemental briefing. My colleague,
25 Senator Winner, will talk about the discovery

1 sanctions portion, so I'll just discuss those first
2 two motions here.
3 Our motion to strike these two expert
4 reports involve a pretty clear effort by the
5 respondents to sandbag us by adding expert reports on
6 the congressional maps well after this Court had set
7 a deadline for them to respond with regard to the
8 congressional maps. As a threshold matter, both
9 these reports should be just struck as a matter of
10 the Court's rules. Their expert reports were due on
11 February 24th. They submitted them two weeks after.
12 But to the extent this Court wants to
13 inquire beyond just noncompliance with this Court's
14 orders -- and I didn't even see them in their
15 responsive papers say that they were complying with
16 the Court's orders with regards to submitting those
17 two -- and were to look into prejudice, I'll talk
18 briefly about the prejudice from the Tapp second
19 report, and then I'll talk in a little bit greater
20 length of the prejudice from the Katz second report.
21 THE COURT: Okay.
22 MR. TSEYTLIN: With regard to the Tapp
23 second report, their only justification for doing it
24 this way is, they said, they wanted to respond to the
25 regression analysis that Mr. Trende offered in his

1 rebuttal report.
2 THE COURT: Was that new by
3 Dr. (sic) Trende?
4 MR. TSEYTLIN: The regression analysis was
5 new, but the rest of the stuff in the second Tapp
6 report that responds to the congressional stuff was
7 not new at all. He asked stuff about how the 5,000
8 maps are too redundant in his view, about county
9 splits, this kind of thing. There's nothing in the
10 lion's share of that second Tapp report with regard
11 to the congressional districts that even mentions the
12 Trende rebuttal report, so I think at least those
13 portions clearly need to be struck.
14 With regard to whether your Honor wants to
15 strike the portion that rebuts only the regression
16 analysis, you know, we don't have a strong view on
17 that. My friends already had multiple experts opine
18 upon that yesterday. That's only a minor aspect of
19 Mr. Trende's report that doesn't go to his core
20 conclusions, and I didn't see anything in Mr. Tapp's
21 second report about regression in particular that's
22 really any different from what your Honor heard from
23 the other side's experts before. But everything he
24 says about redundancy, splits, communities of
25 interest, that plainly needs to be struck since

1 that's not responsive at all to the rebuttal report.
2 Now, turning to the Katz report, that, I
3 would submit, is far, far more problematic. Now, I
4 think in order to understand why that is so
5 problematic, I'd like to explain the battle lines
6 between the parties after the briefing and the expert
7 reports had been submitted. The battle lines, as I
8 understand it, were as follows: Mr. Trende submitted
9 a report that did 5,000 and then 10,000 maps and
10 said, this is the most pro-Democrat map out of any of
11 those 5,000, 10,000. And he did this through his dot
12 plot analysis, which showed Republicans packed into
13 those four districts much more than any of the
14 ensemble maps and then cracked over the next six or
15 so districts, making those far more Democratic and
16 noncompetitive.
17 As I think your Honor saw with the
18 testimony, especially of Mr. -- Dr. Barber yesterday,
19 their primary response to this is, well, Republicans
20 got those four districts, those are now solid four
21 Republican districts; and the rest of the districts,
22 they're just going to call them Democrat because
23 they're 50 percent plus 1 under the statewide
24 metrics; and, therefore, it's a pro-Republican map.
25 Your Honor has that in front of him -- in front of

1 the Court. You've heard lots of testimony about
2 that. You'll hear, I'm sure, a little bit more from
3 Dr. Tapp today. There's been lots of briefing on
4 that. That issue is fairly short.
5 The Katz report that was put in doesn't
6 have anything to say about any of that. It talks
7 about the notion of partisan fairness based on an
8 esoteric version of a concept known as partisan
9 symmetry. It proceeds on the notion that even if
10 this is the most pro-Democrat map that could possibly
11 have been drawn, we're going to score this on a
12 social science view of fairness and say, well, does
13 it, under the social science view of fairness,
14 nevertheless score kind of well? So it doesn't --
15 it's completely -- to borrow a great phrase from
16 Dr. Barber yesterday, it's completely orthogonal to
17 everything the parties have been discussing before
18 your Honor, everything that was submitted in the
19 expert reports, everything in the briefing.
20 You know, I've litigated cases involving
21 other, more standard forms of partisan symmetry. And
22 what happens at every one of those cases, if a party
23 submits an expert report on their particular view of
24 partisan symmetry, you'll, of course, bring in your
25 own expert on partisan symmetry and those experts

1 will do one of two things, usually both: One,
2 they'll present a different partisan symmetry metric
3 often reflecting a different view of social science
4 fairness of that map; and, two, the expert will
5 explain to the Court why partisan symmetry doesn't
6 work and doesn't make sense in this context or why
7 their multi-simulation approach is better.
8 Here, because my friend sandbagged us, we
9 had no opportunity to do any of that. They have this
10 new approach. We don't have an opportunity to --
11 THE COURT: They're sort of saying you
12 sandbagged them by Trende's second, reply report that
13 they never had a chance to reply to.
14 MR. TSEYTLIN: Well, they have submitted
15 testimony on that. They have experts on that. You
16 know, if your Honor doesn't want to strike that
17 portion of the Tapp report that deals with the
18 rebuttal report of Mr. Trende, you know, I'm happy to
19 withdraw that aspect of our motion. But here they
20 have an entirely new approach. We have no experts
21 before the Court on that approach. It has nothing to
22 do with anything in any of the briefing this Court
23 has. It's just kind of lobbed in there two business
24 days before the evidentiary hearing here.
25 Now, their only two defenses for this, as

1 far as I can tell from their briefing submitted
2 yesterday -- and, again, they don't even claim that
3 this was procedurally proper -- one is they say we
4 have the opportunity to cross-examine. Well, your
5 Honor, I'll give it the old college try, but I don't
6 have an expert report to rely upon. I can ask some
7 questions based on my experience in other cases with
8 partisan symmetry metrics that were done differently
9 to give it a shot, but that's not any notion of due
10 process or fairness. I don't have -- you know, I'll
11 ask -- I'm sure I'll ask Dr. Katz questions and he'll
12 rely on his expertise and I got nothing to point to
13 on the other side.
14 Their other defense for what they did is
15 they said, well, we could submit Dr. Katz on the
16 Senate map, and so shouldn't you hear him on both?
17 THE COURT: Well, it was timely on the
18 Senate map.
19 MR. TSEYTLIN: It was timely on the Senate
20 map. But, your Honor, there's different criticisms
21 that could be lodged on congressional versus the
22 Senate.
23 THE COURT: But isn't the issue the same in
24 both? I mean, does it make sense to consider it on
25 the Senate and not on the congressional?

1 MR. TSEYTLIN: Well, so if your Honor wants
2 to consider -- consider it or not in both, I think
3 your Honor should not consider it on both because
4 there's been no adversarial process. There was no
5 briefing on this even on the Senate stuff. But I
6 think that at minimum, if we're going to be
7 prejudiced by what happened on the Senate stuff --
8 and we really were -- they could have let us know a
9 little bit further in advance so we could have
10 retained our own partisan symmetry expert. They made
11 it impossible for us on the Senate. I understand
12 that, you know, it may be, you know, sharp-elbowed
13 litigation, all that.
14 But at least with regard to the
15 congressional, they should have submitted Dr. Katz on
16 February 24th. We surely would have retained an
17 expert on partisan symmetry, as happens in every one
18 of the cases. I'm sure Dr. Katz has testified about
19 partisan symmetry in many, many cases. I would
20 venture to say it will be the first time where his
21 partisan symmetry approach would go entirely
22 un-responded to by any expert. That's just not --
23 that's not any notion of fundamental fairness or due
24 process.
25 At minimum, your Honor, if they wanted to

1 submit a brand new approach to this Court, they
2 should have filed a motion. This Court could have
3 decided if it wanted to hear an entirely different
4 take on partisan fairness from what we've been
5 hearing, but instead they engaged in self-help
6 lobbing in these reports, especially the Katz report,
7 hoping to ring a bell that can't be un-rung. I think
8 that's fundamentally unfair to us.
9 And this brings me, then -- your Honor,
10 does your Honor have any other questions on that
11 before I talk about the other motion?
12 THE COURT: No.
13 MR. TSEYTLIN: And I think that brings me,
14 well, to the other motion I'd like to talk about,
15 which is our motion to submit supplemental briefing
16 on the remedy here, and I think our approach to this
17 contrasts very significantly with their self-help
18 approach with regard to the expert reports. We came
19 to this Court, and we said, we think there are some
20 additional considerations this Court may want to look
21 to in deciding what the final remedy in this case
22 will be, not the interim relief that we asked for at
23 the prior hearing but the final remedy, and we just
24 listed the issues that we wanted to brief. We didn't
25 try to un-ring any bells that can't be un-rung. We

1 just came to your Honor and said, if you want to hear
2 about these issues, we'd like to put this before the
3 Court.
4 My friends were in the middle of trial.
5 Fair enough. I assume and hope the trial will be
6 finished today, if not early tomorrow. The
7 briefing -- supplemental briefing would take place
8 thereafter. And really we want to put -- we want to
9 brief two issues before your Honor: One, whether the
10 notion of having special elections next year, if the
11 Court determines these maps are unconstitutional, is
12 itself constitutional. Certainly we've all heard of
13 special elections, but those take place in situations
14 where a congresswoman passes away or retires and then
15 a seat needs to be filled. The US Constitution says
16 that the members are elected every two years. So we
17 think it should be at least briefed, whether it would
18 be constitutional to yank a member off of Congress
19 based on a special election after they've won.
20 THE COURT: So you're saying I may have
21 been mistaken in saying I could set next year as --
22 if I ruled in your favor in this case, that next year
23 is not feasible for the United States congressional
24 election?
25 MR. TSEYTLIN: It may well not be, your

1 Honor. We haven't fully briefed that for your Honor.
2 We suspect that it's not. Maybe my friends will find
3 authority on this side. But that's why -- and I
4 would also note that the issue of the '23 special
5 elections wasn't raised by either of the parties, so
6 I think it's fair for us to ask your Honor to put
7 that before the Court.
8 The second issue we wanted to brief,
9 especially in light of the first if your Honor
10 concludes that at least with regard to the
11 congressional elections, the '23 option isn't
12 feasible, well, there is a feasible option not to
13 have a congressman elected under an unconstitutional
14 map sitting there for two full years. And there we
15 wanted to brief the feasibility of, for example,
16 moving the primary date.
17 I will note, for example, just yesterday
18 the Maryland Court of Appeals, which is the highest
19 court in Maryland, moved the primary date in Maryland
20 because, considering a partisan gerrymandering
21 challenge which is strikingly similar to this one,
22 similar number of districts, packing, cracking, you
23 know, that kind of thing, they're also considering
24 the state legislative districts. So those -- I don't
25 want to misspeak. They're considering the state

1 legislative districts. They're not the congressional
2 districts. And they have moved the primary there.
3 And so what we wanted to brief is, is it
4 feasible for this Court to order relief that would be
5 effective in 2022? I know my friends are going to
6 say it's not. We'll say it is. Your Honor will make
7 the decision. But the only thing that we asked for
8 was just a modest submission to put this before the
9 Court, and the Court can do with this additional
10 briefing what the Court will. The Court can order it
11 or not.
12 THE COURT: Didn't the Supreme Court of the
13 United States in the recent Alabama case say it was
14 too late to do new maps in their state?
15 MR. TSEYTLIN: That's certainly true, what
16 the US Supreme Court said as a matter of federalism,
17 with federal courts interfering with state elections.
18 As the actions yesterday by the Maryland Court of
19 Appeals show and the actions by the Pennsylvania
20 Supreme Court that we referenced in our prior
21 briefing, state courts are not so constrict. Here
22 the issue is that the maps that my friends enacted
23 are unconstitutional under the state Constitution.
24 There's no federalism principle barring state courts
25 from remedying this election cycle.

1 And as we're seeing in states all over the
2 country at the state level, state courts are moving
3 election deadlines, moving primary dates. In fact,
4 I'm not aware -- and maybe my friends in their
5 briefing will tell me otherwise. I'm not aware of
6 any state court this election cycle that has reached
7 anything like the Supreme Court's decision in
8 Alabama, which, again, was based on the US Supreme
9 Court's consideration of federalism, which obviously
10 don't apply in a state court proceeding under a state
11 Constitution.
12 THE COURT: Anything further, Mr. Tseytlin?
13 MR. TSEYTLIN: No, your Honor.
14 THE COURT: Thank you.
15 MR. HECKER: Your Honor, may I make a
16 suggestion, respectfully? It just turns out I'm
17 going to be arguing those two motions and Mr. Cuti's
18 going to be arguing the third motion. Might it make
19 more sense for me to address things while they're
20 fresh in the Court's mind?
21 THE COURT: All right. Let's do that. I'm
22 fine with that.
23 Any objection to that?
24 MR. TSEYTLIN: No, your Honor.
25 THE COURT: All right. Mr. Hecker?

1 MR. HECKER: Good morning, your Honor.
2 THE COURT: Good morning.
3 MR. HECKER: Eric Hecker, Cuti Hecker Wang.
4 Like Mr. Tseytlin, I'll start with the motion to
5 strike. I honestly don't even understand the
6 argument, and the best way for me to explain why I
7 don't understand what they're even saying -- well,
8 I'll start with Mr. Tapp -- Dr. Tapp. Mr. Trende.
9 Dr. Tapp. I'll start with Dr. Tapp, just like
10 Mr. Tseytlin did, and I want to work backwards from
11 the end.
12 Obviously this is a trial, and what we're
13 doing is we're engaging in the proverbial battle of
14 the experts. And to paraphrase your Honor, as you
15 put it, the whole point is to put the people on the
16 stand so you could see them and you could determine
17 for yourself where the truth lies. Your Honor
18 decided to exclude experts who are on the same side
19 as the testifying expert for basic fundamental
20 fairness reasons, but your Honor expressly declined
21 to exclude from the room opposing experts precisely
22 so that each opposing expert can see what the
23 expert's saying on the stand and have a full and fair
24 opportunity to respond in order to give your Honor a
25 full and fair opportunity to evaluate what

1 everybody's saying.
2 So what is going to happen today is
3 Dr. Tapp is going to address everything that
4 Mr. Trende said, and he said things in three places.
5 He said things in his first report, in his second
6 report, and on the stand, and what he said on the
7 stand, with Dr. Tapp here precisely so that he could
8 respond today, was all about his first report and his
9 second report, so they can't possibly be saying that
10 Dr. Tapp can't talk today about what Mr. Trende said
11 on the stand about what Mr. Trende said in his second
12 report. That would be preposterous. They're not
13 saying that.
14 What they are saying with their heeded,
15 inappropriate invective is that we cynically
16 sandbagged them by giving your Honor and Mr. Tseytlin
17 the courtesy of advance notice before the trial under
18 oath of some of the things that Dr. Tapp disagrees
19 with Mr. Trende about in his report. There was
20 nothing remotely improper about that, and it was far
21 closer to a courtesy than sandbagging and cynical
22 litigation conduct. And honestly, we're not going to
23 play games, but just to show you what the games would
24 look like if you struck the report, couldn't Dr. Tapp
25 just read it into the record today as part of his

1 direct? Dr. Tapp, would you just read into the
2 record what you said in this report; you said that,
3 didn't you? We could play that game. It just
4 doesn't make any sense, what they're saying. They're
5 the ones who are trying to squirm out of things, not
6 us.
7 With respect to Dr. Katz, to understand why
8 what they're saying makes no sense, it actually, I
9 think, makes sense to start from the beginning. The
10 congressional and Senate lines were enacted. Then
11 they filed this case. They chose to only challenge
12 the congressional lines, not the Senate lines. We
13 don't know why.
14 THE COURT: Initially. Initially.
15 MR. HECKER: Initially, yes. And after
16 appropriate procedure your Honor ruled,
17 understandably, that they would have leave to serve
18 their amended petition, and the Senate part of the
19 case, which was not in the case, became part of the
20 case fair and square. And your Honor then set a
21 schedule. You gave us until last Thursday to put in
22 our response papers, and you set a trial for a couple
23 of days later, and you didn't give them an
24 opportunity to reply. And I don't want to put words
25 in your Honor's mouth, but the way I understood that,

1 to have been a very fair and reasonable schedule, is
2 that it's on them that the Senate schedule was so
3 late.
4 And the Constitution says what it says
5 about the deadline for a decision, and your Honor
6 apparently will have dark days next week and needs
7 time to render a decision, so the trial had to be
8 this week, which we get, and the answer date had to
9 be the Thursday before, which we get, and we complied
10 with both. We put all of our Senate papers in on
11 time fair and square, and we showed up here Monday
12 morning ready to try the case. So what did we do
13 wrong by putting in Dr. Katz's affidavit at least
14 with respect to the Senate?
15 If you read their papers, they are not
16 moving to strike Katz with respect to the Senate.
17 They can't. They caused the delay. We complied with
18 the deadline. They are trying to prove beyond a
19 reasonable doubt that this Senate and congressional
20 plan are unconstitutional and infected with invidious
21 intent. So we, of course, availed ourselves of the
22 opportunity to put in a partisan symmetry expert, a
23 Caltech professor who's testified 50 times, mostly on
24 behalf of Republicans, who is going to cogently
25 explain to you today or tomorrow why there is no

1 asymmetry at least in the Senate plan.
2 THE COURT: But that's a new methodology
3 that was introduced?
4 MR. HECKER: Not on the Senate side. It
5 was the first methodology that was introduced. We
6 didn't have an opportunity to respond to the Senate
7 before last Thursday because it wasn't part of the
8 case. Now, it's new in that it wasn't part of the
9 congressional case, and I'll get to that, but there's
10 no new or old with respect to the Senate. The first
11 time and the only time we've ever spoken about the
12 Senate in papers was the Thursday deadline that you
13 set, and we complied with it fair and square.
14 And, again, I understand why your Honor set
15 that tight schedule. You needed to give us a week to
16 respond. Honestly, it would have been nice to have
17 more. If we really thought we couldn't do it, we
18 would have moved, respectfully, and said we can't do
19 it, your Honor. But we burned the midnight oil. We
20 got it done. Dr. Katz did a lot of work. Our other
21 experts did a lot of work. Everybody's tired. Some
22 people are a little cranky. We're all doing our
23 best. And we met the deadline, and we put in
24 Dr. Katz's report at least with respect to the Senate
25 fair and square. And read their papers. They're not

1 claiming otherwise.
2 They're only moving to strike the papers
3 that refer to Congress, so let's get to that. Should
4 you hear both? Look, on that front I do get it.
5 That is the only part of their argument that even
6 makes sense. But what I would say, respectfully, is
7 that once you hear from Dr. Katz, you will see that
8 there is absolutely no difference between his
9 methodology on the Senate side and on the
10 congressional side.
11 Moreover, what you'll hear from him is that
12 his particularly comprehensive way of looking at
13 things, which he'll get into, inherently involves
14 analyzing all relevant Senate and congressional races
15 in addition to general election races. And we'll get
16 into all of that, and he'll explain his reasons why
17 he does it that way. He could not have, as he'll
18 explain, analyzed the Senate without also analyzing
19 Congress because they're hand-in-glove the way he
20 does things.
21 So the only question is, after Mr. Tseytlin
22 gives it the old college try with Dr. Katz and
23 cross-examines him to the best of his ability and
24 your Honor decides whether Dr. Katz is or isn't
25 persuasive in telling you unequivocally, to a degree

1 of reasonable professional certainty, that he is sure
2 that there is no asymmetry at all in the Senate plan,
3 are you or are you not going to apply the very same
4 conclusion on the congressional side?
5 And that's where we come back to the
6 standard of review. This is a beyond a reasonable
7 doubt case. So, I mean, your Honor is going to
8 decide what your Honor's going to do, but I would
9 respectfully ask, are you going to say that you can't
10 find beyond a reasonable doubt that the Senate plan
11 is unconstitutional in part because of what Dr. Katz
12 said but then not consider it and hold that the
13 congressional plan is unconstitutional beyond a
14 reasonable doubt because you're not listening to
15 Dr. Katz because we sandbagged them? It doesn't make
16 any sense in the context of this case.
17 What Mr. Tseytlin should have done if he
18 thought that the schedule that your Honor set -- we
19 get to respond to the Senate on Thursday, and
20 everybody show up in Bath on Monday morning. They
21 could have requested a continuance. They could have
22 requested for leave to serve a supplemental expert
23 report. And, you know, we'll never know the extent
24 to which we would have consented or not, but I have
25 no problem saying that would be a reasonable request

1 to have made. Your Honor, Dr. Katz just put this in
2 on Thursday, I know we're on a tight schedule, put
3 the trial off for a couple of days, let us put in an
4 expert report on Wednesday and testify Thursday.
5 They didn't do any of that. And we sandbagged them?
6 It doesn't make any sense, your Honor.
7 Last point on that: This is a bench trial.
8 Prejudice? What does prejudice mean? Your Honor
9 knows how to call balls and strikes about what
10 evidence is fair, and your Honor is not going to
11 consider evidence that your Honor doesn't think is
12 fair. So you're going to hear from Dr. Katz,
13 Mr. Tseytlin is going to give it the old college try,
14 and your Honor will consider what he's going to
15 consider when he decides this very important case.
16 There's no reason to strike anything.
17 With respect to the remedy briefing, you
18 know, I told you when we first spoke on March 3rd
19 that I normally don't argue against amendment because
20 leave to amend is freely granted. I normally don't
21 try to stop somebody from submitting a brief. You
22 want to submit a brief, submit a brief. I love
23 writing briefs. But this is really the cart before
24 the horse. We're in the middle of a trial. Your
25 Honor hasn't decided anything. Once your Honor

1 decides whatever your Honor is going to decide --
2 THE COURT: We're on an expedited schedule
3 here. That's just going to put it off further if I
4 grant it at the end.
5 MR. HECKER: Fair enough, your Honor.
6 Well, your Honor already stated on the record --
7 clearly reserving wiggle room to do something
8 different later. But your Honor already stated on
9 the record on March 3rd that it would be, in the
10 Court's view, problematic to disrupt this election.
11 It's now March 16th. Candidates in the State of
12 New York have been petitioning in the existing --
13 THE COURT: They were petitioning before we
14 even got in here on the -- early, the first time in
15 here. Two or three days they had been passing --
16 MR. HECKER: And now it's been 16 days.
17 We're more -- we're approximately halfway through the
18 petitioning period. So your Honor's going to rule
19 against us and disrupt this election cycle? The
20 Board of Education -- Board of Elections is not even
21 here. You've had no evidence or testimony about what
22 any such ruling would do. Candidates who have money
23 in their coffers have been spending that money
24 getting petitions in the districts that are under
25 this map. You're going to hit the reset button and

1 make that start over?
2 THE COURT: I don't know how I'm going to
3 rule yet, Mr. Hecker. However, might I be negligent
4 in not -- I mean, maybe I'm going to be forced to
5 cancel this election if I rule in the petitioners'
6 favor. Maybe that's the better choice between the
7 two. I don't know.
8 MR. HECKER: I don't know either. I don't
9 know either, your Honor. But I would say,
10 respectfully -- and this is my last point -- with no
11 disrespect to this Court, just like in every
12 redistricting case that there's ever been for the
13 last 200 years, if the trial court strikes down the
14 plan for any reason, there's a stay and we go up.
15 That's the way it works, and that's not in any way to
16 undermine this Court's authority. It's just the way
17 it works.
18 So the notion that there's anything to talk
19 about with respect to remedy, forget about today.
20 Anytime soon the Fourth Department has to weigh in;
21 perhaps the Court of Appeals has to weigh in; and
22 then down the line, if there's anything to talk about
23 about remedy, we'll look at the calendar. I just
24 don't think there's anything to talk about here.
25 And, you know, we haven't yet had the

1 conversation about where we're going to go from here
2 after today or tomorrow when the evidence is done.
3 We don't know what kind of briefing, if any, the
4 Court will ask for. You know, if they want to
5 address remedies at some point sooner rather than
6 later, that's fine. It's just premature right now.
7 THE COURT: Thank you, Mr. Hecker.
8 MR. HECKER: Thank you.
9 THE COURT: Anybody else on behalf of
10 Respondents?
11 Mr. Bucki, for the Assembly?
12 MR. BUCKI: Good morning, your Honor. We
13 would certainly second all the arguments that
14 Mr. Hecker has made. I think that the origin of the
15 dispute on these matters between the petitioners and
16 the respondents really has to deal with what I would
17 submit is a misapprehension by the petitioners with
18 respect to some basic rules of civil practice that
19 apply in special proceedings.
20 There was a motion for leave to amend that
21 was made. The motion was granted. There was an
22 opportunity for the parties to answer. Now, granted,
23 the Assembly did not serve any new expert reports
24 when the Assembly answered, but we would have had the
25 right to do so in a special proceeding because when

1 you answer you're not just serving your answer as a
2 pleading that responds to an amended petition; that
3 also entails the opportunity to serve other
4 affidavits that may oppose that amended petition as
5 well. And so the additional affidavit, such as
6 Dr. Katz's affidavit that was served on behalf of the
7 Senate, that was perfectly fair game and consistent
8 with the rules with respect to timing that would
9 apply in a special proceeding.
10 With respect to the issue of further
11 briefing, I would submit further that Petitioners
12 have had multiple opportunities to serve whatever
13 briefs they have wanted to concerning the remedy
14 issue. They had their initial brief. They had
15 their -- an additional opportunity for reply before
16 we were here on March 3rd. They served another
17 letter. And now they couldn't get it right three
18 times, and now they want a fourth opportunity to say
19 what they could have said the first three times, and
20 we would submit that that's simply inimical to the
21 summary nature of a special proceeding, in which
22 CPLR 403, 404, and 405 set a rigorous schedule for
23 briefing to be done. There's a petition. There's an
24 answer. There's a reply. They had their
25 opportunity, and they frittered away that

1 opportunity, and we would submit that now is not the
2 time for further briefing on something that they
3 could have briefed already.
4 And, furthermore, we did include a copy of
5 the transcript from the proceedings before this Court
6 March 3rd. We certainly construed, and I think
7 reasonably so, that the Court was very much clear
8 that it perceived that it was probably too late to
9 hold off 2022 elections and that perhaps there would
10 need to be further elections in 2023. And if the
11 respondents (sic) had any issue with that, I would
12 submit further they could have made a motion for
13 leave to reargue under CPL 2221(d). A motion for
14 leave to reargue needs to set forth satisfaction of
15 certain requirements, and that isn't what they've
16 done. That was an option that was available to them,
17 and they chose not to exercise that. And we would
18 submit, again, that the time for briefing has passed
19 on the remedy issue and that the Court's decision in
20 the colloquy on March 3rd on that issue was sound and
21 there's no need for it to be revisited.
22 THE COURT: Thank you, Mr. Bucki.
23 Anybody else? On behalf of the Governor,
24 Lieutenant Governor? Ms. McKay?
25 MS. McKAY: Yes, your Honor. The only

1 proposed order to show cause that related to the
2 Governor's and Lieutenant Governor's case is the
3 final one -- I believe it's Motion Number 9 --
4 regarding the supplemental briefing, and I would
5 certainly join in my colleagues' arguments with
6 respect to that motion.
7 I would also like to point out -- I mean, I
8 think it's plain and simple -- your Honor had ruled
9 on that issue. I believe Mr. Tseytlin today tried to
10 construe that as some kind of motion for interim
11 relief. Well, my question would be, where was that
12 motion? We know what that would have looked like.
13 It would have been a TRO application or an
14 application for a preliminary injunction, and there
15 wasn't one filed. The issue --
16 THE COURT: I think some of the paperwork
17 asked for it, though, didn't it?
18 MS. McKAY: It certainly asked for it, but
19 what that would mean is that they were seeking that
20 relief in their petition and that your Honor was not
21 ruling on an application for interim relief. Your
22 Honor was ruling on the claim that was sought in the
23 petition. So I think that your Honor has already
24 been quite clear with respect to disrupting the
25 current election process, which is already underway.

1 And to the extent that they want -- Petitioners
2 wanted to reargue that decision, I believe that they
3 would absolutely have needed to file a motion to
4 reargue in order to do the proper procedure. So
5 that's all that I'll add in addition to joining with
6 my Senate and Assembly colleagues. Thank you, your
7 Honor.
8 THE COURT: Thank you, Ms. McKay.
9 Anyone else?
10 (No response.)
11 THE COURT: All right. Regarding the
12 motion by Petitioners for the expert reports of
13 Jonathan Katz and Dr. Tapp to be stricken at least in
14 part, I'm going to reserve for the moment on Dr. --
15 Professor Katz. I want to look at something, but it
16 won't be long. As regards to Dr. Tapp, I'm going to
17 rule that Dr. Tapp's report will be considered in
18 response to any new material in Trende's reply report
19 and may testify as such. That's really what I'm
20 ruling. The rest of it would be stricken.
21 As regards to leave to submit supplemental
22 briefing, I'm going to allow both parties to submit
23 supplemental briefing. It in no way indicates how
24 I'm going to rule on the case, but I will grant both
25 parties the right to submit supplemental briefing.

1 And I know we're on a tight schedule. I'm directing
2 that those be submitted by Friday, the 18th at 4:00
3 p.m. That's on those two motions.
4 Let's move to the motion by Petitioner
5 asking for an adverse inference to be drawn from the
6 respondents and their failure to appear for noticed
7 depositions.
8 MR. WINNER: Good morning, your Honor.
9 THE COURT: Good morning, Mr. Winner.
10 MR. WINNER: Thank you. Your Honor, on
11 March 3rd Petitioners sought leave to amend -- or
12 leave to conduct discovery, and that discovery was
13 limited and was ordered -- or decided that it would
14 be able to be conducted to allow to be determined
15 whether or not the maps that were adopted by the
16 Legislature were directed and controlled by one party
17 and whether the Republicans had any opportunity to
18 participate and was the IRC process constitutionally
19 undermined.
20 Important in that order were two other
21 very, very important factors in that decision, your
22 Honor. The Court pointed out that the matter needed
23 to be provided with the highest priority and all
24 other matters be aside. In addition, your Honor
25 pointed out the deadline of the 60-day issue and the

1 fact that March 12th was the deadline to proceed with
2 respect to concluding that discovery.
3 So faced with those two particular
4 deadlines, we went forward, and your Honor filed the
5 decision, and thereupon a notice of appeal was taken,
6 whereupon the Respondents felt that that notice of
7 appeal constituted an automatic stay of the
8 proceeding with regard to any discovery. We believe
9 that that was the beginning of an effort to thwart
10 your Honor's order -- or decision; and, as such, we
11 moved immediately for an application to vacate the
12 automatic stay, which was vigorously opposed by the
13 respondents.
14 Justice Lindley then ruled that the
15 decision did not constitute an order and, therefore,
16 there was no automatic stay. However, he pointed out
17 that in the event that it was an order under
18 5519(a)(1) that it did not prevent discovery from
19 going forward once an order was filed. On March 9th
20 your Honor filed an order granting expedited
21 discovery pursuant to your March 3rd decision, and
22 that order referenced your Honor's review of the
23 papers presented in that case, which included notices
24 of deposition.
25 THE COURT: And that was immediately

1 appealed, wasn't it, my order?
2 MR. WINNER: Your order was not -- that
3 March 9th order was not appealed.
4 THE COURT: But I got a notice of appeal.
5 MR. CUTI: It was, your Honor.
6 MR. WINNER: Excuse me, your Honor. That
7 was immediately appealed. However, the automatic
8 stay does not preclude us from going forward and
9 filing our notices of deposition and proceeding to
10 take notice that the discovery process would
11 continue.
12 THE COURT: You're saying there's no
13 automatic stay, Mr. Winner, once I ruled -- or issued
14 an order after the decision and they appeal it?
15 You're saying there's no automatic stay?
16 MR. WINNER: Yes, your Honor, I'm saying
17 that there is no automatic stay. As Justice
18 Lindsey -- Lindley pointed out, that discovery could
19 go forward once the order was filed; and, therefore,
20 we went forward immediately with notices to take
21 deposition testimony by subpoena. The respondents
22 objected and said that the subpoenas were not proper
23 and that we needed to file notices of deposition,
24 which we promptly did. Both of the subpoenas and the
25 notices of depositions were aimed at Phillip --

1 LATFOR members Phillip Chonigman, Michael Gianaris,
2 Eric Katz, and the IRC David Imamura. And both the
3 subpoena and the notices set forth the same date and
4 time and place for the deponents to appear.
5 The objections that the petitioners -- or
6 the respondents filed or proffered with respect to
7 the deposition notices were the same litigated issues
8 of legislative privilege. They also contended that
9 depositions were not authorized under your Honor's
10 order and decision of March 3rd, and yet those orders
11 authorized discovery without limitations as to form,
12 and the depositions are certainly a form of
13 discovery. See Lopez versus Imperial. But here's
14 the strategy --
15 THE COURT: But in a special proceeding,
16 Mr. Winner, the discovery rules are a little
17 different than your normal case, and my understanding
18 is discovery -- no discovery unless it's authorized
19 and maybe with some particularity as to what you're
20 seeking in discovery.
21 MR. WINNER: You're right, your Honor, and
22 that's what you particularly noted in your March 3rd
23 decision.
24 THE COURT: I think my order just said
25 discovery, discovery is granted. I mean, there was

1 no grant of depositions in particular or subpoena
2 duces tecum.
3 MR. WINNER: Well, your Honor, your -- this
4 March 9th order referenced discovery to proceed
5 pursuant to your decision of March 3rd, and your
6 decision of March 3rd specifically authorized the
7 petitioners to seek discovery as to whether or not
8 the map-drawing process was controlled by one party;
9 whether there was any participation of the Republican
10 party; and, additionally, whether or not the IRC's
11 process was interfered with. Those were your
12 specific directives in the decision of March 3rd.
13 And so -- but where the respondents'
14 determination to prevent any kind of discovery fell
15 down was that when the notices to produce -- or
16 notices for deposition were served. Then it was
17 incumbent upon the respondents to move to a -- for a
18 protective order. And under 3107 McKinney's
19 commentary points out very, you know, distinctly --
20 and I'll quote -- that if the disclosure that is
21 sought for any reason unwarranted or improper, the
22 resisting party or witness has a remedy in the motion
23 for a protective order under CPLR 3103(a). The
24 resisting person should make the motion promptly and,
25 in any event, before the day scheduled for the

1 examination. The respondents made no such protective
2 order application, thumbed their noses at your
3 Honor's order and authorization to seek discovery
4 and, as such, subjected themselves to the potential
5 sanction under 3126 of the CPLR.
6 And had the deponents appeared, in our
7 judgment, and answered proffered questions under
8 oath, they would have acknowledged that the process
9 directed and controlled by one political party was
10 done with no Republican participation and that the
11 political data was used to favor the Democratic party
12 and that the IRC process was undermined by
13 Respondents. And so as a result, your Honor, we
14 would, therefore, request the Court, per 3126, to
15 draw adverse inferences against each of the deposed
16 deponents for their failure to appear and answer
17 questions at the duly scheduled time and place for
18 their deposition.
19 THE COURT: What was the reason that they
20 gave for not complying with the -- whether it was the
21 depositions or subpoenas, what was the reason they
22 gave for not --
23 MR. WINNER: Well, the primary reason that
24 the respondents have raised is that the issue of
25 legislative privilege in the Speech or Debate Clause

1 of the Constitution precludes legislators and the
2 legislative staff from appearing to answer questions
3 outside the Legislature.
4 THE COURT: Isn't there -- I mean, we
5 argued about this one other time here. Isn't that a
6 legitimate issue?
7 MR. WINNER: Well, it was a legitimate
8 issue to raise, your Honor. However, your Honor
9 ruled against them with respect to authorizing the
10 discovery -- limited discovery based upon those three
11 provisions; and, therefore, they did not proceed to
12 present themselves for the properly noticed
13 depositions to answer the questions that your Honor
14 specifically authorized to be raised in the March 3rd
15 decision and the March 9th order.
16 THE COURT: Anything further, Mr. Winner?
17 MR. WINNER: No, your Honor.
18 THE COURT: Thank you.
19 MR. WINNER: Thank you.
20 MR. CUTI: Your Honor, if I may.
21 THE COURT: Mr. Cuti?
22 MR. CUTI: Good morning, your Honor.
23 THE COURT: Good morning.
24 MR. CUTI: I just want to start with
25 legislative privilege because that's where Senator

1 Winner just ended, and I'd like to read a paragraph
2 from a brief that I did not write, but let me read it
3 into the record. The Speech or Debate Clause is
4 designed to protect the individual members from being
5 called to answer for their actions in any other place
6 than the legislative body of which they are a member.
7 Internal quote, the immunities of the Speech or
8 Debate Clause were not written into the Constitution
9 simply for the personal or private benefit of members
10 of Congress but to protect the integrity of the
11 legislative process by ensuring the independence of
12 individual legislators, close internal quote, United
13 States versus Brewster, 408 US 501, 507 (1972).
14 The individual members act through various
15 vehicles, including committee work. Committees are
16 themselves protected by the privilege. The privilege
17 is unique in that it serves both individual and
18 structural purposes and insulates both the person of
19 the Legislature as well as the legislative acts of a
20 legislator, particularly in service to the
21 legislator's informing function. To that end there
22 are structural limits unique to members of the
23 Legislature and the legislative process, close quote.
24 Now, I'll tell you who wrote that brief. A
25 very fine lawyer. Taught me cross-examination back

1 in 1992. His name is David Lewis -- and you know who
2 his client was? It was Senator Winter (sic) -- who
3 submitted that brief in a case called In the Matter
4 of the Governor of the State of New York versus State
5 Senator George H. Winner. They know that the
6 privilege is absolute. Senator Winner's counsel
7 cited the United States Supreme Court broadly
8 construing the federal Speech or Debate Clause, the
9 same exact clause I told your Honor that the New York
10 Constitution provides at least as much protection as.
11 Now let me turn to the motion for
12 sanctions. We were here on March 3rd. The
13 petitioners moved, as they were required to in this
14 special proceeding, for permission even to serve
15 requests for disclosure. Now, I remember the oral
16 argument well -- it wasn't that long ago -- and I
17 read the transcript a few times. Mr. Tseytlin never
18 once mentioned an intention to seek deposition
19 testimony during that oral argument. Your Honor --
20 THE COURT: Was it part of their paperwork?
21 MR. CUTI: It was. Your Honor then asked a
22 question solely about the discovery demands for
23 documents. Mr. Tseytlin responded only to that
24 question and said, your Honor, we're happy to narrow
25 our five requests. There were five requests for

1 documents in the proposed document demand. I got up
2 a few minutes later -- and this is all in my
3 affirmation that was filed yesterday afternoon.
4 THE COURT: I read it.
5 MR. CUTI: -- okay, and I only focused on
6 the document demands.
7 So when I was in the car heading back and
8 read the decision that was posted pretty shortly
9 after the argument, I interpreted it to allow them to
10 serve discovery demands, which, as my papers reflect,
11 is a term of art that means demands for inspection
12 and production of documents.
13 Now let me talk briefly about the automatic
14 stay. I believe Mr. Bucki may have mentioned
15 something about that on March 3rd, but I never did
16 because I understand what CPLR 5519(a) means. A
17 government actor does not get an automatic stay no
18 matter what the nature of the underlying order is.
19 The automatic stay arises only if the lower court's
20 order directs the government to take affirmative
21 action. Your decision didn't direct the Senate
22 Majority Leader or any other respondent to take any
23 action at all. You just granted Petitioners' leave
24 to do something. So I knew there was not an
25 automatic stay, and we directed our clients on

1 March 3rd to begin collecting and reviewing documents
2 because I knew that your decision was in effect. And
3 nothing stopped -- Mr. Tseytlin and his many
4 colleagues who have flown in here from Ohio and from
5 the City, nothing stopped them from narrowing their
6 demands and serving them on March 3rd.
7 Now, they misunderstood the CPLR and
8 mistakes happen. Now, Senator Winner just said they
9 immediately went up to the Fourth Department -- this
10 was four days later -- to vacate a nonexistent stay.
11 We were up all night submitting papers and surreply
12 papers, and then we had a long argument before
13 Justice Lindley, and then he issued his ruling by
14 e-mail given the exigency of the time. And he held
15 that your Honor's decision on March 3rd was not an
16 order, but even had it been, it didn't direct the
17 respondents to do anything, so there was no automatic
18 stay, and then he outlined what was supposed to
19 happen next. He said if the petitioners serve
20 demands for discovery, Respondents will object,
21 Petitioners move to compel, and your Honor will rule.
22 THE COURT: That was in his decision?
23 MR. CUTI: It was. I know what CPLR 3107
24 means, and in an ordinary case one would move for a
25 protective order. By the way, had we done so,

1 3107(b) gives you a stay of the requested deposition.
2 I wasn't looking to play games. I wrote three or
3 four or five letters saying we're asserting an
4 absolute privilege, make a motion to compel, we'll
5 oppose it. They never bothered.
6 Discovery sanctions are very rarely ordered
7 unless there's a violation of a court order, and
8 there was no order from your Honor directing us to do
9 anything. Now, had they moved to compel and for the
10 first time expressly asked your Honor, by the way, we
11 want to take depositions of legislative actors about
12 their legislative conduct, well, we would have had to
13 appeal or comply or both. But they didn't do that,
14 and so we didn't violate any order. And that's so
15 clear because they conceded it in their argument
16 before Justice Lindley, that you hadn't ordered us to
17 do anything, and that's the whole reason there wasn't
18 an automatic stay.
19 If you had ordered us to do something on
20 March 3rd by your decision or by your subsequent
21 codification in that decision in your March 9th order
22 from which we appealed, if that order directed us to
23 provide X or to sit for Y depositions, well, then we
24 would have appealed it, had a stay; things would have
25 unfolded differently. It's just not what happened.

1 Now, if I misunderstood the scope of the
2 decision and order you entered after the oral
3 argument on March 3rd -- I represent to you that I
4 believe that the only thing you granted leave for
5 them to do was serve document demands because that's
6 all that was discussed at the oral argument that I
7 prepared rigorously for and paid close attention to.
8 But let's assume that I was wrong, because I'm wrong
9 like everybody else once in a while. I certainly
10 acted in good faith.
11 And so when you have a situation where
12 there's not even arguably a violation of an order of
13 the Court, the only -- and we cite these cases in the
14 papers. You can't sanction a party unless there's
15 deliberate repeated flouting of legitimate discovery
16 demands. And we didn't do that. They served
17 subpoenas on -- your Honor, can I get a sip of water?
18 THE COURT: Pardon me?
19 MR. CUTI: Can I get a sip of water?
20 THE COURT: Absolutely.
21 MR. CUTI: Pardon me. They purported to
22 serve subpoenas on Senator Gianaris and the counsel
23 to the Majority Leader; Mr. Katz; and to Phillip
24 Chonigman, who is the co-executive director of
25 LATFOR. Now, LATFOR, L-A-T-F-O-R, LATFOR is a

1 respondent in this proceeding. And if they had read
2 the CPLR a little more carefully, they would have
3 realized that members and agents and employees and
4 directors of a party are construed to be parties for
5 purposes of Article 31 of the CPLR. And as I imagine
6 your Honor knows, you don't serve subpoenas on
7 parties. You serve subpoenas on nonparties.
8 Now, they served subpoenas that were
9 defective on their face. And so if I was acting --
10 if I was using sharp-elbowed litigation, as
11 Mr. Tseytlin referred to before, I would have just
12 ignored them, and when they came to your Honor to
13 say, they ignored these subpoenas, I would have
14 embarrassed them by saying they had no right to serve
15 subpoenas, but I didn't do that. I let them know by
16 letter, and in that letter I said, these are invalid
17 on their face; you're not supposed to be sending
18 process servers to represented parties; if you want
19 to seek this deposition testimony, which I put in the
20 letter they didn't have the right even to seek, as I
21 read your Honor's decision, they needed to serve
22 notices of deposition.
23 So I gave them a heads-up, which is
24 professional, which was courteous, and which was
25 evidence of my complete good faith. And when they

1 served the notices of deposition, I did what I told
2 them I was going to do. I asserted the absolute
3 legislative privilege pursuant to what Justice
4 Lindley recommended was the procedure to be followed
5 going forward. That is the opposite of willful,
6 contumacious, bad-faith behavior.
7 We produced -- even though this is the
8 middle of budget season and Senator Gianaris and the
9 counsel to the Leader are consumed in the annual
10 process of enacting the budget for this enormous,
11 complicated state, they set matters aside, because
12 you told me to tell them to do that, and they
13 gathered documents, and we produced them not on the
14 last day, on the day they asked us to produce them.
15 They made their document demands returnable on the
16 12th, yet they only gave us 17 hours to show up for
17 the deposition on Friday morning.
18 And Senator Winner got up this morning and
19 said, we -- they deprived us of evidence of showing
20 there was no -- no Republican involvement in the
21 process. Well, maybe they haven't reviewed the 388
22 pages of documents we produced, because the answer to
23 that question is in those documents. They haven't
24 been deprived of that evidence, your Honor.
25 Let me turn now to one of my favorite

1 subjects, which is the federal common law of
2 qualified privilege. Your Honor's decision
3 compared -- I was going to say equated, but I will
4 say compared -- members of LATFOR to lobbyists, and
5 that section of your Honor's opinion was very, very
6 close to verbatim with Petitioners' reply brief that
7 we did not have an opportunity to respond to before
8 the oral argument. And the case they cite, Rodriguez
9 versus Pataki, the decision of the magistrate judge
10 in that case --
11 MR. TSEYTLIN: Your Honor --
12 MR. CUTI: I'm right in the middle of an
13 argument, sir. You can wait for me to finish if you
14 don't mind.
15 THE COURT: I'll let you have a chance
16 afterwards, Mr. Tseytlin.
17 MR. TSEYTLIN: Sorry, your Honor.
18 MR. CUTI: As you may know, in the federal
19 system the magistrate judge is lower than the
20 district court judge and parties have the right to
21 appeal a magistrate judge's decision to the district
22 court, somewhat like the parties here can appeal to
23 the Fourth Department. I'm referring now to Exhibit
24 O to the affirmation I filed yesterday in opposition
25 to this motion, which is some of the papers that we

1 filed in the Fourth Department, and I'm referring
2 specifically to Paragraphs 87 and 88 and 89 and 90
3 and 91 of that submission. And it explains that the
4 language that your Honor quoted from the magistrate
5 judge, that language exists, but there were
6 subsequent decisions in that litigation, and the
7 magistrate judge later ruled that the qualified
8 privilege applied to LATFOR as it did to other
9 legislative actors with respect to, quote, the
10 reasons why they and others in the Senate Majority
11 Redistricting Office drew the lines for particular
12 Senate districts in the ways they did.
13 And that's the information they seek here,
14 and even under the qualified privilege, the
15 magistrate judge in Rodriguez held it was privileged.
16 There was an appeal from that. It went up to the
17 district court, and the district court emphasized,
18 quote, the rather narrow circumstances, close quote,
19 addressed in the magistrate judge's order and
20 emphasized that there was no authorization to
21 conduct, quote, any depositions of legislators or
22 their staffs, close quote, and that no discovery of
23 any LATFOR official was permitted, close quote, where
24 LATFOR was acting solely as the surrogate of the
25 Majority Leader or other individual members of the

1 Legislature, close quote, 293 F. Supp. 2d 305.
2 I knew that law, and I knew that it didn't
3 apply, but I also knew that even if it did, they
4 didn't have a right to depose these legislative
5 officials about their motivations and their
6 legislative conduct. Petitioners are asking your
7 Honor to do something that no Court has ever done,
8 and that is to draw an adverse inference against the
9 Legislature because a legislator did not provide
10 testimony. It's never been done.
11 In the case of North Carolina State
12 Conference of NAACP versus McCrory,
13 997 F. Supp. 2d 322 (2014), the Court noted in
14 Footnote 47, Plaintiffs argued at the hearing that
15 the Court should draw an adverse inference from the
16 fact that Defendants have asserted legislative
17 privilege and refuse to disclose certain
18 communications that Plaintiffs argue might be
19 probative of intent. This would be inappropriate.
20 Drawing such an inference would be tantamount to
21 punishing a party for asserting a privilege,
22 especially one that as of yet had not been determined
23 to be unavailable. It would also be contrary to the
24 Court's prior discovery ruling.
25 In the case of Florida versus United

1 States, 885 F. Supp. 2d 299, the Court also refused
2 to -- let me just read it to you. This is at
3 Footnote 65: The defendants maintain that we should
4 not weigh these contemporaneous statements in
5 Florida's favor but should instead draw an adverse
6 inference against the state because Florida
7 deliberately chose not to put forward any legislator
8 deposition testimony and actively opposed the United
9 States' and interveners' efforts to compel such
10 testimony. During the discovery phase of this case,
11 the interveners moved to compel deposition testimony
12 from four Florida legislators and two legislative
13 staff members, but a federal court in Florida denied
14 the motion on the grounds of legislative privilege,
15 refusing to draw any adverse inference.
16 The only case -- up pretty late last night.
17 The only case that I can find where a Court entered
18 discovery sanctions in a redistricting case against a
19 government actor was in the Detzner litigation in
20 Florida in 2015. Now, Florida does not have a Speech
21 or Debate Clause in its Constitution, and that's not
22 even actually that relevant, but I just want to make
23 sure the record's clear on that. Sanctions were
24 imposed in that case because the Court found that
25 members of the Legislature had, quote, systemically

1 deleted almost all of their e-mails and other
2 documentation relating to redistricting, close quote.
3 Now, that's your classic case for sanctions,
4 spoliation of material evidence. There's no
5 allegation of that here nor could there be. I simply
6 told my clients -- not waiving any privileges here.
7 I simply told my clients, you have an absolute
8 privilege, and if you go down there and you answer,
9 you can't un-ring the bell.
10 I hope your Honor does not enter any
11 sanction in this case, but if you do, I just want to
12 make a technical point. The three persons that they
13 served notices of deposition on are agents of LATFOR.
14 Now, LATFOR is a party here. But at most you could
15 draw an inference -- and I hope you don't because
16 there's no basis for it. But at most it would be
17 against LATFOR, not the Senate Majority Leader, not
18 the Speaker of the Assembly, and not the Governor.
19 But this case, one of fundamental constitutional
20 importance, should be decided on the merits, not
21 based on an inference that is simply not supported by
22 the law.
23 Do you have any questions, your Honor?
24 THE COURT: No. Thank you, Mr. Cuti.
25 MR. CUTI: Thank you so much.

1 THE COURT: Before we get to Mr. Tseytlin,
2 is there anyone else?
3 Mr. Bucki?
4 MR. BUCKI: Good morning again, your Honor.
5 We began the morning with the charge of sandbagging
6 from the petitioners, and I would submit that this
7 motion concerning discovery really is the sandbagging
8 that's going on. We went in front of Justice Lindley
9 a week ago Tuesday after this Court entered what all
10 of us actually thought was an order authorizing leave
11 for discovery to be engaged in. And, in fact, when
12 one goes to the NYSCEF docket, it reads decision and
13 order on motion. It was uploaded. It was entered as
14 an order. And, in fact, I guess all of us got it
15 wrong, construing that as an order, because then
16 Justice Lindley said, you know what, it wasn't an
17 order after all. And so as a consequence there was
18 nothing for him to rule upon.
19 Justice Lindley did set forth in great
20 detail a process that the parties should follow with
21 respect to discovery disputes forthcoming, and that
22 process is laid out in Exhibit B to Mr. Cuti's
23 affirmation, and the process went like this: that,
24 first of all, there needed to be an actual order, in
25 Justice Lindley's view, that would come from your

1 Honor. And, in fact, your Honor did issue that order
2 pretty promptly after we brought the issue -- after
3 the petitioners, rather, brought the issue to your
4 Honor's attention. Then there would need to be
5 service of discovery demands. And, in fact, those
6 demands were served by the petitioners, and those
7 demands included some deposition notices, which were
8 much narrower than the initial deposition notices and
9 subpoenas that had been proposed originally by the
10 petitioners, narrowed to the extent that now my
11 client, the Speaker of the Assembly, was no longer
12 sought for a deposition. And, in fact, no one from
13 the Assembly was sought for a deposition. Everyone
14 who was sought to be deposed was either under the
15 control of the Senate, namely, Senator Gianaris
16 himself, and some employees of LATFOR that are on the
17 Senate side of LATFOR and then, in addition, a
18 commissioner of the Independent Redistricting
19 Commission, which is not a party to this case. Those
20 were the depositions that were sought by the
21 petitioners.
22 So all that the Assembly had before it was
23 a document demand. And notwithstanding the position
24 that we took on March 3rd with respect to
25 CPLR 5519(a)(1), which it turned out Justice Lindley

1 didn't even think that there was an order in place --
2 so no wonder it was determined that there was, in
3 fact, no stay -- notwithstanding that we, too,
4 encouraged the Assembly, in the event that any
5 documents would need to be produced, to start
6 compiling them so that we would be able to comply by
7 the March 12th deadline that the Court set on
8 March 3rd.
9 And Justice Lindley went on to say that
10 once these discovery demands would be served, if
11 there was any kind of objection that was made to them
12 or if the petitioners thought that the respondents
13 were not complying with their discovery obligations,
14 the response would be a motion to compel. And, in
15 fact, I would like to read from Justice Lindley's
16 decision what he said on this matter. He said,
17 quote, of course, if Respondents object to those
18 demands, being discovery demands that would be served
19 subsequent to last Tuesday, Petitioners may file a
20 motion to compel and the trial court will then be
21 called upon to resolve the discovery dispute.
22 Here there is no motion to compel. Justice
23 Lindley from the Fourth Department, whose rulings are
24 binding upon this Court, set forth the process, and
25 the petitioners didn't follow it, and I would submit

1 that the reason that they haven't followed it is that
2 they don't really care about getting any discovery in
3 this case. What they care about is getting this
4 adverse inference that they're asking for. So in
5 reality it's not that the petitioners are looking to
6 get to the truth or looking to get information from
7 the Assembly or the Senate. They want to get all the
8 benefit without doing any of the work. And we would
9 submit, particularly with respect to the Assembly,
10 that that would be patently unfair because, number
11 one, no one from the Assembly was sought to be
12 deposed. We have no control over the people who were
13 sought to be deposed, and the Fourth Department was
14 clear back in 2018 In the Matter of Estate of Lewis
15 that when a party is not -- who is sought to be
16 deposed -- any individual who is sought to be deposed
17 is not under the control of a party, no adverse
18 inference can be taken against that party.
19 And when one looks at the motion that was
20 made by order to show cause by the petitioners for an
21 adverse inference, they asked for an adverse
22 inference to be taken not only against the Senate
23 Majority and the Leader but also against the Speaker
24 and all of the respondents, and we would submit that
25 that is simply impossible given the fact that the

1 Assembly had nothing to do with the so-called willful
2 and contumacious conduct, which I would submit was
3 not willful or contumacious at all given what
4 Mr. Cuti so eloquently said. But we had nothing to
5 do with who was going to appear for a deposition and
6 who wasn't.
7 And notwithstanding that, the best that the
8 petitioners can do is drop a footnote in their
9 memorandum of law in support of the adverse inference
10 request to say that they have a generalized grievance
11 with the way that the Speaker of the Assembly
12 responded to the discovery demands that the Speaker
13 did get, and I would submit that we absolutely
14 complied with our discovery obligations because, in
15 fact, we did serve 131 pages of responsive documents
16 and we served a document response that set forth the
17 Bates-numbered pages that were applicable to
18 particular requests.
19 We did raise some objections, but I cannot
20 recall a single time that I've ever seen a response
21 to a document demand that doesn't set forth some
22 kinds of objections. And if the petitioners have any
23 problems with any objections that we've asserted or
24 what the Majority Leader of the Senate has asserted
25 or any respondent has asserted, they've been given a

1 procedure by Justice Lindley to follow, and they
2 haven't followed it. And, further, the reason why
3 they haven't followed it is that Justice Lindley also
4 said that if a motion to compel were made and this
5 Court were to issue an order compelling disclosure
6 and then if any of the respondents were to file a
7 notice of appeal that that action clearly would give
8 rise to a stay under CPLR 5519(a)(1).
9 And so in reality what the petitioners are
10 also trying to do in their motion is to evade
11 appellate review that would be meaningful with
12 respect to the legislative privilege, which, once
13 documents are produced, the privilege bell cannot be
14 un-rung. And, further, what they're trying to do is
15 to evade our right under CPLR 5519 to get that stay
16 so that we can seek meaningful appellate review, and
17 that stay would not exist in response to necessarily
18 a motion for a protective order that would be on
19 appeal, depending upon what your Honor's order would
20 say.
21 So we would submit, number one, there is no
22 basis at all to take an adverse inference against the
23 Speaker of the Assembly and, even if there were, we
24 have complied with our discovery obligations. The
25 petitioners had a means to object if they had any

1 problem with the discovery that we produced. They
2 have not taken those steps, and there is no reason to
3 take an adverse inference. If they want to make a
4 motion, they certainly can. We submit it would be
5 unsuccessful. But let's follow the process that
6 Justice Lindley laid out if there are any kinds of
7 issues pertaining to discovery.
8 THE COURT: Thank you, Mr. Bucki.
9 MS. McKAY: Your Honor --
10 THE COURT: Ms. McKay?
11 MS. McKAY: -- may I briefly be heard?
12 For the purposes of the record, I just want
13 to make clear I hadn't planned on presenting any
14 argument with respect to this order to show cause. I
15 do not interpret that order as seeking sanctions
16 against the Governor or the Lieutenant Governor.
17 However, for the purposes of the record, I want to
18 make it clear that the only discovery that was served
19 on the Governor and Lieutenant Governor were document
20 demands to which we did fully respond and that that
21 does not appear to be any subject of the order to
22 show cause that is before your Honor. And if that's
23 an improper interpretation of it, I would
24 respectfully request an opportunity to very briefly
25 provide papers to the Court explaining why any kind

1 of an adverse inference with respect to my clients
2 would be absolutely inappropriate.
3 THE COURT: Thank you, Ms. McKay.
4 MS. McKAY: Thank you, your Honor.
5 THE COURT: Mr. Tseytlin?
6 MR. CUTI: Your Honor, I object to somebody
7 who didn't argue the motion getting up to do the
8 reply.
9 THE COURT: I'm going to let him do it, but
10 I'll let you reply to his reply.
11 MR. CUTI: Thank you, your Honor.
12 MR. TSEYTLIN: Just -- I'll be very quick.
13 The reason I was standing up -- I apologize. I
14 should have waited until my fellow counsel
15 finished -- is I thought that he was basically orally
16 arguing a motion for reconsideration of your Honor's
17 decision, explaining why he thought that was wrong,
18 and I thought that was inappropriate, but I do
19 apologize. I should have waited until after he
20 finished.
21 With regard to Justice Lindley's statement,
22 he said there needed to be objections. The way that
23 objections are done to deposition notices is by a
24 motion for a protective order. They didn't file
25 that, and because they didn't file that, even though

1 the CPLR requires that, they had to show up.
2 Certainly if they had filed that, that would have
3 been the objection. There are different ways to
4 object to different discovery requests. The way you
5 object to a deposition notice or a subpoena is by
6 filing a protective order.
7 There was a comment from my friend here
8 that said, oh, we're not really trying to get
9 questions answered. We read all our questions into
10 the record. Those are the questions we had intended
11 to ask. Those questions are really by far the best
12 way to get at the issues that we're trying to get at.
13 Those questions are before your Honor. You know, I
14 think it would have been hard for anyone to, under
15 penalty of perjury, say that political data wasn't
16 used in drawing these maps. But, I mean, I guess if
17 they had showed up, we would see if they were willing
18 to say something like that.
19 Now, in terms of the inferences, I do want
20 to clarify. We're asking for adverse inferences
21 against LATFOR and the individuals that didn't show
22 up, not asking for adverse inferences against the
23 Governor or Lieutenant Governor, not asking for
24 adverse inferences against your client. It is often
25 the case in a redistricting litigation that if the

1 map drawer, which is here LATFOR, used political
2 data, got improper communications, that's seen as
3 important evidence. You know, an admission at a
4 deposition about that is seen as important evidence
5 because they are the map drawer.
6 We're not asking for an actual finding of
7 legislative partisan intent or the Governor's intent
8 on signing it. We're saying the map drawers, they
9 use political data. I mean, everyone knows they use
10 political data, but this was the way we were going to
11 get that admission because they would have been under
12 oath, but they didn't show up.
13 And then, finally, this documents thing,
14 you know, they've basically gave us no meaningful
15 documents. They print out a bunch of pages from the
16 public debates over the maps and some tweets.
17 THE COURT: Maybe there aren't any.
18 MR. TSEYTLIN: Maybe there aren't any.
19 Maybe there are. If there aren't any, that's exactly
20 why a deposition was so important, because we have
21 the right to inquire, did you take political data
22 into account in drawing this notorious gerrymander?
23 Under oath, you know, everyone knows the answer to
24 that if they were going to answer it. Did you
25 interfere with the IRC process? We suspect they did.

1 I'm not going to say it with as much confidence as I
2 do about the political data, as to what their answer
3 might have been. Did you cut Republicans out of the
4 process? We have a sworn affidavit saying
5 Republicans were not part of the process. I assume
6 they would have conceded to that, but we'll never
7 know because they didn't show up.
8 THE COURT: Didn't Mr. Cuti object to your
9 discovery requests for LATFOR?
10 MR. TSEYTLIN: He objected to our
11 deposition notice, and the way you object to a
12 deposition notice under the CPLR is by filing a
13 protective order. He didn't do that. You know, to
14 be frank, I expected them to file a protective order.
15 We would have been immediately opposed. We were
16 hoping to convince your Honor to deny that, and they
17 would have taken their appeal.
18 They, for reasons passing our
19 understanding, didn't do the typical thing, which is
20 file for a protective order. They just didn't show
21 up. We had a bunch of attorneys that read the
22 question into the record, which we wouldn't have done
23 if they had filed for the protective order and had
24 been granted it. So they made those choices. You
25 know, as Mr. Cuti says, people make mistakes. They

1 made a mistake by not seeking a protective order, and
2 so they had the obligation to show up, and they
3 didn't do so, and the only effective relief is an
4 adverse inference because discovery, of course, was
5 closed.
6 THE COURT: Thank you.
7 Mr. Cuti?
8 MR. CUTI: Thank you, your Honor. That
9 argument is a great example of elevating form over
10 substance. I know how to make a motion for a
11 protective order. I was following what an appellate
12 judge told me to do, which was object. Now -- but
13 let's play out their scenario. If --
14 THE COURT: Is there a more formal way to
15 object?
16 MR. CUTI: A motion for a protective order
17 is what one generally would do. Now, even if I
18 hadn't done that and even if I could have gotten the
19 Senator and the counsel to the Majority Leader and
20 Dr. Chonigman together on 17 hours' notice and
21 absented myself and two of my colleagues from trial
22 prep -- remember now, this is three or four days
23 before trial, 17 hours' notice that they want
24 sanctions for -- when we got to the deposition, I
25 would have instructed them not to answer every

1 question about their motivation or their intent. So
2 is this just an exercise in playing games? I don't
3 know. I don't like to play games in litigation. I
4 like to get to the point.
5 The complaint that they were deprived of
6 evidence about whether Republicans were cut out of
7 the process I've already addressed. If they look at
8 the documents carefully, maybe they could find
9 something.
10 Now, with respect to -- and I know your
11 Honor raised some concerns about this at the
12 March 3rd argument, about whether there was
13 Democratic interference with the process of the IRC.
14 I'll just note that in our answer to the amended
15 petition, which is verified -- none of their
16 pleadings was verified -- there is a specific sworn
17 representation that the respondents did not interfere
18 with the IRC. That hasn't been rebutted. I'll
19 represent to you that there was no information to
20 share about that because none exists. Thank you,
21 your Honor.
22 THE COURT: Thank you.
23 Mr. Bucki, one last -- one minute and I
24 want to move on.
25 MR. BUCKI: The only thing I would like to

1 add on behalf of the Speaker, your Honor, is, with
2 respect to LATFOR, Mr. Tseytlin says, oh, we're
3 looking for an adverse inference against LATFOR. I
4 think what's important to acknowledge is that the way
5 LATFOR is set up, there's an Assembly side of LATFOR
6 and a Senate side of LATFOR. And the only people who
7 were sought for a deposition were people who work on
8 the Senate side of LATFOR, no one on the Assembly
9 side of LATFOR, and so to take the proposed adverse
10 inference against LATFOR, in effect, would be taking
11 an adverse inference against the Assembly and people
12 under the control of the Assembly and the Speaker,
13 and for the reasons I've already stated, that would
14 not be appropriate.
15 THE COURT: Thank you, Mr. Bucki.
16 MR. TSEYTLIN: Your Honor, I apologize. I
17 want to clarify the record on what was just said. We
18 did a notice of deposition on LATFOR as an entity,
19 and no one showed up for that, so just to clarify
20 that.
21 THE COURT: Thank you.
22 I'm denying the adverse inference. I think
23 Judge Lindley did set forth a process and I
24 understand, but I think the petitioners did know that
25 there was objections lodged, and they could have come

1 in to me to be more specific as to -- and actually
2 order the respondents to provide certain kinds of
3 discovery. Therefore, I'm denying that motion.
4 I'll get back to you on -- I'm going to
5 take a ten-minute break. I'll get back to you on my
6 reservation on the Katz report, or affidavit. We'll
7 take ten minutes. Thank you.
8 (A recess was taken.)
9 (Respondents' Exhibits S-16 and S-17 were
10 marked for identification.)
11 MS. McKAY: May I be heard on something?
12 THE COURT: Pardon me?
13 MS. McKAY: May I be heard on something?
14 THE COURT: Yes.
15 MS. McKAY: Okay. With respect to the
16 supplemental briefing deadline, I would request --
17 first of all, it seems like this is supplemental
18 briefing that's on a remedy that is sought by
19 Petitioners here, so I would request that the
20 deadlines for the briefing be staggered. I'm also
21 doing that in part because of my own personal
22 schedule. I have depositions all day on Friday, so
23 there's no way that I can comply with the deadline.
24 I don't believe -- I'm not at a big firm. I don't
25 have a lot of other people at my disposal, so I would

1 request that that deadline for Respondents be pushed
2 to Monday or Tuesday.
3 I did approach Mr. Tseytlin about this. He
4 indicated he's amenable, and he can speak to this
5 too, to pushing everyone's deadline, perhaps, if your
6 Honor feels that you would have enough time, to the
7 following week. However, I want to put on the record
8 my request that it be staggered because as of right
9 now I don't know what I'm briefing. I don't know
10 what they'd like to brief and what they'd like to
11 argue in favor of their remedy, so --
12 THE COURT: I think everybody knows what
13 they're seeking. I'm assuming they're seeking, you
14 know, suspending the current election.
15 MS. McKAY: Well, I think, you know, in
16 terms of -- I'd like to see their arguments to
17 understand what arguments they're making in support
18 of their remedy that they're seeking. So that's my
19 request, is that it be staggered, but at the very
20 least I would request that your Honor do put it off a
21 little.
22 THE COURT: Mr. Hecker?
23 MR. HECKER: Your Honor, I would strongly
24 join Ms. McKay. I can't imagine a bolder request
25 than for this Court to suspend the ongoing election

1 processes, and we'd like to see with specificity what
2 their arguments are and what cases and other
3 authorities they're citing so we can respond to them.
4 I don't think it would be a good idea for your Honor
5 to consider enjoining an election without allowing us
6 to respond to the specific cases they cite.
7 THE COURT: Mr. Tseytlin?
8 MR. TSEYTLIN: We want to be helpful to
9 your Honor. If you want to do simultaneous briefing
10 Friday, Monday, we're fine. If we're to do staggered
11 briefing, then the traditional staggered briefing is
12 opening brief, responsive brief, reply brief. So I
13 think the only thing that we would oppose is an
14 opening brief and a response brief with no reply.
15 We're happy with staggered opening, response, reply,
16 and we're happy with moving the schedule back from
17 Friday to Monday to accommodate the schedule of my
18 friend.
19 THE COURT: Is that enough time for you to
20 put in your initial?
21 MR. TSEYTLIN: Yes, your Honor.
22 THE COURT: Is Monday enough time, at 4:00
23 o'clock, for you to reply --
24 MS. McKAY: Yeah.
25 THE COURT: -- to answer that?

1 MS. McKAY: Yeah. Thank you.
2 THE COURT: And then you want an additional
3 day beyond that?
4 MR. TSEYTLIN: We could file a reply
5 Tuesday. Yes, your Honor.
6 THE COURT: All right. So Friday at 4:00,
7 Monday at 4:00, Tuesday at 4:00.
8 MR. TSEYTLIN: Fine.
9 THE COURT: Let's leave it like that.
10 Everybody agree?
11 MR. HECKER: Yes, your Honor.
12 MS. McKAY: Yes, your Honor. Thank you.
13 THE COURT: With regard to Professor Katz's
14 expert report, I'm going to allow his testimony and
15 expert report as it pertains to the Senate but not
16 the congressional.
17 Okay. So I think we left off -- Mr. Tapp
18 was on the stand, and I think we're resuming direct
19 examination. I'll ask that he be re-sworn.
20 KRISTOPHER R. TAPP,
21 called herein as a witness, having been first duly sworn,
22 was examined and testified as follows:
23 THE DEPUTY: State and spell your name
24 again for the Court. Thank you.
25 THE WITNESS: Kristopher Tapp. Last name

1 T-a-p-p.
2 DIRECT EXAMINATION (CONT'D)
3 BY MR. MULLKOFF:
4 Q. Good morning, Dr. Tapp.
5 THE COURT: Mr. Mullkoff?
6 MR. MULLKOFF: Good morning, your Honor.
7 As a very preliminary housekeeping matter, yesterday
8 afternoon we marked Dr. Tapp's CV as Exhibit S-15. I
9 don't believe we entered it into evidence. I would
10 move at this time to enter S-15 into evidence.
11 THE COURT: Petitioners?
12 MS. DiRAGO: Sorry. That was his CV?
13 MR. MULLKOFF: Correct.
14 MS. DiRAGO: Yeah. No objection.
15 THE COURT: It's admitted.
16 (Respondents' Exhibit S-15 was received in
17 evidence.)
18 BY MR. MULLKOFF:
19 Q. Dr. Tapp, yesterday afternoon we established
20 that you are a math professor at Saint Joseph's
21 University, correct?
22 A. Yes.
23 Q. And your recent work has focused on mathematics
24 relating to elections and redistricting specifically?
25 A. Yes.

1 Q. Have you ever served as an expert witness
2 before?
3 A. No.
4 Q. Have you ever testified in a trial before?
5 A. No.
6 Q. In any context?
7 A. Nope.
8 Q. Are you a little nervous today?
9 A. Very nervous.
10 Q. Did you submit affidavits in connection with
11 this case?
12 A. Yes. Two of them.
13 MR. MULLKOFF: Permission to approach, your
14 Honor?
15 THE COURT: You may.
16 MR. MULLKOFF: I've handed the witness two
17 exhibits that have been pre-marked as S-16 and S-17,
18 which are the two affidavits submitted by Dr. Tapp
19 and filed in this case.
20 Q. Dr. Tapp, do you recognize these two documents?
21 A. Yes.
22 Q. Beginning with S-16, what is that?
23 A. This is the first affidavit I submitted.
24 Q. And S-17, what is that?
25 A. The second.

1 Q. These are the affidavits containing your expert
2 opinions submitted in this case?
3 A. Yes.
4 MR. MULLKOFF: At this time we would move
5 to admit those two documents into evidence.
6 THE COURT: Petitioners?
7 MS. DiRAGO: No objection.
8 THE COURT: They're admitted.
9 (Respondents' Exhibits S-16 and S-17 were
10 received in evidence.)
11 BY MR. MULLKOFF:
12 Q. Dr. Tapp --
13 MS. DiRAGO: I'm sorry. Your Honor, I'm so
14 sorry. We have one objection just to the extent that
15 your order just a few minutes earlier -- that
16 Dr. Tapp's second report, that is not a rebuttal to
17 Mr. Trende's second report. To the extent, you know,
18 his report addresses that, we would like to have it
19 excluded from evidence.
20 MR. MULLKOFF: Your Honor, just briefly.
21 Your Honor's order speaks for itself. My
22 understanding of Dr. Tapp's second report is there is
23 not anything that is about Congress in the second
24 report that is not responding to Mr. Trende's reply
25 report.

1 MS. DiRAGO: And we would disagree.
2 MR. MULLKOFF: But to the extent there is,
3 the judge's order speaks for itself. We don't object
4 to applying the ruling.
5 MS. DiRAGO: So then that portion will not
6 be admitted into evidence?
7 MR. MULLKOFF: To the extent it exists.
8 Are you pointing to particular portions?
9 MS. DiRAGO: If your Honor wants me to.
10 THE COURT: Go ahead.
11 MS. DiRAGO: Sure. So I know, for example,
12 in Page 48 --
13 MR. MULLKOFF: Paragraph 48?
14 MS. DiRAGO: I'm sorry. Yes -- or, no,
15 it's Paragraph 49 on Page 21. Dr. Katz -- sorry.
16 Dr. Tapp talks about the ensemble. The Senate
17 ensemble is very likely to be infected with a level
18 of redundancy that renders them statistically useless
19 and that his congressional ensemble may well suffer
20 from the same deficiency. And that's sort of an
21 example of how he treats this information throughout.
22 So this redundancy issue, he talks about it with
23 respect to the Senate map but then often concludes
24 that it also applies to the congressional map.
25 THE COURT: I understand, but I can parse

1 that when I'm --
2 MS. DiRAGO: Okay.
3 THE COURT: Okay.
4 MS. DiRAGO: That's fine, then, your Honor.
5 Thank you.
6 THE COURT: Go ahead, Mr. Mullkoff.
7 MR. MULLKOFF: So just to confirm, those
8 exhibits have been admitted?
9 THE COURT: They've been admitted except as
10 I determine it shouldn't be considered in my
11 decision.
12 MS. DiRAGO: Can I get the exhibit numbers
13 for those?
14 THE COURT: 16 -- S-16 and S-17.
15 MS. DiRAGO: Thank you.
16 BY MR. MULLKOFF:
17 Q. Dr. Tapp, what was the scope of your analysis in
18 your reports?
19 A. I was retained to weigh in on the methodology
20 and conclusions of Mr. Trende's two affidavits.
21 Q. What materials did you review in conducting that
22 analysis?
23 A. I reviewed his two affidavits; and I reviewed
24 the paper by McCartan and Imai, the preprint; and I looked
25 at the ALARM website, where the proposed algorithm from

1 that paper is made publicly available.
2 Q. I've placed in front of the witness the
3 previously admitted exhibit, P-1. What exhibit is that,
4 Dr. Tapp? I believe it's one of the blue exhibits there.
5 A. The reply of Mr. Trende is -- I'm not positive
6 how to read this.
7 MR. MULLKOFF: I believe, for the record,
8 that P-1 is Mr. Trende's first report and P-2 is
9 Mr. Trende's reply report.
10 Q. Are those Mr. Trende's reports that you
11 reviewed?
12 A. Yes. Exactly.
13 Q. And also in front of you is an exhibit that's
14 been marked as S-1 --
15 A. Yes.
16 Q. -- which is a draft paper by Drs. McCartan and
17 Imai?
18 A. Yes.
19 Q. Is that the document that you referred to
20 reviewing?
21 A. Yes.
22 Q. Did you form opinions regarding Mr. Trende's
23 analysis in this case to a reasonable degree of
24 professional certainty?
25 A. Yes.

1 Q. Generally speaking, what were your conclusions?
2 A. I have severe concerns about both his
3 methodology and his conclusions.
4 Q. So first I'd like to talk about Mr. Trende's
5 methodology. Can ensembles be reliable tools in
6 redistricting?
7 A. Yes. They are standard tools.
8 Q. When we say "ensembles," is that the same as
9 saying simulated maps?
10 A. Yes.
11 Q. What is necessary for an ensemble analysis to be
12 reliable in analyzing a redistricting plan?
13 A. So the overall idea is to have a computer
14 generate an ensemble of thousands of random maps and then
15 compare how those behave on average to the enacted map,
16 and for that comparison to be valid, I'd say several
17 things are absolutely essential. One, the random maps
18 have to follow the same rules as the enacted map; so, in
19 particular, they have to be compliant with all of the
20 congressionally mandated rules governing redistricting.
21 Two, I'd say there has to be a large enough ensemble but,
22 more specifically, enough diversity within the ensemble,
23 and that's one of my major concerns that I'll get into.
24 And, three, I think it's crucial that the modeler
25 transparently and clearly specifies what balance of maps

1 the algorithm is spitting out.
2 Q. What do you know about the methodology that
3 Mr. Trende used?
4 A. I think very little is described in the two
5 affidavits, and I learned a little bit more from his
6 testimony on the stand.
7 Q. What is your understanding of which algorithm
8 Mr. Trende used to conduct his analysis?
9 A. He used the sequential Monte Carlo algorithm
10 that is proposed in this McCartan and Imai paper.
11 Q. What is the sequential Monte Carlo algorithm,
12 generally speaking?
13 A. It is a very new algorithm that is based on some
14 of the same underlying mathematics as the more-established
15 Markov chain algorithms, but it does it in a very, very
16 different way but with the same goal of producing a large
17 ensemble of random maps.
18 Q. What is the current state-of-the art algorithm
19 for redistricting analysis to the extent there is one?
20 A. There are a few slight variations on the idea of
21 Markov chain Monte Carlo algorithms. I would consider
22 those the state-of-the-art.
23 Q. With respect to the sequential Monte Carlo
24 algorithm that Mr. Trende used, do you have an opinion
25 regarding using that algorithm in analyzing a

1 redistricting plan?
2 A. I think it is very new, and I think that there
3 are issues with redundancy creeping into the ensemble
4 that, in my mind, are severe enough that, going forward,
5 anybody using this algorithm should do very careful checks
6 to make sure that the algorithm is structurally -- that
7 the ensemble is structurally intact and isn't suffering
8 from redundancy.
9 Q. Dr. Tapp, a moment ago -- a minute ago you
10 mentioned the term "balance of maps." What do you mean by
11 that?
12 A. I mean it's not enough just to have a computer
13 algorithm spit out maps. In fact, it's not even enough to
14 have the algorithm spit out maps in a way that avoids
15 looking at partisan data. Unintentional bias can creep in
16 if it's not a well-defined algorithm. So in my opinion,
17 it's extremely essential for the modeler to specify
18 exactly what balance of maps -- the more precise term is
19 target distribution -- is being drawn from.
20 Q. Why is that important?
21 A. Because otherwise there's no way to evaluate
22 whether it's doing the job at an intuitive level, creating
23 maps that are what a nonpartisan human who knows all the
24 congressional rules would create.
25 Q. If the target distribution is not clearly

1 defined, does that have an effect on the reliability of
2 conclusions that can be drawn in comparing the ensemble to
3 an enacted map?
4 A. Yes. Absolutely.
5 Q. What type of effect?
6 A. It's -- the whole point of ensemble analysis is
7 to compare apples to apples or compare one apple, namely,
8 the enacted map, to an ensemble of apples, a bushel of
9 apples, the random outputs of the computer. And if the
10 ensemble doesn't follow the same congressional (sic) rules
11 or if the ensemble is sampled from a not clearly specified
12 algorithm and we don't know what it's doing, then you're
13 not comparing apples to apples; you're comparing apples to
14 oranges, and an apple's not supposed to look like a bushel
15 of oranges.
16 Q. Do you know if Dr. Imai and Dr. McCartan
17 expressed a view about the relevance of the target
18 distribution in conducting an ensemble analysis?
19 A. Yeah. It's central to their paper from the
20 abstract all the way through. That's the whole point of
21 the complicated mathematical machinery that they're using,
22 is to create an algorithm that is capable of drawing from
23 a specified target distribution. If they weren't trying
24 to do that, they could have used a much, much simpler
25 algorithm, one that's faster, one that requires much less

1 memory in the computer, and essentially one that has no
2 issues with redundancy.
3 Q. Is that related to your apples-to-apples
4 analogy?
5 A. It shows that they are very conscious of the
6 importance of having a modeler know what kind of ensemble
7 the algorithm is spitting out, know that it's targeting a
8 specific balance of maps, a specific target distribution,
9 that can be defended or criticized in court.
10 Q. I'd like to direct you to the previously
11 admitted exhibit, S-1, which is in front of you, the
12 McCartan-Imai draft paper. On the second page of the
13 exhibit, which has Page Number 1, I'd like to direct your
14 attention to the fourth paragraph down that begins
15 optimization-based.
16 A. Yes.
17 Q. I'm going to read that paragraph without reading
18 the internal citations to academic articles.
19 Optimization-based and constructive Monte Carlo methods
20 can be made scalable and incorporate many constraints, but
21 they are not designed to sample from any specific target
22 distribution. As a result, the resulting plans tend to
23 differ systematically, for example, from a uniform
24 distribution under certain constraints. The absence of an
25 explicit target distribution makes it difficult to

1 interpret the ensembles generated by these methods and use
2 them for statistical outlier analysis to detect
3 gerrymandering.
4 Dr. Tapp, what is your understanding of what
5 Dr. Imai and Dr. McCartan are saying in that paragraph?
6 A. They're pointing out a major problem with some
7 of the previous methods used to construct ensembles, and
8 if those methods aren't clearly and transparently
9 specifying a target distribution and aren't provably
10 targeting that distribution, then the statistical analysis
11 is weakened.
12 Q. Do you agree with their view on that topic?
13 A. Yes, I do.
14 Q. Does that concern also apply to the proposed new
15 model of sequential Monte Carlo?
16 A. It depends how it's used. The main advertised
17 feature in this paper is that it is capable of drawing
18 from a specified balance of plans, target distribution,
19 but it only does that if it's used in exactly the right
20 way.
21 Q. I'd like to talk now about Mr. Trende's specific
22 methodology to the extent you understand it. What is your
23 understanding of what target distribution or balance of
24 maps Mr. Trende used in his models?
25 A. He says very little about that. Like, for

1 example, he mentioned that he told the algorithm to try to
2 preserve counties, and in his testimony he described that
3 as just a toggle switch in the algorithm, yes or no, and
4 there's no clear specification of what that means. Like
5 to preserve counties might mean that you're asking the
6 algorithm to only produce maps that have between 16 and 25
7 county splits or it might mean that you're asking the map
8 to just preferentially be more -- probabilistically more
9 likely to spit out a map with fewer county splits, almost
10 as if it's drawing maps from a hat, but the ones with
11 fewer county splits are to rise to the top of the hat.
12 They're weighted. And either of those would be okay, but
13 neither is specified, and they would result in different
14 kinds of distributions.
15 And then it gets more concerning when added
16 criteria are layered onto the county-splitting criteria.
17 So he -- especially in the second report. He's not only
18 asking the algorithm to spit out maps that preserve
19 counties but also preserve cities and towns and have core
20 retention and other things, and I think it's crucial -- I
21 mean, obviously a human drawing a map would need to know
22 which of those things to prioritize more, what balance to
23 put on the different things you're prioritizing, and I
24 think that's essential to specify how the map is doing
25 that, not just to say, oh, I clicked the toggle that said

1 my maps are going to retain cores, or, I clicked the
2 toggle that says they're going to try to avoid county
3 splits, but to specify the relative weight, the relative
4 importance, that are put on the different competing
5 criteria because these criteria do compete.
6 Q. Based on the information Mr. Trende has provided
7 in his reports and in his testimony earlier this week, are
8 you able to tell which maps his model considers to be
9 included in his sample?
10 A. I can tell very little. I definitely can't tell
11 a clearly specified target distribution. I know a few of
12 the criteria that he considered -- or that he told the
13 algorithm to consider.
14 Q. Based on the information Mr. Trende has provided
15 in his reports and in his testimony, are you able to tell
16 which maps are more or less likely to be chosen for his
17 ensemble?
18 A. No.
19 Q. What does that -- strike that question. What
20 does the information Mr. Trende has provided about his
21 target distribution indicate about the reliability of
22 results drawn from Mr. Trende's ensemble analysis?
23 A. I think it undermines the reliability. I think
24 he's claiming to be producing random maps that are
25 representative of what humans would draw, but it's more

1 like he's producing random maps that are outputs of a
2 computer program that only he knows the parameters he set
3 for.
4 Q. Are you able to tell if Mr. Trende is comparing
5 apples to apples?
6 A. There's a few cases in which you can guess what
7 he did. Like I mentioned, there's different ways of
8 telling the algorithm to maintain counties, and it looks
9 like he did the second, where he sort of severely weights
10 maps that have fewer county splits. Overall, no. Overall
11 I would say he's comparing apples to oranges.
12 Q. With respect to the redistricting criteria
13 contained in the New York Constitution, what do you know
14 about how Mr. Trende applied those criteria?
15 A. In his first report he considered a very short
16 list of the criteria, really just compactness, which was
17 quantified in a very specific way, and continuity (sic) is
18 guaranteed because that's how the algorithms work, and
19 county preservation was considered. And I think that's
20 the full list in both the congressional and Senate case in
21 his first report. And then in his second report he added
22 some congressional criteria to not his Senate ensemble but
23 his congressional ensemble.
24 Q. The fact that those are the criteria that
25 Mr. Trende chose to use in his ensembles, does that have

1 relevance to the results Mr. Trende draws?
2 A. Yes.
3 Q. What, in your opinion, is the relevance?
4 A. Well, it's important to have the random maps
5 follow the same rules as the enacted map. His main punch
6 line is that the enacted map differs from the random
7 outputs. And if it's following different rules, if it's
8 obeying different constitutional requirements, then that's
9 a possible explanation of why there's a difference.
10 Q. What information do you have with respect to how
11 Mr. Trende instructed his models to balance the different
12 constitutional redistricting criteria?
13 A. Absolutely none, and even in his oral testimony
14 he did not seem to clarify that. He just talked about
15 turning on toggles.
16 Q. What relevance does that have to Mr. Trende's
17 results?
18 A. It's sort of the opposite of what a modeler
19 should do, of starting with a clearly specified balance of
20 maps that you're choosing to draw from so that all of us
21 can decide whether we agree with the sort of intuitive
22 idea that it's drawing the kinds of maps that humans would
23 draw, nonpartisan humans.
24 Q. Do you know if Mr. Trende took into
25 consideration the "town on border" rule with respect to

his Senate ensemble?

A. He doesn't report taking into account any rules other than just county splitting and compactness and contiguity.

Q. What about the "block on border" rule with respect to a Senate ensemble?

A. The same.

Q. With respect to splitting towns, do you know if Mr. Trende addressed that in his Senate ensemble?

A. I believe he did not.

Q. What effect would those omissions have on Mr. Trende's results?

A. Again, there are -- those are just more ways in which the enacted map differs from the random outputs and more reasons why, therefore, the partisan statistics of the random maps might differ from that of the enacted plan.

Q. With respect to the criterion of preserving the cores of prior districts, maintaining the cores, what information do you have about whether and how Mr. Trende addressed that factor?

A. Very little. I believe he said in his report that he told the algorithm to maintain cores. I have no idea what that means, I have no idea what relative weight he gave the preserving of cores compared to the other

1 criteria that he was balancing, and I have no idea how he
2 even operationalized and defined the preservation of
3 cores.
4 Q. Would there be multiple ways to instruct the
5 algorithm with respect to maintaining cores?
6 A. Yeah, especially in a situation where the number
7 of congressional districts changes between the decades.
8 Core preservation is a subtle thing. I think algorithms
9 that measure how much a random map is preserving cores is
10 a little bit subtle because even matching old districts to
11 new districts can be sort of a hard problem.
12 Q. Would -- the choice that Mr. Trende made as to
13 how to instruct the model to preserve cores, would that
14 affect the maps that were chosen in his sample?
15 A. Yes.
16 Q. How so?
17 A. Well, his sample maps would obviously be
18 instructed to either be more likely to preserve cores or
19 to have some core preservation metric between two bounds,
20 depending on how he set that up, and I have no idea which
21 of those he did. Of course it would determine what his
22 random maps look like.
23 Q. Would it have an effect on how maintaining cores
24 was balanced relative to other constitutional criteria?
25 A. Yes.

1 Q. With respect to communities of interest, do you
2 know if Mr. Trende instructed his model to take those into
3 account?
4 A. He said that he did not.
5 Q. I believe Mr. Trende in his second report -- I
6 don't think we need to go into it for efficiency -- says
7 that communities of interest are, quote, difficult to
8 encode. Do you recall that?
9 A. Yes.
10 Q. Do you agree with that statement by Mr. Trende?
11 A. I do agree, yes.
12 Q. Could you explain why?
13 A. Well, in New York there's no agreed-upon
14 specification of which communities should be maintained.
15 I think it would be hard for any modeler to find an
16 accurate way that everybody could agree is correct to
17 program the computer to maintain communities of interest.
18 Q. What effect does not including communities of
19 interest have on the reliability of the model?
20 A. Well, it's another sense in which the random
21 outputs are not following the same rules that the enacted
22 map was required to, so even if we grant that there was no
23 obvious way for him to program the computer to make the
24 random outputs follow that rule, it's still the case that
25 that missing constitutional requirement could undermine

1 the validity of his statistical conclusions.
2 Q. Based on what you've described about the target
3 distribution and the constitutional criteria that
4 Mr. Trende included in his model, do you have an opinion
5 as to whether one can reliably conclude that differences
6 between the enacted congressional and Senate maps and
7 Mr. Trende's ensembles are due to partisan bias?
8 A. I believe there are many other possible
9 explanations.
10 Q. Could you give an example?
11 A. Well, we've talked about many differences
12 between the enacted map -- the rules followed by the
13 enacted map and rules followed by the random maps,
14 including communities of interest.
15 Q. Based on what Mr. Trende -- strike that. Based
16 on your understanding of how Mr. Trende instructed his
17 ensemble with respect to the target distribution and the
18 constitutional criteria and how those criteria are to be
19 balanced, do you have an opinion as to what differences
20 between Mr. Trende's ensembles and the enacted maps can
21 tell us with respect to reliable statistical conclusions?
22 A. I think the failure to specify what balance of
23 maps he's drawing from, the failure to specify a target
24 distribution, kind of makes it a moot point. It makes it
25 almost silly to compare his ensemble to an enacted map

1 because we don't know -- we don't know what his ensemble
2 represents.
3 Q. Is his ensemble an apples-to-apples comparison,
4 in your opinion?
5 A. I don't consider it so.
6 Q. In your first affidavit you refer to sample
7 size.
8 A. Yes.
9 Q. What is the relevance of sample size to an
10 ensemble analysis?
11 A. The sample -- like, for example, he used a
12 sample size of 5,000, so he has 5,000 random maps. And
13 that has to be big enough to really -- big enough and
14 diverse enough to really yield valid statistical
15 conclusions.
16 Q. In the draft paper by Dr. McCartan and Dr. Imai
17 that we discussed earlier, do they include any validation
18 regarding an appropriate sample size?
19 A. Yes. There is a validation study in which I
20 think they used an ensemble of 10,000 maps to study a
21 state with 50 precincts to be divided into three or four
22 districts.
23 Q. What is your understanding of what sample size
24 Mr. Trende used again?
25 A. Mr. Trende used an ensemble of 5,000 maps to

1 study New York, which has over 15,000 precincts and is to
2 be broken into 26 congressional districts or 63 Senate
3 districts.
4 Q. In Mr. Trende's reply did he use a higher sample
5 size for congressional ensemble?
6 A. For portions of what he did, he increased it
7 from 5,000 to 10,000.
8 Q. Did Mr. Trende do any validation, to your
9 knowledge, to ensure that his sample size was sufficient?
10 A. Not to my knowledge.
11 Q. The hypothetical jurisdiction you referred to in
12 the McCartan-Imai draft paper with 50 precincts --
13 A. Yes.
14 Q. -- how does that relate to applying the
15 sequential Monte Carlo algorithm to New York?
16 A. It definitely doesn't validate that the same
17 sample size would work in the much bigger size of
18 New York.
19 Q. Is it your opinion that additional validations
20 would be necessary?
21 A. Yes.
22 Q. Why is that?
23 A. I think the algorithm is new, and I think people
24 are just bumping into how severe the redundancy problem
25 can be, so I think it's crucial to do several validations.

1 Like validations could include running the same thing ten
2 times and making sure that some of the key graphs, like
3 the ordered district graphs, don't change, aren't
4 defective, like look the same in all ten cases, or
5 doubling your ensemble size and making sure the key graphs
6 are unaffected, don't change. And maybe even more
7 crucially, in measuring the redundancy, there are ways of
8 measuring the redundancy of the ensemble, and I think
9 that's an important validation to do moving forward.
10 Q. What does redundancy mean?
11 A. So like an extreme case of redundancy would be
12 if all 5,000 of the maps just happened to be exactly
13 identical or maybe just exactly identical copies of just
14 two maps or slight variations on just one single map or
15 slight variations on just two single maps.
16 Q. In those example hypothetical situations you
17 gave, what effect would those levels of redundancy have on
18 the reliability of the ensemble analysis?
19 A. It would completely destroy the ability to make
20 statistical conclusions because -- so why, in the first
21 place, don't we take just an ensemble of a single random
22 map? And the reason is that would be subject to way too
23 much random variability. A single map just by pure chance
24 might come out being extremely Republican-leaning or
25 extremely Democratic-leaning or extremely competitive or

1 extremely anticompetitive. There's just a lot of wild,
2 random variability into one map. So the reason of using
3 5,000 maps is because extreme qualities of one sort of get
4 averaged and washed out. But if there's too much
5 redundancy, then extreme qualities of one map get
6 amplified.
7 Q. Do you believe redundancy was a risk with the
8 approach that Mr. Trende used in this case?
9 A. Yes.
10 Q. Why?
11 A. There's actually evidence within his report that
12 a severe problem with redundancy did affect his Senate
13 ensemble.
14 Q. Before we get to that, I'd like to ask you about
15 something you discuss on Page 13 of your second report
16 where you use hypothetical people named Amy and Bob.
17 THE COURT: What page is that?
18 MR. MULLKOFF: Page 13 of Dr. Tapp's second
19 report, second affidavit.
20 Q. Could you explain --
21 MR. MULLKOFF: We'll wait for your Honor.
22 THE COURT: Go ahead.
23 Q. Dr. Tapp, could you explain what this example of
24 Amy and Bob -- what you mean in this section?
25 A. Yes. This was an example -- this was sort of a

1 hypothetical example of the sort of redundancy that one
2 might worry would creep into an ensemble using this
3 algorithm and using these methods. So I asked the reader
4 to imagine that Amy and Bob each create a partially
5 finished Senate map, so each of them just draw the first
6 50 districts of the 63, leaving 13 left to be finished.
7 So both Amy and Bob create that, a determination of how
8 the first 50 of the Senate districts are formed. And
9 then, say, a computer just randomly finishes them, so
10 maybe a computer randomly chooses how to create those last
11 13 districts and does that 2,500 times for Amy and 2,500
12 times for Bob. And that would result in an ensemble of
13 5,000 maps, but they would all be slight variations on
14 just two maps, Amy's and Bob's.
15 Q. Is this related to the concept of redundancy
16 that you were talking about?
17 A. Exactly. This is an example of the kind of
18 redundancy that could creep into an ensemble because of
19 the way the algorithm works.
20 Q. And let's come back to what you said a couple
21 minutes ago about Mr. Trende's results. Do you believe
22 there was evidence of redundancy in Mr. Trende's results?
23 A. Yes. The histogram in which he shows the
24 Polsby-Popper scores --
25 Q. Let's just look at the histogram, not to

1 interrupt. I believe you're referring to Mr. Trende's
2 first report on Page 22 of Exhibit P-1. What is -- first
3 off, let's take a step back. What does this chart purport
4 to show?
5 A. For his Senate ensemble of 5,000 maps, the black
6 histogram portion is showing the Polsby-Popper scores of
7 all of those maps in the ensemble. And Polsby-Popper
8 scores is one of several compactness measurements one
9 could use.
10 Q. What does the horizontal axis show?
11 A. That is the Polsby-Popper score. So among the
12 5,000 maps in his Senate ensemble, it looks like the
13 Polsby-Popper scores vary from something like .22 to .27.
14 Q. And what does the vertical axis show?
15 A. That's just the density axis. So when the bump
16 comes up higher, that means more of the maps in his
17 ensemble are in the corresponding range of values on the
18 x-axis.
19 Q. What is your interpretation of what the results
20 are depicted on this chart?
21 A. My interpretation is that the only good
22 explanation for why you would get this crazy, unexpected
23 shape, namely, a bimodal distribution with just two sharp
24 spikes, is that the ensemble is broken, that the kind of
25 redundancy I described with that Amy-Bob hypothetical

1 scenario is similar to what actually happened in his
2 Senate ensemble. I don't believe there's anything about
3 the geography of New York or any state that would make
4 this particular graph come out bimodal like that, and I
5 asked around to several other experts, and they just sort
6 of laughed and said, no way.
7 MS. DiRAGO: Objection.
8 THE COURT: Sustained.
9 Q. Just to be clear, on this chart what do the
10 black bars represent?
11 A. So this is a histogram. And like if you wanted
12 to know in his ensemble what portion of his 5,000 maps
13 have a Polsby-Popper score between .22 and .24, you would
14 just measure the area of the corresponding black shaded
15 region. So this is showing that a good portion of them
16 have Polsby-Popper scores in that range, between .22 and
17 .24; almost none of them have Polsby-Popper scores in the
18 next range; but then, again, a good portion of them have
19 Polsby-Popper scores in a range around .26.
20 Q. And is there any explanation for that clustering
21 in two areas, in your opinion?
22 A. In my opinion, it means the ensemble's broken
23 and it means it's broken because of redundancy. I think
24 that's the only reasonable explanation I can come up with.
25 Q. For example, the set -- the cluster of bars on

1 the left, what is your understanding of what that likely
2 represents?
3 A. For example, that would be similar to the bunch
4 of random maps that are just slight variations on Bob's
5 partially finished map, whereas the bunch on the right
6 would be -- would sort of correspond to the bunch of
7 random maps that are slight variations on Amy's random
8 map.
9 Q. Did you hear Mr. Trende testify about this chart
10 on Monday?
11 A. Yes.
12 Q. I will paraphrase. I don't know if I'll get his
13 exact words right, but I believe on cross-examination he
14 was asked effectively, does anything about this chart look
15 strange to you? And he responded no. Does that surprise
16 you?
17 A. That did surprise me, yes.
18 Q. Why is that?
19 A. It just needs explained. There's no way anybody
20 would expect this graph to look like that. I don't think
21 anybody has seen a bimodal Polsby-Popper histogram. And
22 that needs explained.
23 Q. If you were conducting an analysis and a bimodal
24 distribution like this occurred in your results, what
25 would you do?

1 A. When I first read the report, that jumped out at
2 me as that's just wrong; that needs explained.
3 Q. What would you do if it were you?
4 A. I would dig deeper. My first guess would have
5 been what I'm now saying, is that there's redundancy in
6 the ensemble, and I would have analyzed that.
7 Q. Would you have performed validations?
8 A. Yes. I mean, I would have access to the
9 ensemble, so you can actually break it in parts and see
10 what the two parts -- basically this is saying that the
11 whole ensemble of 5,000 maps breaks into two camps. And
12 you could actually look at those two camps and see what
13 properties they have and see how much redundancy there is
14 between the two camps and see how they compare to each
15 other.
16 Q. Do you have access to the maps that Mr. Trende
17 generated in his ensembles?
18 A. I do not.
19 Q. In your second report you refer to a replication
20 that you did. Could you explain what you refer to in
21 there?
22 A. This is exactly because I do not have access to
23 Mr. Trende's data. So I did a replication in which,
24 together with a research assistant, I used exactly the
25 same algorithm, the McCartan-Imai algorithm downloaded

1 from the same site and built an ensemble of 5,000 maps
2 just like he did. And since -- because of his testimony,
3 I now know that he used a compactness setting of 1. But I
4 didn't know that at the time, so I tried several choices
5 for a compactness setting because I was aware from the
6 start that that would be the parameter -- the compactness
7 parameter that most severely affects how much redundancy
8 you expect to have in your ensemble.
9 Q. I believe you say in your report that the
10 compactness setting of 1 has the least concerns about
11 redundancy of any compactness setting. Is that accurate?
12 A. Exactly. Yes.
13 Q. And we now know that is what Mr. Trende used,
14 right?
15 A. Exactly. Yes.
16 Q. Do you still have concerns about redundancy when
17 the compactness setting is 1?
18 A. Yes. My replication study showed that there's
19 still severe concerns. I was surprised by that.
20 Q. Could you explain, please?
21 A. Yes. So we created a Senate ensemble of 5,000
22 maps, and we looked at the redundancy carefully, and the
23 level of redundancy was shocking. It turned out to be
24 that about half of the districts appear in exactly the
25 same configuration in over half of the maps, so that's

1 crucial. Let me say that in a different way. You can
2 take the ensemble of 5,000 maps --
3 Q. Let me just pause. Are you referring to
4 Paragraph 47 of your second report, Page 19?
5 A. Yes.
6 Q. Okay. I apologize for interrupting.
7 So what did you find when you looked at your
8 replication of Mr. Trende's ensemble?
9 A. So basically the 5,000 maps, you can take a
10 subcollection of more than half of them, over 3,000 of
11 them, and within that subcollection they all have in
12 common the way their first 31 districts are drawn, exactly
13 in common.
14 Q. What effect does that have on the reliability of
15 the ensemble?
16 A. It could have a huge effect because the way that
17 those first 31 districts were drawn, that just happened
18 one time, so that could be subject to wild chance
19 variability. Just by pure chance that -- let's call it
20 half of a map -- the specification of the way those first
21 31 districts were drawn, that could be extremely
22 Republican-leaning; it could be extremely
23 Democrat-leaning; it could be extremely anticompetitive or
24 competitive, and that single choice of half a map that was
25 supposed to be -- just appear once in the ensemble, its

1 importance gets amplified because it appears in half of
2 the maps of the ensemble, and that could have very extreme
3 effects on the partisan statistics of the resulting
4 ensemble.
5 Q. A Senate ensemble of 5,000 maps in which 31
6 districts are the same in 3,219 of those maps --
7 A. Yes.
8 Q. -- in your opinion, does that constitute a
9 representative sample of actual maps that would be drawn
10 by actual map drawers?
11 A. No.
12 Q. Why is that?
13 A. It's more as if the 5,000 map drawers mostly
14 just copied each other.
15 Q. With respect to the compactness setting of 0
16 (sic) -- I want to ask also about the county
17 preservation --
18 A. Yes.
19 Q. -- mode that Mr. Trende chose. Do you have a
20 further understanding of what Mr. Trende did with
21 instructing his model about preserving counties now?
22 A. Yes. He did testify to that, so my new
23 understanding is that he's basically using just the
24 built-in switch that's yes or no, do you want the model to
25 preserve counties. And the way that that's done under the

1 hood is described in the McCartan-Imai paper.
2 Q. What effect would it have for Mr. Trende to have
3 used that -- what effect did it have that Mr. Trende used
4 that instruction with respect to preserving counties?
5 A. I think it undermines the ability of any of us
6 to really know and understand the target distribution. I
7 mean, I've mentioned that McCartan and Imai's algorithm is
8 capable of drawing from any specified target distribution,
9 but that combination of settings is at the exact opposite
10 extreme. When you use a compactness of 1 and you turn on
11 county splitting, it's drawing from a distribution that
12 nobody really understands. I call that the hierarchical
13 spanning tree distribution. I don't think that's common
14 language yet because it's not commonly discussed yet.
15 It's a distribution that needs to be understood but isn't
16 yet.
17 Q. What effect would the hierarchical spanning tree
18 distribution being implicated have on the reliability of
19 the results?
20 A. It basically means we would need to understand
21 that in order to understand what sort of maps are in his
22 ensemble and we don't.
23 Q. Did Mr. Trende provide any information about
24 that concept in his reports or his testimony?
25 A. No.

1 Q. Taking a step back and talking about all of
2 Mr. Trende's methodology to the extent you understand it,
3 in your opinion, does Mr. Trende's ensemble of the
4 congressional map provide a representative sample of
5 actual maps that could be drawn by actual people without
6 partisan consideration?
7 A. No, I do not believe it does.
8 Q. What about the Senate ensemble?
9 A. I do not believe it does.
10 Q. In your opinion, what does comparing
11 Mr. Trende's congressional and Senate ensembles to the
12 enacted maps tell us?
13 A. There's so many explanations for what could
14 cause the difference, it's hard to attribute differences
15 to partisan intent.
16 Q. Does Mr. Trende -- do Mr. Trende's ensembles
17 provide apples-to-apples comparisons of maps -- of actual
18 maps that would be drawn by actual map drawers?
19 A. I don't believe so. No.
20 Q. Do you hold these opinions to a reasonable
21 degree of professional certainty?
22 A. Yes.
23 Q. Dr. Tapp, what is the gerrymandering index that
24 Mr. Trende refers to?
25 A. It is a single number that attempts to measure

1 how close the enacted map is to the random maps in the
2 ensemble basically with respect to what their ordered
3 districts plot looks like.
4 Q. What does it show?
5 A. Since it's a single number, it's hard to say
6 what it shows because that single number can be high for a
7 variety of reasons. It can be high because the map favors
8 one party or favors the other. It can be high because the
9 map, relative to the ensemble, is very competitive or very
10 noncompetitive. It can be high because of what happens in
11 districts that are so noncompetitive that they don't
12 affect the number of seats won by either party. It can be
13 high for a variety of reasons, so its limitation is that
14 it's just one single number that has a lot packed into it.
15 Q. Does the gerrymandering index provide any
16 information about which party an enacted map favors?
17 A. No.
18 Q. Does the gerrymandering index provide any
19 information about whether an enacted map discourages
20 competition?
21 A. No.
22 Q. Do you believe the term gerrymandering index is
23 an accurate title for what information the index provides?
24 A. It has some issues.
25 Q. And I'd like to turn your attention to

1 Mr. Trende's first report on Page 15, Exhibit P-1.
2 Dr. Tapp, what does this chart that Mr. Trende provided
3 show?
4 A. This is a standard ordered districts plot. So
5 along the horizontal axis are just the numbers 1 through
6 26 because there are 26 congressional districts. And if
7 you first look at the dots, those are just the Democratic
8 seat (sic) shares in those districts, and they're
9 guaranteed to go uphill because they're ordered from the
10 most Republican district on the left to the most
11 Democratic district on the right.
12 So like, for example, the leftmost dot over the
13 ordered District Number 1 looks like it's at about 42
14 percent. That means that in the most Republican-leaning
15 of the districts, the Democratic vote share was 42
16 percent. And then those go all the way up to the far
17 right. It's in the 90s. So that's what the dots mean.
18 And then you imagine doing the exact same thing, creating
19 those dots for every one of the 5,000 maps in the
20 ensemble, and that gives you your clouds of dots that are
21 colored blue when they are above the 50 percent line and
22 red when they're below the 50 percent line.
23 Q. And the red and blue dots, are those the results
24 of the simulated maps Mr. Trende created?
25 A. Yes.

1 Q. To be clear, do you believe those red and blue
2 dots are an accurate representation of actual maps actual
3 map drawers would draw?
4 A. No.
5 Q. On the left side where it says percent
6 Democratic, what is that number based on?
7 A. That's based on the partisan index that
8 Mr. Trende chose, which came from partisan data from a
9 list of elections that happened between 2016 and 2020
10 averaged together.
11 Q. In your opinion, does this chart show anything
12 with respect to the partisan lean of the enacted
13 congressional map in comparison with Mr. Trende's
14 ensemble?
15 A. When you look at it carefully, it shows that the
16 enacted map has a slight Republican lean relative to the
17 maps in the ensemble.
18 Q. Why do you say that?
19 A. The easiest way is to really create the picture
20 that Mr. Trende should have shown, sort of the standard
21 picture, which is a histogram that shows the number of
22 seats predicted to be won by the Democrats in the enacted
23 maps and also in all of the maps in the ensemble.
24 Q. Did you create that?
25 A. Yes, I did.

1 MR. MULLKOFF: Let's turn to Page 7 of
2 Mr. -- of Dr. Tapp's second affidavit.
3 Q. Dr. Tapp, with respect to the chart on the top
4 of this page, what is that?
5 A. This is a histogram showing the predicted number
6 of Democratic seats won by the enacted maps -- so the blue
7 vertical line shows that the prediction is that the
8 Democrats would win 22 seats -- and it also shows it for
9 all of the 5,000 maps in the ensemble. That's what the
10 shaded light blue area is. So, for example, the shaded
11 area comes up highest over the number 23. That means
12 that's the most commonly occurring number among the many,
13 many maps in the ensemble. Like a large number of them
14 elect 23 Democrats, and some also elect 24, and a few even
15 elect 25, and a smaller number elect 21.
16 Q. What information did you use to create this
17 histogram?
18 A. I used the chart that we were looking at just
19 previously, the ordered district chart on Page 15 of
20 Mr. Trende's first report, and I pretty much just
21 approximated for each one of those rectangular clouds what
22 portion of it was red and what portion of it was blue.
23 Q. Were you able to count exactly how many of
24 Mr. Trende's dots were each color?
25 A. No. There was some estimation, but it didn't

1 affect the overall shape and the overall conclusion.
2 Q. When it says Democratic seats on this histogram,
3 what does that refer to?
4 A. That refers to the prediction using the partisan
5 index that Mr. Trende used to create his graph of how many
6 Democrat -- how many districts will be won by the
7 Democratic party.
8 Q. Are you saying that for any district that is
9 above 50 percent in Mr. Trende's partisanship index, a
10 Democrat candidate will always win?
11 A. No. These are predictions for what's going to
12 happen in future elections starting in 2022, so nobody
13 could possibly know that. I'm just using this -- I'm sort
14 of doing the simplest approximation, which is exactly what
15 Mr. Trende did in coloring the dots red and blue, sort of
16 using the 50 percent as the baseline.
17 Q. What is your conclusion -- do you have any
18 conclusions from this histogram regarding the partisan
19 lean of the enacted map in comparison with Mr. Trende's
20 congressional ensemble?
21 A. Yeah. It exactly shows the enacted map has a
22 slight Republican lean compared to the maps in the
23 ensemble. It elects slightly fewer Democrats than on
24 average to the maps in the ensemble.
25 Q. According to this chart, how many Democratic

1 seats does the enacted map have?
2 A. 22.
3 Q. According to this chart, which is based on
4 Mr. Trende's data, what is the most common number of
5 Democratic seats in Mr. Trende's congressional ensemble?
6 A. 23.
7 Q. What's the next most common number?
8 A. 24.
9 Q. I would like to turn your attention to
10 Mr. Trende's chart on Page 21 of his first report.
11 A. Yes.
12 Q. What is this -- what does this chart show?
13 A. I think I'm looking at the wrong report. One
14 second.
15 Q. It's Exhibit P-1.
16 A. This is exactly the same thing except for -- for
17 the Senate ensemble instead of the congressional ensemble.
18 Q. Do you have any -- do you have any opinions
19 regarding whether this chart shows anything with respect
20 to the partisan lean of the enacted Senate map in
21 comparison to Mr. Trende's Senate ensemble?
22 A. Again, it shows that the enacted map is
23 Republican-favoring relative to the maps, on average, in
24 the ensemble, and in this case the Republican lean is more
25 extreme.

1 Q. What makes you say that?
2 A. Well, I did the same activity of creating the
3 histogram that Mr. Trende should have shown.
4 Q. Where is your histogram?
5 A. That's Page 7, Paragraph 13, of my second
6 report, right underneath the congressional one that we
7 just looked at.
8 Q. In your lower histogram on Page 7 of
9 Exhibit S-17, what does that chart show?
10 A. It's very similar. So for the Senate case the
11 enacted map would be predicted to elect 49 Democrats,
12 whereas all of the 5,000 maps in his ensemble elect at
13 least 51 and the most common number for them to elect is
14 53.
15 Q. What information did you use to create this
16 histogram?
17 A. It was the same. I counted dots. I
18 approximated what portion of each one of those bars was
19 red and what portion was blue. So there was some
20 estimation, but it doesn't affect the overall shape and
21 the overall conclusions.
22 Q. When you use the term Democratic seats in this
23 chart, what does that refer to?
24 A. It means the number of seats that would be
25 predicted to be won by Democrats using the partisan index

1 that Mr. Trende used. And by -- "won" means won with over
2 50 percent of the vote share.
3 Q. Are you saying that for any district that is
4 above 50 percent in Mr. Trende's partisanship index, a
5 Democrat will always win that seat?
6 A. No. It's a prediction for the future elections
7 based on past partisan data, so nobody can know that for
8 sure.
9 Q. Looking at your Senate histogram, the lower part
10 of Page 7, which is based on Mr. Trende's ensemble
11 results, what does it indicate about how many Democratic
12 seats the enacted map contains?
13 A. It predicts 49 for the enacted map.
14 Q. What is the most common number of Democratic
15 seats in Mr. Trende's Senate ensemble?
16 A. 53.
17 Q. What is the next most common number in
18 Mr. Trende's Senate ensembles?
19 A. Probably 54, but it could be 55. There's some
20 approximation, so I don't want to say that I know for sure
21 when the bars are close.
22 Q. Is it accurate to say that the second and third
23 highest numbers -- the second and third most common
24 numbers of Democratic seats in Mr. Trende's Senate
25 ensemble are 54 and 55?

1 A. Yes.
2 Q. What are the fourth and fifth most common
3 numbers of Democratic seats in Mr. Trende's ensemble?
4 A. 51 and 52.
5 Q. What is the sixth most common?
6 A. There's a very small portion that have 56.
7 Q. Was there any one of Mr. Trende's 5,000 Senate
8 ensembles in which Democrats -- in which there are fewer
9 than 51 Democratic seats?
10 A. No.
11 Q. Dr. Tapp, in Mr. Trende's second report, he
12 refers to a figure of 53 percent.
13 A. Yes.
14 Q. And I believe he also testified about that on
15 Monday.
16 A. Yes.
17 Q. Do you recall that?
18 A. Yes.
19 Q. What is your understanding regarding what
20 Mr. Trende is saying about the 53 percent number?
21 A. I think he's moving the goalpost. I think he
22 chose his partisan index, which was based on blended
23 election data, and he's now arguing that compared to his
24 partisan index in congressional elections, Republicans do
25 a little bit better. So he wants to move from the

1 standard baseline, that 50 percent is parity between the
2 parties, to this 53 percent number that I consider weakly
3 justified and ad hoc.
4 Q. Is it common, in your experience in mathematical
5 and statistical research, to apply a different measure in
6 the second stage of a two-stage experiment?
7 A. I've never seen anything like that. In fact, it
8 undermines the value. When you do have a two-stage
9 experiment in which you see how the first stage comes out
10 before you set the bar for the second stage, then there's
11 all kinds of statistical issues with that.
12 Q. Does that have an effect on the reliability of
13 the results one reaches?
14 A. Yes.
15 Q. I'd like to turn your attention to Mr. Trende's
16 second report, Page 10, Exhibit P-2. Dr. Tapp, do you see
17 the chart on Page 10 of Mr. Trende's report?
18 A. Yes.
19 Q. What is your understanding of what this chart
20 shows, generally speaking?
21 A. This is showing for the congressional elections
22 in 2016, 2018, and 2020, the actual Democratic vote share
23 in all those elections, and it's being compared to the
24 partisan index, which is like what the predicted
25 Democratic vote share would be according to the partisan

1 index he chose using statewide election data.
2 Q. By "he" do you mean Mr. Trende?
3 A. Yes.
4 Q. Is it your understanding that Mr. Trende used
5 this chart in reaching his 53 percent figure?
6 A. Yes.
7 Q. In your opinion, is Mr. Trende's method of
8 reaching 53 percent using this chart reliable?
9 A. No. It's ad hoc and not reliable.
10 Q. Why is that?
11 A. There's several reasons. But, I mean, just
12 looking at the chart, his argument seems to be that 53
13 percent is about the place that you would draw a
14 horizontal line across the chart so that it's mostly blue
15 below your line and mostly red above the line, but even
16 that's not exactly the case. Like when I looked at it
17 carefully, it's more like 52 is where you have to draw the
18 line so that the number of exceptions are balanced. It's
19 mostly blue except for, say, five red below the line, and
20 it's mostly red except for, say, five blue above the line.
21 To get that balance, you have to move the line to about
22 52.
23 And, furthermore, if you ignore Katko's
24 district, which is exceptional and is somebody who's
25 retiring and, hence, is an effect that couldn't possibly

1 affect the next decade, the line moves to more like 51.
2 But I don't want to argue for 51 instead of 53. I think
3 the moral of this is that when you do this kind of
4 activity of trying to figure out where to draw the line,
5 you realize that the only thing you're measuring is
6 incumbent effects from the past decade, Katko and other
7 incumbents.
8 Q. To be clear, which district is Representative
9 Katko in?
10 A. 24. So this sort of activity of figuring out
11 the right place to draw the line, is it 50 percent, or is
12 it something above, is purely based on incumbent effects.
13 I mean, there's districts that his partisan index would
14 predict would go red but instead went blue and vice versa,
15 and it's all -- like the reason that happens is because of
16 particular incumbents who are popular or unpopular or
17 controversial. That's why statewide election information
18 sort of differs from congressional election information.
19 So these -- where you put the bar, this number we're
20 arguing about, is purely about nothing other than the last
21 decade's incumbent effects, and I think it would have no
22 predictive value on the next decade's incumbents because
23 the whole point is a whole new set of lines will be drawn.
24 Q. As a mathematician, is the method Mr. Trende
25 employs using the chart on Page 10 a method you would use

1 to reach a reliable conclusion?
2 A. No.
3 Q. I'd like to turn our attention to the next page,
4 Page 11, of Mr. Trende's reply report.
5 A. Yes.
6 Q. Mr. Trende refers to a regression analysis,
7 correct?
8 A. Yes.
9 Q. What is your -- do you have an opinion as to
10 whether Mr. Trende's regression analysis supports his
11 conclusion regarding 53 percent?
12 A. I don't believe it does. I have some issues
13 with it. For one thing, it's very sensitive to data that
14 just doesn't matter. If you look at a district where the
15 partisan index is very high, like 90 percent, it doesn't
16 make a bit of difference to the election outcome, whether
17 the congressional vote share was 70 percent or 100
18 percent. That doesn't change the election, but it does
19 change his punch line of the analysis. So that's one
20 issue.
21 But my deeper issue is that it's just the wrong
22 activity to do. Like he's running a regression and
23 reporting these statistical things, confidence intervals
24 and p-values, and I don't think this is a setting in which
25 that statistical language is even appropriate. You use

1 that language when you're trying to decide whether some
2 effect could have been caused by chance.
3 Like so the standard example in statistics is a
4 clinical trial where you have 100 participants that need
5 to be broken in two, maybe half of them in a control group
6 and half of them in an experiment group. And if in the
7 end the experimental group that got the drug ends up
8 healthier, you ask, well, is that because of the drug, or
9 could that have been caused by chance? And there was
10 chance in that experiment, the chance of how they were
11 broken into two groups. So the language of confidence
12 intervals in statistics is exactly designed to answer the
13 question, could this have been done by chance?
14 But he's applying this to a table where there's
15 no chance. This is just exactly how elections turned out
16 in the previous decade. I don't see a chance element. I
17 just don't see the appropriateness of using this language
18 at all. So I did say in my report that the 50 percent
19 standard baseline does fall within his confidence
20 intervals, but that's almost silly because I don't believe
21 that the language of confidence intervals is relevant.
22 Q. With respect to that comment about 50 percent
23 falling within Mr. Trende's confidence intervals, what
24 does that mean with respect to whether Mr. Trende's
25 conclusion believes that 50 percent as a marker of

1 Democrat or Republican would or would not be a reasonable
2 conclusion?
3 A. Personally I think 50 percent is the only
4 reasonable baseline. That's just what people use. And I
5 did point out that it falls within his confidence
6 interval.
7 Q. And what does that mean, that it fell within his
8 confidence interval?
9 A. It means, according to his calculations, it's
10 within the realm of reasonable.
11 THE COURT: Mr. Mullkoff, within the next
12 five or so minutes, can you pick a spot, or are you
13 almost done?
14 MR. MULLKOFF: I actually will finish
15 probably within five minutes.
16 THE COURT: Okay. Very good.
17 MR. MULLKOFF: Good timing.
18 BY MR. MULLKOFF:
19 Q. Did Mr. Trende take into account any other
20 variables in his regression?
21 A. It's nothing but a regression based on the
22 numbers in this table. He didn't take into account
23 incumbency, and I would say it's measuring nothing except
24 incumbency. The whole point of this sort of analysis is
25 measuring nothing except incumbency from the last decade,

1 and that's not what you want to be measuring if your goal
2 is to predict what's going to happen in future elections.
3 Q. In your opinion, is it important to account for
4 incumbency?
5 A. I would more say it's important not to do this
6 kind of two-step experiment at all.
7 Q. If one is doing the type of regression
8 Mr. Trende is of comparing congressional election results
9 to statewide averages, in your opinion, is it important to
10 control for incumbency?
11 A. Yes, controlling for incumbency or acknowledging
12 that it's not measuring anything much other than
13 incumbency. Yes.
14 Q. Do you have an opinion as to whether the
15 regression Mr. Trende performs on Page 11 provides a
16 reliable forecast of what the results are likely to be in
17 future elections in new districts?
18 A. I do not find it reliable.
19 Q. Why is that?
20 A. I think overall it's ad hoc and just a
21 non-convincing attempt to move the goalpost from the
22 standard 50 percent to 53 percent.
23 Q. On Page 11 Mr. Trende also uses the number 55.6
24 percent.
25 A. Yes.

1 Q. And in the interest of efficiency, I'll quote.
2 He says, as the point at which Republicans have no chance
3 at winning whatsoever. To the best of your understanding
4 of what Mr. Trende is doing, what is that 55.6 percent
5 number based on?
6 A. That seems purely from the row corresponding to
7 District 24, which is John Katko's district. So, again, I
8 think that number has no predictive value for what's going
9 to happen in congressional elections in the next decade
10 under a new set of lines. It's just a statement about
11 what happened in the past decade.
12 Q. In your opinion, is the 55.6 percent figure that
13 Mr. Trende arrived on a reliable way to determine the
14 point at which a Republican candidate has no chance at
15 winning in a future district?
16 A. No. It's just a statement about what happened
17 in a collection of elections from the past decade.
18 Q. In your opinion, are the methods that Mr. Trende
19 uses on Pages 10 and 11 of his reply statistically
20 reliable ways to predict future election results?
21 A. No.
22 Q. In your opinion, is there any basis to apply the
23 53 percent figure Mr. Trende uses to the Senate map that
24 was enacted?
25 A. That's even weaker because he derived that

1 number in a non-convincing way, purely by looking at
2 congressional data. I don't see any basis for assuming
3 anything would work out the same way if he looked at
4 Senate data.
5 MR. MULLKOFF: I have no further questions.
6 THE COURT: Thank you. You can step down
7 for the moment until after lunch, Doctor.
8 And we'll pick up again at 10 minutes to
9 2:00. Okay. That gives everybody about an hour and
10 20 minutes. Okay? Thank you.
11 (A recess was taken.)
12 THE COURT: Bring the witness up.
13 You're still under oath, sir. Okay?
14 THE WITNESS: I understand.
15 THE COURT: All right. Where are we,
16 cross-examination?
17 CROSS-EXAMINATION
18 BY MS. DiRAGO:
19 Q. Hello, Dr. Tapp.
20 A. Good afternoon.
21 Q. My name is Molly DiRago, and I am an attorney
22 for Petitioners. How are you?
23 A. I'm well.
24 Q. So your opinion is that Mr. Trende's methodology
25 that he used to create his ensemble maps did not yield

1 statistically valid results, correct?
2 A. Correct.
3 Q. But you didn't create your own ensemble of
4 simulated maps using what you would consider a valid
5 methodology, did you?
6 A. I did not.
7 Q. Weren't you even curious to see if they would
8 yield the results you think they would?
9 A. It's not a quick and easy thing.
10 Q. So you were not curious to even see what they
11 would yield?
12 A. Not curious enough to spend all the tens of
13 hours it would take to do it correctly.
14 Q. You were asked to opine on the validity of
15 Mr. Trende's analyses, right?
16 A. Correct.
17 Q. Wouldn't it have been quite persuasive to create
18 your own ensemble and demonstrate conclusively that
19 Mr. Trende's ensemble has different results than your more
20 valid ensemble?
21 A. That's just not within the parameters of what I
22 was retained to do.
23 Q. But it would have been more persuasive, correct?
24 A. I'll leave that to the Court.
25 Q. In fact, none of Respondents' five experts

1 created their own ensemble of maps using a valid
2 methodology, did they? I'm sorry. Let me strike that.
3 None of the respondents' five experts created their own
4 ensemble maps using what they would consider valid
5 methodologies, right?
6 A. I was not allowed to be in the room for
7 Dr. Barber's report, so I'm not sure what he did. And
8 aside from that, you're correct.
9 Q. Okay. So you didn't calculate your own
10 gerrymandering index for any of the enacted maps, did you?
11 A. The gerrymandering index can only be calculated
12 once you have an ensemble, and no.
13 Q. Okay. Thank you.
14 So then I guess we'll look at Mr. Trende's
15 gerrymandering index, which is -- well, let's look at the
16 congressional enacted map gerrymandering index, which is
17 on Page 14 of his first report. And I just want to ask
18 you before we really look at this, you take issue with
19 Mr. Trende's sample size with his ensemble maps, correct?
20 A. Yes.
21 Q. But did you know that Dr. Barber created 50,000
22 ensemble maps using Mr. Trende's analysis?
23 A. I only ever looked at a rough draft, early
24 report of Dr. Barber's affidavit, which I don't think
25 matched very well with the final report, so I'm honestly

1 not sure what he did.
2 Q. So it wouldn't surprise you if you heard that he
3 said his results aligned with Mr. Trende's results, would
4 it?
5 A. I have no basis for knowing.
6 Q. Okay. So you agree generally that a
7 gerrymandering index tells us how much the enacted map
8 vectors vary from the average of the ensemble maps'
9 vectors, correct?
10 A. Yes. Exactly.
11 Q. And the larger the gerrymandering index, the
12 more variance there is, correct?
13 A. Yes.
14 Q. And you would agree that Mr. Trende's calculated
15 gerrymandering index shown on this chart is large, right?
16 A. Yes.
17 Q. In fact, the average gerrymandering index on the
18 congressional ensemble maps is around 7.5, correct?
19 A. Yes, percent. You're converting it to a
20 percent, right?
21 Q. I am. I am. Thank you.
22 A. Sure.
23 Q. And the absolute highest gerrymandering index of
24 the ensemble maps is 14.3 percent, correct, or
25 thereabouts?

1 A. That looks correct.
2 Q. And so even that 14.3 percent is a statistical
3 outlier, right?
4 A. Probably.
5 Q. And yet the enacted map, congressional map, has
6 a gerrymandering index of 17 percent; is that right?
7 A. Looks about right.
8 Q. So you agree that 17 percent is a great
9 statistical outlier compared to those ensemble maps,
10 right?
11 A. I would guess that it's enough standard
12 deviation from the average to qualify as an outlier. Yes.
13 Q. Okay. Thank you.
14 And I understand from your report that the
15 gerrymandering index doesn't tell us why there is a
16 variance, just that it's there, right?
17 A. Correct.
18 Q. But one possible reason for a large
19 gerrymandering index is that the map systematically is
20 biased towards the Democratic party, right?
21 A. That is a possibility, yes.
22 Q. And your report does not provide a reason as to
23 what is actually causing this large gerrymandering index
24 here, does it?
25 A. It does not.

1 Q. Okay. Let's take a look at the enacted Senate
2 maps' gerrymandering index, which is Page 20. So just
3 like the gerrymandering index in the enacted congressional
4 map, this gerrymandering index is very large, right?
5 A. Correct.
6 Q. And you did not render an opinion as to why this
7 one is large either, did you?
8 A. I did not.
9 Q. The enacted Senate maps' gerrymandering index is
10 much larger than any of the Senate ensemble maps'
11 gerrymandering indices, right?
12 A. That is correct. I assume.
13 Q. And one possible reason for a large
14 gerrymandering index for the Senate map is that it is
15 systematically biased towards the Democratic party, right?
16 A. It is possible.
17 Q. I want to briefly touch on the Polsby-Popper
18 scores that you talked about on your direct examination.
19 That's Page 22 of Mr. Trende's first report. So you
20 discussed on direct examination that this is sort of a
21 bimodal pattern, and you said that you don't see any
22 reason why that would occur except if the ensemble is
23 broken; is that correct?
24 A. Correct.
25 Q. But you really have no basis for evaluating that

1 because you're not an expert in political geography, are
2 you?
3 A. I'm not an expert in political geography, but
4 the Polsby-Popper score is exactly based on differential
5 geometry, which is the field of math that I worked on
6 before pivoting to the mathematics of redistricting.
7 Q. But you don't know why the bimodal pattern is
8 created? I mean, you know nothing about New York's
9 political geography to say that that wouldn't occur
10 naturally, right?
11 A. I think it's very, very, very unlikely to have
12 occurred for reasons that have to do with the geography of
13 New York. I think by far the most likely explanation is
14 redundancy in the ensemble.
15 Q. Did you test it with your own ensemble maps?
16 A. Yeah. I exactly described doing a reenactment
17 and finding this sort of same kind of level of redundancy.
18 Q. Right. So you reenacted what Mr. Trende did,
19 but I'm saying, did you create your own ensemble maps to
20 show that this Polsby-Popper score here is unnaturally
21 occurring?
22 A. I did create my own ensemble just as part of the
23 recreation that I described, and I just took it for
24 granted, just based on common sense, that an ensemble
25 that's diverse would not show these characteristics in its

1 Polsby-Popper histogram.
2 Q. Okay. So you just took it for granted on common
3 sense, but what I am asking you is, as an expert, you
4 cannot say that you know for sure whether this bimodal
5 pattern would not occur naturally, right?
6 A. I find it very unlikely.
7 Q. Okay. And you didn't create your own ensemble
8 maps using a methodology that you believed is valid to
9 show that this bimodal pattern is unnatural, did you?
10 A. I did not.
11 Q. In fact, you said in your testimony on direct
12 examination that the first time you looked at this, you
13 just thought this is wrong?
14 A. Correct.
15 Q. But you did not address this in your first
16 report, did you?
17 A. I did not, and that was because Counsel asked me
18 to only address the congressional story in my first report
19 and not the Senate story.
20 Q. All right. Let's move on to -- okay. So your
21 expert opinion is that Mr. Trende's data actually shows
22 that the enacted maps favor the Republican party, right?
23 A. Yes, with respect to his chosen partisan index.
24 Yes.
25 Q. And your reasoning for that is that both enacted

1 maps give more seats to Republicans than their ensemble
2 counterparts, right?
3 A. On average, yes.
4 Q. And according to you, the congressional enacted
5 map gives Democrats 22 seats out of 26, whereas some of
6 the ensemble maps give Democrats at least 23 or 24 or even
7 25, right?
8 A. Yes, relative to his ensemble and using his
9 partisan index. Yes.
10 Q. And according to the Senate map enacted, it
11 gives Democrats 49 seats, whereas every single one of the
12 Senate ensemble maps give Democrats at least 51 seats, and
13 actually, the majority have 53, right?
14 A. That sounds right. Yes.
15 Q. So your conclusion that these maps favor the
16 Republican party, when you're providing that expert
17 opinion, is simply based on the number of seats that
18 you've counted Republican or Democrat, right?
19 A. Yes. Exactly. That's the standard analysis.
20 Q. And nothing else goes into your consideration
21 when you're making that expert conclusion, right?
22 A. I made that purely from the two charts in
23 Trende's reports that show the ordered seats. So, yes,
24 nothing that wasn't in those reports went into my
25 histograms.

1 Q. But I guess what I'm asking is, your expert
2 opinion that those maps favor Republicans is based solely
3 on your conclusion of how many seats there are in the
4 enacted maps versus the seats in the ensemble maps, right?
5 A. Yes.
6 Q. So let's then -- we have to discuss these
7 labels, Democrat and Republican. So to label a seat
8 Democrat, you decided that any seat above the 50 percent
9 Democratic line for the partisan index is Democrat, and
10 any seat below that 50 percent line is Republican, right?
11 A. I can't predict what's going to happen in
12 elections in the next decade. I mean, this is sort of the
13 standard baseline for forming a prediction. And, of
14 course, it could turn out differently. I did the same
15 thing Mr. Trende did when he colored the dots red and blue
16 according to exactly that characterization.
17 Q. Okay. I'm glad to hear you say that because
18 that cuts out a lot of my questions.
19 All right. So it sounds like you will agree
20 with me, but I'm not sure. So under the binary view that
21 you were just discussing, a seat that is, say, 70 percent,
22 you know, in the partisan index would be labeled the same
23 as a seat that's at the 50.1 percent index, right?
24 A. In the way that those histograms were
25 constructed, yes. Yeah, they're treated the same.

1 Q. Okay. And so a map that's had, say, five seats
2 that were 49.9 percent, so just under that 50 percent
3 line, and four seats that were, say, 70 percent, so way
4 above the 50 percent line, would be a map that had five
5 Republican seats and four Democratic seats, right?
6 A. That sounds right.
7 Q. Okay. And so according to you, that map would
8 favor Republicans, right?
9 A. I did not say that, but that kind of
10 consideration you're getting into is not factored into the
11 histograms, so that is correct.
12 Q. But a map with five seats that would be
13 Republican and four seats that would be Democrat would
14 favor Republicans, right, under your definitions?
15 A. There's 26 seats. I'm actually confused by the
16 question.
17 Q. It's just a hypothetical map. You can make it
18 any number. But what I'm saying is that it's simply
19 counting which seats favor Republicans above that line or
20 which -- below that line or which favor Democrats above
21 that line, and how high or far above that line is not
22 taken into consideration?
23 A. Right. The competitiveness of the elections are
24 not taken into consideration in that first analysis. Yes.
25 Q. You actually didn't look at the competitiveness

1 of the seats at all, did you?
2 A. I did not.
3 Q. And you don't render an expert conclusion about
4 the competitiveness of any of the seats in the enacted
5 map, right?
6 A. I did not.
7 Q. So when you were asked -- I'll just tell you.
8 You say on Page 3 of your report that you're asked to
9 opine on Mr. Trende's conclusions. You do not opine on
10 his conclusion that the enacted map renders some seats
11 less -- a lot of seats less competitive due to
12 gerrymandering, did you?
13 A. I did not address that.
14 Q. Let's turn to Page 15 of Mr. Trende's report, if
15 you don't mind.
16 A. The first report?
17 Q. Yeah. I'm sorry. Yes.
18 THE COURT: What page are you on?
19 MS. DiRAGO: 15 of his first report.
20 THE COURT: Thank you.
21 Q. And before I get to this, really quickly I want
22 to just ask you one more thing about the competitiveness.
23 You do understand that the New York Constitution states
24 that the maps shall not be drawn to discourage
25 competition, right?

1 A. Yes.
2 Q. Okay. So let's look at the chart, like I
3 mentioned, on Page 15, and this refers to the enacted
4 congressional map. So according to your definitions, this
5 chart shows that the enacted congressional map has four
6 Republican seats, right?
7 A. Correct.
8 Q. And that would be Districts -- ordered
9 Districts 1 through 4, right?
10 A. Correct.
11 Q. And you agree that this chart shows that those
12 four Republican seats contain a higher percentage of
13 Republicans in the enacted map than any of the districts
14 in the ensemble congressional maps, right?
15 A. Correct. In fact, the fourth seat in the
16 ensemble maps most likely goes to -- in most of the
17 ensemble maps goes to the Democrats instead of the
18 Republicans.
19 Q. Well, remember you're not predicting who it'll
20 go for. But just using this comparison, it shows that,
21 yes.
22 Okay. And then the next five seats, so
23 Districts 5 through 9, sort of the same thing but the
24 opposite. All of these -- for 5 through 9 the enacted map
25 shows many more Democrats -- Democratic voters than any of

1 the ensemble maps, right?
2 A. Correct.
3 Q. And then let's look at the next four seats,
4 Districts 10 through 13. These seats you would label
5 Democrat seats, right?
6 A. Right.
7 Q. And you would agree that the chart shows that
8 these seats, while matching some ensemble congressional
9 maps, are at the very high end of the percentage of
10 Democratic votes vis-à-vis the ensemble congressional
11 maps, right?
12 A. They are at the high end relative to the
13 ensemble.
14 Q. And your report did not address this pattern at
15 all, where the Republican seats were made essentially more
16 Republican and the competitive Democratic seats were made
17 essentially more Democrat, did you?
18 A. Relative to an ensemble that has many issues and
19 I did not.
20 Q. But you would agree that a seat that is 50
21 percent Democrat is more competitive than a seat that is
22 55 percent Democrat, right?
23 A. Correct.
24 Q. Okay. So let's look at District Number 5. You
25 agree that District Number 5 in the enacted map is more

1 competitive than in any of the ensemble maps, right?
2 A. I believe you meant to say less competitive.
3 Q. I did mean to say that.
4 A. Yes.
5 Q. Thank you.
6 And you agree that District Number 6 is less
7 competitive than any of the ensemble maps, right?
8 A. It looks that way. Yes.
9 Q. Looks like it.
10 And you agree that Number 7 is made -- is less
11 competitive than any of the ensemble maps?
12 A. Correct.
13 Q. Okay. And I don't have to go through all of
14 them, but 8 and 9 are the same, correct?
15 A. Correct.
16 Q. And then the same is true actually for
17 Districts 1 through 4. They're made less competitive but
18 just in the other way, right?
19 A. Correct. I don't know how they're made, but
20 compared to the ensemble maps, they are less competitive
21 than the maps in the ensemble.
22 Q. That's fair. Okay.
23 And, in fact, as you go bluer there are some
24 seats on sort of the end of the spectrum, but not one seat
25 in these really blue seats falls outside the spectrum for

1 the ensemble maps, right, so Districts 10 through 26?
2 A. 10 is barely within the spectrum, as are others,
3 but I think you're technically correct.
4 Q. And let's look at the Senate map chart on
5 Page 21 of the Trende report, the first report. I mean, I
6 don't want to belabor this, but we see sort of the same
7 pattern. So if we look at the Districts 1 through 14,
8 those are all on the very low end of -- the enacted map
9 for Districts 1 through 14 falls on the very low end and
10 in some cases are outliers compared to the ensemble Senate
11 maps, right?
12 A. At least 2 through 14, yes.
13 Q. Okay. And then let's look at 16 through 25
14 because there the opposite is true. Those districts have
15 significantly more Democratic voters in the enacted map
16 than they do in the ensemble maps, right?
17 A. Correct.
18 Q. Dr. Tapp, do you know what the term packing
19 means?
20 A. Yes.
21 Q. So I have a definition, and you can tell me if
22 you agree with it or not. My definition that I found is
23 concentrating the opposing party's voting power in one
24 district to reduce their voting power in other districts.
25 Do you agree with that definition?

1 A. Yes. That sounds reasonable.
2 Q. I'm sorry. What did you say?
3 A. Yes. That sounds reasonable.
4 Q. And actually, if we could turn to Page 10 of
5 your second report, Paragraph 22, you state something that
6 I thought sort of illustrates why packing even works as a
7 gerrymandering. You state, for example, in a district
8 with a partisan index of 85 percent, it would make no
9 difference to the election outcome whether the Democrat
10 congressional vote share is 75 percent or 95 percent; is
11 that right?
12 A. That's what I wrote, yes.
13 Q. And you still agree with that, don't you?
14 A. Yes. It would make no difference to the number
15 that resulted from Mr. Trende's linear regression, which
16 was 53 percent -- or, sorry, let me -- so the point I was
17 making in this paragraph, yeah, is that anything in the
18 range of 75 percent, 95 percent, that would affect the
19 number that Mr. Trende arrives at, that 53 percent number,
20 but it would really make no difference for election
21 outcome. I think I misspoke.
22 Q. So you didn't analyze either of the enacted maps
23 to determine if there was evidence of packing, right?
24 A. I did not.
25 Q. So you don't have an expert opinion as to

1 whether Republican voters were packed into certain
2 districts in order to reduce their voting power in other
3 districts, right?
4 A. Correct.
5 Q. You made a statement -- and I want to know if
6 you still agree with this -- that if the enacted map is a
7 statistical outlier, this is taken as evidence that the
8 enacted map was drawn with partisan intent. Do you still
9 agree with that?
10 A. If the ensemble is truly representative of
11 maps -- of legally compliant maps that are nonpartisan and
12 are the kind that humans would draw, then, yes, that's how
13 you -- yes.
14 Q. And so nothing in your analysis refutes the
15 thesis that the enacted congressional map was drawn so
16 that Republicans were packed into four districts, thereby
17 giving them less of a chance to win any of the other 22
18 districts, correct?
19 A. I think that statement is mostly outside of what
20 I addressed.
21 Q. Right. So you can't refute that thesis, right?
22 A. I did not refute that thesis.
23 Q. Okay. And you cannot refute the thesis that the
24 enacted Senate map was drawn so that the Republicans were
25 packed into 14 districts, thereby giving them less of a

1 chance to win any of the other 49 seats, right?
2 A. I did not address that.
3 MS. DiRAGO: That's it. I'm done.
4 MR. MULLKOFF: Very brief redirect.
5 THE COURT: Mr. Mullkoff?
6 REDIRECT EXAMINATION
7 BY MR. MULLKOFF:
8 Q. Dr. Tapp, when you were discussing Mr. Trende's
9 charts on Pages 15 and 21 --
10 A. Yes.
11 Q. -- of his report with Ms. DiRago and you made
12 observations about where the black dots were compared to
13 the blue and red dots --
14 A. Yes.
15 Q. -- were you providing your opinion regarding how
16 the enacted map compares to a representative sample of
17 simulated maps?
18 A. I was not. I was providing my opinion about
19 where dots were relative to other dots.
20 Q. Is it accurate to say you were only providing
21 your opinion about what Mr. Trende's chart purports to
22 show based on the ensemble results he generated?
23 A. Right. I was only providing an opinion about
24 how the enacted map and these charts differ from the
25 random maps in his ensemble.

1 Q. Is it your -- do you have an opinion as to
2 whether -- where the blue and red dots on Mr. Trende's
3 charts would represent his simulated maps are flawed due
4 to his methodology?
5 A. Yeah. In detail under direct exam, I talked
6 about many concerns about his methodology and, therefore,
7 concerns about the integrity of his ensemble.
8 Q. What relationship would there be between
9 concerns about Mr. Trende's methodology and where the blue
10 and red dots are on the charts on Pages 15 and 21?
11 A. So that whole discussion was about how the
12 enacted map differs from the ensemble in various ways, and
13 if ensemble is not representative, it becomes a largely
14 moot point.
15 Q. Given what you've testified about Mr. Trende's
16 methodology, does comparing the blue and red dots on
17 Mr. Trende's charts to the enacted map provide any
18 reliable conclusions regarding whether the enacted maps
19 disfavor competition?
20 A. I think the conclusions are made much less
21 reliable because of problems in the methodology.
22 Q. Given what you've testified about Mr. Trende's
23 methodology, can any reliable conclusions be drawn from
24 comparing Mr. Trende's ensembles to the enacted maps about
25 whether Republicans were packed into some districts?

1 A. Again, I have enough concerns about structural
2 problems with the ensemble that I think the ability to
3 draw conclusions is severely weakened.
4 Q. Is it accurate to say that any conclusions that
5 one could draw from the charts on Pages 15 and 21 of
6 Mr. Trende's report are entirely dependent on whether
7 Mr. Trende's ensemble provided an accurate -- a reliable
8 sample?
9 A. Yes.
10 MR. MULLKOFF: No further questions.
11 THE COURT: Recross?
12 MS. DiRAGO: No.
13 THE COURT: No?
14 MS. DiRAGO: Thank you.
15 THE COURT: You can step down, sir.
16 THE WITNESS: Thank you.
17 THE COURT: Thank you.
18 (The witness was excused.)
19 THE COURT: Respondents, next witness?
20 MR. MULLKOFF: Your Honor, we -- the Senate
21 respondents call Jonathan Katz.
22 JONATHAN N. KATZ,
23 called herein as a witness, having been first duly sworn,
24 was examined and testified as follows:
25 THE DEPUTY: State your name and spell it

1 for the Court, please.
2 THE WITNESS: Jonathan Neil Katz,
3 J-o-n-a-t-h-a-n, Neil, N-e-i-l, Katz, K-a-t-z.
4 THE COURT: I'll ask you to keep your voice
5 loud so I can hear you. Thank you.
6 Mr. Mullkoff?
7 DIRECT EXAMINATION
8 BY MR. MULLKOFF:
9 Q. Good afternoon, Dr. Katz.
10 A. Good afternoon.
11 Q. Where are you from originally?
12 A. I grew up in New York City.
13 Q. How long did you live in New York City?
14 A. Until I was 18 years old.
15 Q. What is your educational background?
16 A. I did my undergraduate degree at MIT in applied
17 mathematics, my graduate degree in economics and political
18 science at UC San Diego. I was a postdoctoral fellow at
19 Harvard University, and I have been an assistant -- I have
20 been with Caltech since 1995 with a short hiatus, when I
21 was on the faculty at the University of Chicago.
22 Q. What is your current position at Caltech?
23 A. I am the Kay Sugahara -- so that's K-a-y,
24 S-u-g-a-h-a-r-a -- professor of social sciences and
25 statistics.

1 Q. Did you previously serve as the chair of a
2 division at Caltech?
3 A. Yes. I was the division chair for humanities
4 and social sciences at Caltech, which is equivalent to a
5 dean of arts and sciences at most universities.
6 Q. And how did you come to hold that title?
7 A. Like most academic administrative appointments,
8 there was a faculty search committee, and I was eventually
9 appointed by the provost.
10 Q. How long did you serve as the chair?
11 A. I did that for seven years.
12 Q. In the past few years at Caltech, what types of
13 classes have you taught?
14 A. To undergraduates I teach an applied data
15 analysis course in our new information and data sciences
16 major. To graduate students I teach both the required
17 political economy sequence, and I teach advanced courses
18 in political methodology, which is applied statistics in
19 social sciences.
20 Q. Have you published material in peer-reviewed
21 journals?
22 A. I've published one book and about thirty-five
23 articles.
24 Q. Have you published books or articles about
25 elections and redistricting?

1 A. Yes. About half my portfolio is on studies of
2 elections and redistricting in particular. I've developed
3 statistical techniques in advanced -- sort of the standard
4 models that are used to study elections and American
5 politics, and then I wrote a book with Gary Cox on the
6 impact of the Reapportionment Revolution on congressional
7 elections.
8 Q. The subject of that book was about
9 redistricting?
10 A. Yes. It was how redistricting shaped
11 congressional elections.
12 Q. Have you received any awards for your
13 professional work?
14 A. Yes. The two most prominent, I'm an elected
15 fellow of the American Society of Arts and Sciences, which
16 is one of the highest honors that a US academic can
17 receive, and I'm also a fellow -- elected fellow of the
18 Society for Political Methodology, which is the
19 organization of people who do statistics in political
20 science.
21 Q. Do you have involvement with Science Advances?
22 A. Yes. I am the -- one of the deputy editors for
23 social sciences at Science Advances. Science Advances is
24 the open-access journal of the American Association for
25 the Advancement of Science. We're sometimes better known

1 for the Journal of Science, which is one of the leading
2 science journals. Science Advances is the open access;
3 that is, it's free for anyone to -- any one of you can go
4 to the internet and download the articles.
5 Q. And were you previously involved with Political
6 Analysis?
7 A. Yes. I was the co-editor in chief for Political
8 Analysis for eight years.
9 Q. What is Political Analysis?
10 A. Political Analysis is the journal of the Society
11 for Political Methodology. It's the premier outlet for
12 development of statistical tools in political science.
13 Q. Have you been involved with the Caltech/MIT
14 Voting Technology Project?
15 A. Yes. I've been a member of it for many years.
16 I forgot how long. And I served briefly as its director.
17 And it was -- we study various aspects of election
18 administration and technology.
19 (Respondents' Exhibit S-18 was marked for
20 identification.)
21 MR. MULLKOFF: Your Honor, I believe that
22 Dr. Katz's CV has been marked as Exhibit S-18. I
23 would --
24 THE COURT: S-18?
25 MR. MULLKOFF: S-18.

1 Permission to hand it to the witness,
2 please.
3 THE COURT: Please do.
4 BY MR. MULLKOFF:
5 Q. Do you recognize this document I've handed to
6 you that's marked S-18?
7 A. Yes, I do.
8 Q. What is this document?
9 A. It's my curriculum vitae.
10 Q. Does this document accurately reflect the
11 progression of your career and your publications to this
12 date?
13 A. It does.
14 Q. Dr. Katz, have you ever been an expert before?
15 A. Yes. I've been an expert in many election law
16 cases over the last 24 years.
17 Q. Have you been accepted by courts as an expert in
18 those cases?
19 A. I have.
20 Q. In those cases has that been on behalf of
21 Democrats or Republicans or something else?
22 A. I work for both Democrats, Republicans. I do
23 also a fair bit of work in California, which is mostly for
24 nonpartisan local election officials.
25 Q. Is there one party you've worked for more than

1 the other?
2 A. By happenstance I do a slight bit more work for
3 the Republicans than for the Democrats. I think supply
4 and demand. There are more academics who are willing to
5 serve as expert witnesses for the Democrats, fewer for the
6 Republicans.
7 Q. Is there a recent example of work you've done on
8 behalf of Republicans that you can provide?
9 A. Certainly. I was retained in two cases by the
10 Attorney General's Office of the State of Texas, and I
11 also served in a case prior to that for the Attorney
12 General's Office of New Hampshire.
13 Q. Have you ever been asked to be an expert witness
14 in a case and declined to do so?
15 A. Yes. As early as last week.
16 Q. And why do you do that in such cases?
17 A. For two main reasons: One, for timing but also
18 if I don't believe my analysis will likely be acceptable
19 or helpful for the client asking me to do the work.
20 Q. Are you being compensated for your expert work
21 in this case?
22 A. I am. I'm being paid $600 an hour.
23 Q. Does your compensation depend in any way on the
24 expert opinions or testimony that you provide?
25 A. Most definitely not.

1 Q. Does your compensation depend in any way on the
2 outcome of the case?
3 A. No.
4 MR. MULLKOFF: At this time the Senate
5 respondents tender Dr. Jonathan Katz as an expert
6 witness in the fields of political science and
7 statistical analysis of redistricting and elections.
8 THE COURT: Any objections?
9 MS. DiRAGO: No objection.
10 THE COURT: Yes. I'm qualifying him as a
11 witness as such.
12 Proceed.
13 BY MR. MULLKOFF:
14 Q. Dr. Katz, did you prepare an expert report in
15 this case?
16 A. I did.
17 (Respondents' Exhibit S-19 was marked for
18 identification.)
19 MR. MULLKOFF: Permission to approach, your
20 Honor.
21 THE COURT: You may.
22 BY MR. MULLKOFF:
23 Q. I've handed you a document that's been
24 pre-marked as Exhibit S-19. Do you recognize this
25 document?

1 A. I do.
2 Q. What is this document?
3 A. It's my expert report I prepared for this case.
4 MR. MULLKOFF: Your Honor, I would move to
5 enter Exhibit S-19 into the record.
6 THE COURT: Petitioners?
7 MR. TSEYTLIN: Your Honor, pursuant to your
8 ruling earlier today, I think everything after --
9 Page 19 and after, as well as the summary on Page 1
10 that relates to the congressional maps, should not be
11 in the record.
12 THE COURT: Mr. Hecker?
13 MR. HECKER: Your Honor, I think your
14 ruling speaks for itself. I trust Mr. Tseytlin that
15 those are the pages that deal with the congressional
16 map. We obviously disagree with the Court's ruling,
17 but we respect it.
18 THE COURT: Understand.
19 MR. MULLKOFF: And just to clarify, I
20 assume that the other side is not striking Page 28,
21 the references page of the report.
22 MR. TSEYTLIN: Right, except to the extent
23 it's making references in the objection.
24 THE COURT: References to the Senate.
25 MR. TSEYTLIN: Yeah.

1 MR. MULLKOFF: We understand that the
2 Court's ruling speaks for itself.
3 THE COURT: Okay.
4 MR. MULLKOFF: And I'd also at this time
5 move to enter Dr. Katz's CV, Exhibit S-18, into the
6 record.
7 THE COURT: Any objection?
8 MR. TSEYTLIN: No objection.
9 THE COURT: Admitted.
10 (Respondents' Exhibits S-18 and S-19 were
11 received in evidence.)
12 BY MR. MULLKOFF:
13 Q. Dr. Katz, what was the scope of your expert
14 report in this case with the understanding that we will
15 only be discussing it with respect to the Senate today?
16 A. I was asked to examine the potential political
17 partisan impact of the newly enacted Senate plan.
18 Q. Did you form opinions on that subject to a
19 reasonable degree of professional certainty?
20 A. I did.
21 Q. Generally speaking, what conclusions did you
22 come to?
23 A. Using historical election data, I found that the
24 enacted 2022 Senate plan shows no statistically
25 significant partisan bias in favor of either party.

1 Q. Dr. Katz, what is the concept of partisan
2 fairness?
3 A. So the idea of partisan fairness in analyzing an
4 election map or other set of electoral rules is asking,
5 does it treat in this case the two parties the same, or
6 fairly? We'll say -- if it treats them symmetrically,
7 we'll call it fair. So, for example, if the Democrats win
8 80 percent of the seats with 65 percent of the vote, we'll
9 call that fair as long as if the situation were reversed
10 and the Republicans won 65 percent of the vote; they, too,
11 would receive 80 percent of the seats.
12 Q. You would consider that a fair map?
13 A. Yes. The idea of partisan symmetry is well
14 established, going back almost a century.
15 Q. Is partisan fairness the same as
16 proportionality?
17 A. No. Proportionality, although often people
18 think of election outcomes being proportional, that's
19 actually a separate electoral system. The single-member
20 district system that we use -- and I say it typically does
21 not lead to proportional outcomes and probably easiest to
22 think about that by a simple thought experiment. Suppose
23 that, again, the Democrats were getting 65 percent of
24 votes statewide in New York and that every district was an
25 exact partisan representation of that, so 65 percent of

1 the votes in every district were Democratic. That would
2 give you an average of 65 across the state. There -- in
3 that map then they would win every district.
4 Now, that's not probable because, as we know,
5 partisans aren't uniformly distributed across the State of
6 New York or any state that I'm aware of. You know,
7 there's more Democrats in New York City and in other
8 cities in the state, more Republicans in this area, for
9 example, and so that difference will mean that you
10 probably won't win exactly 100 percent of the seats, but
11 you're going to win a very large number of them because
12 that's the only way your average vote share can be 65
13 percent.
14 Q. In a state in which a party received 65 percent
15 of the statewide vote, would you expect the party to
16 receive 65 percent of the seats?
17 A. Again, no. That would be a sort of knife-edge
18 case. That's proportionality. Single-member district
19 systems are well known to give a bonus or extra seats to
20 the party that wins more than the majority of the votes.
21 So typically they would get significantly more than 65
22 percent of the seats.
23 Q. Would it reflect partisan bias if the Democrats
24 in New York received 65 percent of the statewide vote but
25 won substantially more than 65 percent of the seats?

1 A. Again, returning to the notion of partisan
2 fairness that's established in the political science
3 literature, that's fair as long as, were the situation
4 reversed and Republicans were getting 65 percent of the
5 statewide vote, they, too, would be receiving about the
6 same seat share as the Democrats in that situation.
7 Q. I want to direct your attention to the exhibit
8 that's been admitted as Petitioners' 2. I believe it's in
9 front of you open with the chart. If you could look at
10 Page 6 of that exhibit, please, and I just want to read
11 you one sentence from Mr. Trende's reply report. Quote,
12 the conclusion that independent analysts on the left,
13 right, and center are all incorrect about the fairness of
14 a map that would appear to limit Republicans to 15 percent
15 of the seats in a state where they routinely win around
16 1/3 of the vote is one that can only be reached through a
17 misapplication of methods and a naive interpretation of
18 data, end quote. Dr. Katz, do you agree with that
19 sentence?
20 A. No. It's incorrect. It's the mere problem. So
21 if the Democrats are the majority party and they're
22 getting more than their share -- a larger share of the
23 seats than their votes, that has to come at the expense of
24 the minority party winning fewer share of the seats than
25 their votes. In fact, this is a very well-known result

1 going back to Duverger in the 1950s, a French lawyer and
2 sociologist, and is well established in other cites, in
3 Kendall and Stuart in my report.
4 Q. Do you agree with Mr. Trende insofar as he's
5 suggesting a map with that percent of the statewide vote
6 and that percent of the seats would necessarily be unfair
7 to the Republican party?
8 A. You can't say what's fair without knowing how
9 many seats the Democrats would receive at 15 -- at 30
10 percent of the vote. If they, too, would receive 15
11 percent of the seats, then that would be fair.
12 Q. Did you conduct an analysis with respect to
13 New York's Senate map about partisan symmetry?
14 A. I did.
15 Q. How do you measure partisan symmetry?
16 A. One second. I need some more water.
17 THE COURT: Take your time.
18 A. The idea of partisan symmetry, we have to figure
19 out what's the vote distribution in the new map since we
20 haven't observed any elections yet under the 2022 map. So
21 the first part of the -- the starting point of this
22 analysis is to use historical election results, in this
23 case the election results from the last election decade,
24 2012 to 2020, to relate those results in the
25 congressional, Senate, and Assembly districts in the State

1 of New York to characteristics of the districts, such as a
2 measure of partisanship by looking at average statewide
3 vote share that the Democrats do; whether or not an
4 incumbent's running, because we know incumbents do better
5 than non-incumbents in elections; and the demographic
6 makeup of that election.
7 Q. Let me ask you about one of those things, and
8 please say anything else you'd like. With respect to
9 incumbents, how does your model take that into account?
10 A. We include a set of indicator variables that
11 indicate whether or not the seat at hand in a particular
12 district in a particular election has a Democratic
13 incumbent, a Republican incumbent, or an open seat, and
14 that's just because of the fact that we know, on average,
15 in New York State and from my analysis, incumbents do
16 better by about 3 percentage points. So if you compare an
17 incumbent Republican to the Republican candidate's vote
18 share in an open seat, the incumbent Republican member
19 does about 3 percentage points better.
20 Q. Does your model take into account variations
21 from one election to another?
22 A. Of course, because elections vary over time. So
23 what we do is we estimate the overall variability in
24 elections over the last decade, and we use that as our
25 benchmark or as our calibrated value to think about what

1 variability should be in the future.
2 The model also controls for the fact -- since we
3 have repeated observations of districts over time -- so we
4 observed elections in 2012, 2014, 2016, 2018, 2020 -- we
5 can look at some districts, and some districts just
6 outperform their fundamental factors. So, for example, it
7 could be because there's a very popular incumbent who does
8 better than their party compatriots. And so the model
9 allows for that systematic overperformance to be accounted
10 for, as something we wouldn't want to forecast in a new
11 map, because we don't know if that incumbent is going to
12 run again or if the situation in that district will change
13 again.
14 Q. I want to look at Page 7 of your report, which
15 is Exhibit S-19. Just to point to Footnote 7, you used
16 the phrase systematic. I'll read the footnote. The full
17 model also controls for systematic unobserved
18 characteristics, end quote. Is that what you're talking
19 about?
20 A. That's exactly what I was talking about, this
21 idea that some districts routinely overperform given their
22 characteristics; some routinely underperform given their
23 characteristics, and so we have repeated observations.
24 There are some technical statistical tools that allow to
25 control for that fact.

1 Q. So what is the -- in plain English what is the
2 model doing with those types of results?
3 A. In plain English. Okay. It's just saying
4 this -- there's -- we allow -- if you think about it,
5 there's a -- in each of those districts, we would estimate
6 this district effect, and it says, you know, in
7 District 25 the Democrats are doing way better than we
8 expect, and so it just puts a little positive value that,
9 when we forecast in the future, we're going to assume is 0
10 because we don't know that it's going to continue in the
11 future. But in the historical map District 25
12 overperformed the map.
13 Q. Are you aware of an example in New York that
14 would fall within this control for systematic and observed
15 characteristics?
16 A. Yeah. For example, Representative Katko from
17 this area, I know that he's a very popular incumbent. In
18 fact, he looks like he does better than, for example, the
19 statewide vote share for Republicans in his district.
20 MR. TSEYTLIN: Your Honor, objection.
21 That's talking about congressional --
22 MR. MULLKOFF: Your Honor, if I may
23 explain. This is not about Dr. Katz's congressional
24 analysis.
25 THE COURT: And I won't consider it for

1 such.
2 MR. MULLKOFF: Dr. Katz's model --
3 THE COURT: I think he's trying to give an
4 example.
5 MR. MULLKOFF: Well, just to be clear,
6 Dr. Katz's model uses congressional, Senate, and
7 Assembly election history in order to accurately
8 forecast the Senate --
9 THE COURT: I understand.
10 MR. MULLKOFF: -- and so we're not --
11 THE COURT: I'm going to allow it, but I'm
12 not going to consider it for the purposes of the
13 congressional maps.
14 BY MR. MULLKOFF:
15 Q. So with respect to Representative Katko's
16 performance in past elections, what would your model do
17 with that information?
18 A. Again, it would -- if he was overperforming
19 Republicans, that is, so actually models in terms of
20 Democratic vote share, that is, the Democratic vote share
21 is lower than we would otherwise expect, given the
22 characteristics, the estimated indicator, or fudge factor,
23 if you like, would say that there's a little bit
24 negative -- there's a negative term that we control for as
25 an extra error.

1 Q. Is one way of describing that that it would not
2 give as much weight to the outcome of Representative
3 Katko's election, or is it something different?
4 A. Something -- more like it corrects the outcome.
5 It says, he's doing too well, so we're going to estimate
6 the separate effect. That's going to just be netted out.
7 So we're sort of handicapping it as opposed to
8 downweighting it.
9 Q. With respect to your overall model and for
10 purpose of forecasting, why does it do that effect on
11 Representative Katko's results?
12 A. Because, again, in a future election we assume,
13 absent any additional information, that in the new map all
14 districts are identical, that all these fudge factors, all
15 these indicator variables, are 0 because we don't know who
16 will be running or what the exact circumstances will be.
17 Q. You mentioned that your model takes into
18 consideration a variety of past elections, including
19 Assembly elections and Senate elections in addition to
20 congressional and statewide elections, correct?
21 A. That's correct. So what we do is what's
22 formally called in statistical literature partial pooling,
23 again, to have more data points. As we get more data
24 points, our statistical estimates become more certain, so
25 we jointly model all three elections over the last

1 election decade just to give us a bigger set of
2 observations to use in generating our forecasting model.
3 Q. Does having that bigger set of observations have
4 an effect on the accuracy of the model?
5 A. Right. It makes the model more accurate. More
6 data leads to more accurate forecasts and more stable
7 estimates.
8 Q. This model you've been describing, have you used
9 it in the past?
10 A. Yes. I use it -- the model is based on work by
11 co-authors of mine, Andrew Gelman and Gary King, from
12 1994, and it is the model that everyone uses who studies
13 legislative elections.
14 Q. Is it accurate to say this model is commonly
15 used by others?
16 A. Yes, very commonly used.
17 Q. Do you believe it to be effective?
18 A. Yes. And, in fact, I've done work with Gary
19 King expanding this to other cases, for example,
20 multiparty elections, more-than-two-candidate elections.
21 Q. Have you ever engaged in validation efforts to
22 examine how accurate the model is?
23 A. I and others have done this repeatedly over the
24 last three decades. Looking at forecasts of -- using it
25 on historical data and then comparing to see how it does

1 on future, it does very, very well on average.
2 Q. Do you mean that it accurately forecasts what
3 the elections would do or something else?
4 A. Yes. It accurately forecasts on average. Of
5 course, it's a forecasting model. So, for example, if
6 there was an election that had a candidate who suddenly
7 found themselves in a scandal, they might underperform.
8 The model doesn't account for that, so there are some
9 errors. It's not a -- it's a statistical model, but on
10 average the model systematically characterizes
11 congressional -- legislative elections.
12 Q. So it won't predict the correct result every
13 time; is that right?
14 A. Not every time, but on average it will.
15 Q. Do you have a great deal of confidence in the
16 reliability of the forecasts?
17 A. Yes, I do. I would -- if we were betting, I'd
18 be happy to bet on a portfolio of elections for the -- in
19 the new Senate -- in the new map.
20 Q. Did you apply this model for forecasting
21 election results to New York?
22 A. I did. That's presented in -- for example, the
23 first part of it is presented in Table 2 of my report on
24 Page 8.
25 Q. Are you referring to Page 8 of Exhibit S-19?

1 What does this chart show?
2 A. So as I told you, the first part of the analysis
3 is we generate our forecasting regression model. We then
4 use that. So now in the new map -- a new map is --
5 usually you think about a new map as just being lines on a
6 grid; you know, you go down East -- you go down
7 Main Street, take a left on Davidson, take a right on
8 whatever the next street is. That's not -- in our world a
9 map is just a new set of these characteristics. What's
10 the average vote share for gubernatorial, Senatorial, so
11 forth, elections in the district in the new map as we add
12 up the precincts? What's the demographic characteristics?
13 Given that and the statistical model that we fit, we can
14 forecast what the vote -- we can forecast various aspects
15 of elections in that map. So, for example, we can predict
16 what's the expected or average vote share for the
17 Democratic candidate in that election in this case
18 assuming that there are no incumbents running.
19 Q. Why do you assume that no incumbents are
20 running?
21 A. Of course, in any real election incumbents run.
22 The problem is that whether or not incumbents run is
23 partly a function of the map; that is, it's endogenous to
24 the map. So you might think about -- in districts that
25 are very supportive of Democrats, you might likely see in

1 future elections Democrats running as incumbents. In
2 districts that are Republican, you might see Republican
3 incumbents running. But the problem is -- we might have
4 good guesses about who the incumbents are going to be,
5 say, in the 2022 election, but let's think it out -- this
6 map's going to be in place until 2030. Do we know what
7 incumbent is going to run in every district? People have,
8 unfortunately, health issues. People choose to run for
9 higher office. We don't know those things, so we don't
10 actually know what incumbents are going to run in future
11 elections, so the benchmark is done with the -- assuming
12 the map is all open seats.
13 THE COURT: So could it be 3 percent off if
14 you don't take incumbency into consideration?
15 THE WITNESS: It would be -- yes. You're
16 right. So it's about a 3 percent fudge factor.
17 A. If you just wanted to go through it or, your
18 Honor, if you want to, you could turn to my analysis on
19 Page 14, which looks at the Senate map assuming a
20 reasonable guess about what incumbents are going to run if
21 this map is allowed to be used.
22 Q. So, Dr. Katz, is it accurate to say that you
23 first did the calculations for the Senate map assuming no
24 incumbents?
25 A. That's correct.

1 Q. And then for the second you did the same
2 calculations using what the public knows currently about
3 which incumbents are likely to run in each Senate
4 district?
5 A. Right. I do that as like a robustness check.
6 Let's see how -- do things change wildly?
7 Q. All right. So I would like to talk about that
8 in a few minutes, but if we could talk about this chart
9 first, I think it would be clearer. Could you describe
10 what each of the columns in Table 2 on Page 8 shows?
11 A. Yeah. It might be easier if we actually take a
12 particular district so we can actually run through an
13 example, so let's look at District 3. So District 3 -- so
14 the first column tells you what district it is. The first
15 thing is we see the expected Democratic vote in that
16 district is 56.4 percent. Now, that means that if the
17 seat were open, we would expect, on average, the vote
18 share to be 56.4 percent. But, of course, there's
19 variability.
20 Q. Before you go on, could I clarify? The 56.4
21 percent, is that the same as the past voting average in
22 that district, or is it something different?
23 A. No. That's the estimate that comes out of the
24 forecasting model. That uses the aggregated statewide
25 election results as an input to that model, but it's not

1 the same thing.
2 Q. So what does this 56.4 percent represent?
3 A. It means that if -- for example, in the next
4 election I doubt -- I don't know if District 3 will be
5 open, but if it were, then our best guess as to what the
6 Democratic vote share would be, would be 56.4 percent.
7 Q. What do the third and fourth columns mean?
8 A. Well, clearly elections aren't fixed. We
9 observe good years and bad years for both parties and
10 candidates change, so there's a variability. For this
11 district the variability is about 8.7 percentage points.
12 So the way to think about it is if you thought about
13 what's the entire range of plausible values of Democratic
14 vote share we would see in that district. By some math,
15 which we can talk about in detail if you want, if you take
16 the mean, the 56.4 percent, and you add twice that
17 standard deviation and you subtract twice the deviation,
18 that gives you the range, a sort of 95 percent range, of
19 where we think vote shares would be.
20 So let me actually run through the example. So,
21 for example, in this case 56.4, so the upper bound would
22 be 2 times -- would be 56.4 plus 2 times 8.7, which is
23 73.8. That would be like the best you would expect to see
24 in this district. And the lower bound for Democratic
25 performance in this -- Democratic vote in this district

1 would be 56.4 minus 2 times 8.7, which is 39 percent. So
2 that gives us the idea that there's going to be
3 variability depending on national conditions, state
4 conditions, and districts. Districts vary.
5 Q. And what about the fourth column?
6 A. And the fourth column is sort of the summary,
7 which is telling us what's the probability the Democrat
8 would win that seat, and it's 76.8. Now, what is --
9 people have hard times thinking about probabilities. The
10 best way you should think about it is as a long-term
11 average. Suppose that we were to run, say, 100 elections
12 with this map and observe the election results in it. Of
13 course, we're not actually going to observe it 100 times,
14 but if we did, we would expect about 77 times the
15 Democrats would win and about 33 times they would lose.
16 Q. Do you mean 23?
17 A. 23 times. That's what I get for doing math on
18 the fly on the stand.
19 Q. I don't purport to be able to do it well.
20 Just for clarity, could you explain how this
21 works for District 4, for example?
22 A. Sure. So, similarly, for District 4 the
23 expected Democratic vote share is 42 percent,
24 equivalently, because there's only two parties effectively
25 running in the state. I know there are minor parties.

1 But they get -- the Republicans would get about 58 percent
2 of the vote. It has about a similar variability. It's
3 about 8.6 percentage points. And that corresponds to a
4 sort of long-term average that the Democrats win this
5 about 17 percent of the time or, equivalently, Republicans
6 win this seat about 83 percent of the time if you, say,
7 were to run this election 100 times in this district.
8 Q. Did you provide these four columns of
9 information for each of the 63 Senate districts in the new
10 map?
11 A. I did. I did. It's a very long table. It goes
12 over three pages.
13 Q. So is it accurate to say that the first column
14 is the actual number of the enacted Senate district?
15 A. Yes, that's the number of the enacted plan.
16 Q. The second column is your predicted average
17 Democratic vote percentage for that district in the new
18 map?
19 A. That's correct.
20 Q. The third column is the standard deviation for
21 that calculation?
22 A. Correct.
23 Q. And then the final column is your model's
24 forecast of the percentage of times the Democratic
25 candidate in that district is expected to win?

1 A. Correct.
2 Q. What is the next step of your analysis?
3 A. So recall that to do partisan fairness, we need
4 to compare how many seats the Democrats would get for a
5 given vote share versus how many seats -- what the
6 Republicans get for the same vote share. That entire
7 relationship is captured in what's called a seats-votes
8 curve, and there's an example of one in Figure 1 on
9 Page 11 of my report.
10 Q. Looking at Figure 1 on Page 11, what does this
11 tell us?
12 A. Well, let me tell you. So we estimate -- so
13 this curve comes from converting the results in Table 2 to
14 trace out the seats-votes curve, and the seats-votes
15 curve -- the dark line is what you should spend most of
16 your attention on. It's telling you if you -- so the
17 horizontal axis is the average Democratic vote share, and
18 the vertical axis is the percent of seats. So, for
19 example, if we looked at 50 percent, which has a dashed
20 line on it so it'll make it easy to see, we run up until
21 that dashed line intersects the dark seats-votes curve.
22 Q. So just to be clear, you're going up from the
23 bottom dashed line --
24 A. Correct.
25 Q. -- for a 50 percent Democratic district vote

1 percentage?
2 A. Right.
3 Q. And then what does it tell you when you hit the
4 black line that crosses that?
5 A. Then we do another line that goes to the
6 vertical axis, which is about -- I think, about 48
7 percent, if I'm eyeballing it correctly. So that says for
8 50 percent of the vote -- average Democratic vote share,
9 pardon me, Democrats are getting about 48 percent of the
10 seats.
11 Q. For the other vote shares, other than 50
12 percent, what information does this chart provide?
13 A. Exactly the same. So you could do -- so you
14 could look to see what vote share the Democrats get at 70
15 percent of the averaged vote share. We also get the flip.
16 We also get the Republicans. How do we do that? Well,
17 since there's only two parties, we just take 100 minus
18 that. So if I want to know how the Democrats -- how the
19 Republicans are doing at 70 percent of the vote, I look at
20 the 30 percent point because that means the Democrats --
21 that means the Republicans are getting 70 percent of the
22 vote, and I look at their -- the seat share, which is
23 about -- looks like about 8 percent, and so that means the
24 Republicans get 100 minus that. So the Republicans are
25 getting back 92 percent of the seats at 70 percent of --

1 60 percent of the vote share.
2 Q. Does this chart also show how many seats
3 Republicans get with a given percent of the vote share?
4 A. Yeah. I just did that calculation.
5 Q. Just clarifying.
6 A. Yes, it does, because it's the mirror image.
7 And I should point out one other feature of this.
8 Because, again, it's a statistical estimate, we don't know
9 it. If we knew it, you wouldn't need to hire someone like
10 me. These gray lines are basically what are called
11 confidence intervals. They're telling us what's the most
12 likely possible values we could see for the seats-votes
13 curve.
14 Q. What is the next step in your analysis?
15 A. Since reading charts like this by hand is a
16 little painful and really recalling what partisan fairness
17 is, is asking what's the amount of -- how many -- what's
18 the difference in seat share that the Democrats get versus
19 the Republicans at the same vote share, we can actually
20 directly calculate what's called partisan bias, that is,
21 that difference. Of course, we have to choose a
22 particular value -- a particular vote share to do that,
23 and that's done in Figure 2 of my report on Page 12.
24 Q. Is it accurate to say that this figure shows the
25 information on the seats-votes curve we were just looking

1 at in numbers?
2 A. No. It's -- a calculation from the seats-votes
3 curve is a more accurate way of describing it.
4 Q. Thank you for clarifying.
5 So please tell us what this chart on Page 12,
6 Figure 2, shows.
7 A. Right. So, again, it's probably easiest if we
8 take an example. Let's look -- so what I plot out here
9 are various ranges of vote shares, and we do ranges
10 because we want to average over a range to get a better
11 estimate. And I chose ranges that were either interesting
12 or plausible, so we go from basically 50 percent all the
13 way up to 70 percent vote share. So let's take the top
14 one. The top bin is 66 to 70 percent, so that's when the
15 parties are getting 66 to 70 percent of the vote. What's
16 the difference between the Democratic vote share -- the
17 Democratic seat share and the Republican seat share in
18 this region? And we see that it's a point estimate of
19 0.58 percent. It's Democrats on average getting about
20 0.58 percent, 0.6 percent more seats.
21 The other thing, remember -- recall, just like I
22 showed you on the seats-votes curve, that there's these
23 uncertainties because we don't actually know these numbers
24 for sure, we can actually estimate a confidence interval
25 for that estimate. That's accounted for in that bar that

1 goes through the center dot. And most importantly, we see
2 that the -- so both of the point estimates are very small.
3 It's a very small level of bias. And more importantly,
4 because that bar goes across this dashed line at 0, that
5 means we can't -- that there's no statistically
6 significant evidence of partisan bias in favor of either
7 party.
8 Q. So you just explained that for 66 to 70 percent
9 vote share, the bias percentage is 0.58 percent, correct?
10 A. Correct, in the Democratic direction.
11 Q. Is that a significant level in your review?
12 A. No, because, again, it's, one, small in
13 substance. But in practice, because its confidence
14 interval crosses the 0 line, we can't reject that there's
15 no bias at that level, in that range of vote share.
16 Q. What does the next line down for 61 to 65
17 percent vote share show?
18 A. Here it's the same magnitude. It's about .6
19 percentage points, but it's in the Republican direction.
20 So in this range Republicans are doing slightly better
21 than Democrats at converting their votes into seats. But,
22 once again, since the confidence interval crosses this 0
23 line, we can't -- there's no statistically significant
24 evidence of bias. We can't reject that there's zero bias.
25 Q. What about the third column down -- the third

1 row down, 56 to 60 percent?
2 A. Here, again, the bias is a touch larger in
3 magnitude. The point estimate's about 1.3 percent in the
4 Republican's direction. But, once again, although the
5 magnitude's a touch larger, it's still pretty small. It
6 is statistically insignificant; that is, we can't reject
7 that it is also zero.
8 Q. And just to put it into terms of Senate
9 districts, what does 1.29 percent in the Republican's
10 direction mean, approximately?
11 A. Approximately, since there's -- 1 over 63 is
12 about 1.6, so it's about one seat. I think that's right.
13 Are my calculations right?
14 Q. So what does that mean, that -- the minus 1.29
15 percent number mean in terms of Senate seats?
16 A. In that range of vote share, the Republicans are
17 getting almost one extra seat than the Democrats at the
18 same vote share.
19 Q. What about 52 to 55 percent row?
20 A. Here the point estimate is down to .2 percent,
21 so even smaller, effectively almost 0 substantively. And,
22 again, the confidence interval crosses the 0 line, so we
23 can't reject that it could be -- that it's zero.
24 Q. And what about the final, 49 to 51 percent row?
25 A. Here the confidence interval's the largest, but

1 the point estimate is 1.44 percent, so similar to the
2 previous example, in the Republicans' favor. They're
3 getting 1.44 percent more seats for the same vote share.
4 The uncertainty's a little bit bigger, but we also can't
5 reject that the -- that it's -- we -- it's statistically
6 insignificant.
7 Q. Overall what were your findings of partisan bias
8 with respect to the New York enacted Senate map?
9 A. Given the results in this figure, there's no
10 evidence of statistical bias in favor of either party in
11 the enacted Senate map.
12 Q. Do these results suggest the intent to disfavor
13 a political party in the enacted Senate map?
14 A. This is evidence that the map is not biased.
15 Intent, I can't really tell you. This is evidence that
16 the map is not biased.
17 Q. Do you have a basis for comparison of the levels
18 of bias on this chart compared to enacted maps that you've
19 dealt with in litigation in other states?
20 A. Sure. In other states I've seen maps that have
21 similar levels. Oregon showed similar levels of low bias
22 in their enacted map. In my work in Florida, that map
23 showed a map that was like -- I forget the exact number.
24 MR. TSEYTLIN: Your Honor, objection. None
25 of this was in the report, about other states.

1 MR. MULLKOFF: Your Honor, I'm just asking
2 Dr. Katz to provide some context for how large these
3 numbers are, and it seems useful to compare to what
4 he's found significant.
5 THE COURT: You can confine it to his
6 report.
7 Q. Is it fair to say that -- do you consider these
8 levels of partisan bias statistically significant in any
9 way?
10 A. No, and they're substantively small.
11 Q. What is the next step in your analysis?
12 A. The second feature that comes out of the
13 seats-votes curve and related to this notion of
14 proportionality is we estimate the responsiveness, which
15 is telling us, for -- as the majority party's vote share
16 increases by 1 percentage point, what's -- how much does
17 their seat share increase? So under proportional
18 representation, if your Honor turns back to Figure 1, that
19 curve would be a straight line with a slope of 1, if you
20 remember that from your high school geometry.
21 In practice single-member district systems give
22 the majority party more than that. So, for example, here
23 we see in the top range at 66 to 70 percent, the slope is
24 about 1.63. That just means that if one of the parties
25 get about 1 percentage point more vote, they get about

1 1.63 percent more seats. And it goes up a little bit as
2 we go down the range. It's about 2.1 percent, so an
3 increase of 1 percentage point in the range 61 to 65
4 percent increases the party's seat share by about 2
5 percentage points.
6 Q. What conclusions, if any, did you draw about
7 responsiveness of the enacted Senate map based on your
8 analysis?
9 A. This is pretty typical. Values between 2 and 4
10 are common. It depends on states. As you can see, the
11 estimates are quite uncertain because estimating a slope
12 is a much harder statistical problem.
13 Q. What was the next step in your analysis?
14 A. The other thing we might care about is the
15 estimated number of seats. That's not on the table.
16 That's in the paragraph that's underneath Figure 3, the
17 second paragraph on Page 13.
18 Q. Did you draw any conclusions about the expected
19 number of seats in the enacted Senate maps -- enacted
20 Senate map?
21 A. Right. So assuming all the seats were open, the
22 estimates from Table 2 suggest that the Democrats would
23 win about 43.1 of the 63 seats. Of course, you can't win
24 a fraction of a seat. Again, you should think about this
25 as a long-run average, if you were to run this many times

1 on this map. Of course, this is about 69 percent of them.
2 Because, as is everything, this is a statistical estimate,
3 there is a confidence interval, a 95 percent confidence
4 interval, on this, and so the low estimate is Democrats
5 could win as few as 37 of the seats and they could win as
6 high as 49 percent of the seats as our best estimates.
7 Q. What is this expected seat share based on?
8 A. It's based on Table 2. In particular, if you
9 were to --
10 Q. Let's say the page number so everyone's --
11 A. Oh. Page 8 of my report, Table 2.
12 Q. So your expected seat share prediction -- your
13 expected seat share conclusion is based on Table 2?
14 A. Yes. It's a calculation made from -- a fairly
15 complicated but a calculation based from Table 2.
16 Q. Is it related to the final column, the
17 probability a Democrat wins?
18 A. Right. So the point estimate is if you summed
19 up these points and divided by 100. That would be the
20 number of seats they were winning.
21 Q. Did you also examine the New York enacted Senate
22 map with assumptions about incumbents running?
23 A. We did. The initial part of that output is on
24 Table 3 on Page 14.
25 Q. Can I direct you to Page 16 of your report

1 first?
2 A. Certainly.
3 Q. On Page 16 you list a number of districts.
4 Could you tell us what you're referring to?
5 A. Right. To do this analysis, we obviously had to
6 choose what the configuration of incumbents was. With
7 help from Counsel, the best guess we could make given the
8 date of my report was that Republican incumbents would be
9 running in Districts 1, 2, 24, 43, 44, 46, 47, 49, 51, 54,
10 58, 59, 61, and 62. There would be open seats in
11 Districts 3, 4, 9, 17, 23, 27, 36, 50, 53, and 63. And
12 all the remaining seats, so I don't have to enumerate
13 them, would be -- we assumed to have Democratic
14 incumbents.
15 Q. Thank you for running through those.
16 So going back to Page 14 in Table 3, what does
17 this table reflect?
18 A. So this table reflects that allocation of
19 incumbents, so that's going to change the expected
20 Democratic seat share -- sorry -- estimated Democratic
21 vote share. That's Column 2.
22 Q. How did you apply that assumption about
23 incumbents?
24 A. Again, so the statistical model, the forecasting
25 model, allows us to set values. So what we did on the

1 previous analysis is we set all the districts to have 0,
2 that is, to have open seats. This one we set it to have
3 the configuration that I enumerated just previously. And
4 so in districts that will -- the easy rule of thumb in
5 districts that have a Democratic incumbent, the Democratic
6 vote percentage will raise, on average, about 3 percentage
7 points; in districts that have Republican incumbents from
8 that list, we'll see their vote share increase --
9 decrease -- the Democratic vote share decrease by 3
10 percent or, equivalently, the Republican vote share
11 increases by 3 percent on average; and in open seats it's
12 as in the previous table. And so given this Table 3
13 analysis, we can do the exact same partisan bias and --
14 copy the seats-votes curve and do the same partisan bias
15 analysis we did previously.
16 Q. So just to -- we don't need to run through it in
17 as much detail, but just quickly, looking at District 1,
18 for example, could you just explain what the chart shows?
19 A. Right. So in District 1 -- District 1 was
20 assumed to have a Republican incumbent, so the vote share
21 now is -- the Democratic vote share is expected to be 46.5
22 percent. Previously it was -- the Democratic vote share
23 was 49.8 percent.
24 Q. So what was the effect of the incumbency
25 assumption on the predicted vote share?

1 A. It decreased the Democratic vote share,
2 increased the Republican vote share.
3 Q. Is that what you would expect?
4 A. Exactly what one would expect.
5 Q. Okay. What is the -- the standard deviation
6 column, what does that mean?
7 A. That's the same thing we talked about. It's
8 talking about the variability. That's actually not --
9 that's not affected by incumbency, or not particularly.
10 Q. And then the final column, the probability a
11 Democrat wins?
12 A. Right. That clearly -- in this case a Democrat
13 wins. Since there's a Republican incumbent, Republicans
14 do better; the probability the Democrat wins declines.
15 That's equivalent to saying the Republican's probability
16 of winning increased. So the Democrats win this about 34
17 percent of the time. That means that the Republican
18 incumbent is expected to win this about 66 percent of the
19 time.
20 Q. Did you do these calculations for each of the 63
21 new Senate districts?
22 A. I did. They're enumerated in Table 3 of my
23 report.
24 Q. Did you calculate the partisan bias for the
25 enacted Senate map with these assumptions about which

1 incumbents will run in the future?
2 A. I did. They're presented in Figure 4 on Page 17
3 of my report.
4 Q. What did you find?
5 A. Qualitatively the same results we saw without
6 the incumbents. The point estimates actually change, but
7 they're all small -- they're actually all smaller in
8 magnitude. And all, once again, are statistically
9 insignificant, so we cannot -- so there's no evidence --
10 there's no statistically significant evidence of partisan
11 bias in favor of either party in the scenario with this
12 set of incumbents.
13 Q. Are these even smaller levels of bias than with
14 the first Senate calculation?
15 A. The point estimates are smaller in absolute
16 value.
17 Q. Did you draw any ultimate conclusions about the
18 partisan bias of the Senate map based on these
19 calculations?
20 A. Yes. Assuming this configuration of incumbents,
21 there is no evidence of statistically significant partisan
22 bias in favor of either party given this analysis.
23 Q. Did you analyze the responsiveness of the
24 enacted Senate map with this assumption about incumbents?
25 A. I did. That can be found on Page 18 on Figure 5

1 and it's very similar. For the most part responsiveness
2 is somewhere around 2 percentage points, a little bit
3 lower at the very top end, which is, again, in line with
4 what we expect in single-member district electoral
5 systems.
6 Q. With this assumption of which incumbents will
7 run in the future, did you draw any conclusions about how
8 many seats Democrats would be expected to win in the
9 enacted Senate map on average?
10 A. I did. That can be found in the last paragraph
11 of Page 18 of my report, and there we see that now -- the
12 Democrats are now expected to win with this configuration
13 of incumbents 44.3 of the 63 percent -- of those 63 seats,
14 or about 70 percent of them, again, with the idea that
15 this is a long-run average. The confidence interval,
16 because this actually remains rather similar, 39 seats on
17 the low end, 49 seats for the Democrats on the high end.
18 Q. So based on those two analyses of the Senate
19 with and without incumbency estimates, did you draw any
20 overall conclusions about -- with respect to partisan
21 bias?
22 A. Yes, that there is no statistically significant
23 evidence of partisan bias in favor of either party in this
24 map with this configuration of incumbents.
25 Q. And was that the same conclusion you drew

1 without incumbents built in?
2 A. It was.
3 Q. In your report you use the term efficiency gap.
4 What does that mean?
5 A. Lately a number of authors have proposed other
6 measures of partisan fairness. The one that's gotten the
7 most prominence is probably the efficiency gap. In work
8 that I did with Gary King and Elizabeth Rosenblatt and
9 somewhat recently published in the American Political
10 Science Review, we sort of showed that all these newly
11 proposed measures actually aren't really a
12 characterization of fairness -- of partisan fairness. But
13 because they've become sort of popular in the press, I
14 calculated the efficiency gap for this map.
15 Q. So what does the efficiency gap purport to
16 measure?
17 A. It purports to measure a very intuitive idea,
18 which is that one way -- the way that -- one way that you
19 disadvantage a party is you make it more expensive; that
20 is, they waste more of their votes. You pack them in is
21 sometimes the language referred to. So the idea under the
22 efficiency gap is for each party we calculate what's
23 called the wasted vote. What's a wasted vote? A wasted
24 vote is all the votes you get over 50.1 percent in a
25 district you win and all the votes in a district you lose.

1 And the idea is that if you knew that ahead of time and it
2 were legal and possible, you'd like to move those votes to
3 some other district that you might win with them, right?
4 So the idea is we look at -- we calculate the
5 number of wasted votes for the Democrats and the number of
6 wasted votes for the Republicans, and we compare those two
7 numbers. And, again, just like we assigned it with bias,
8 a positive number means that the Republicans are wasting
9 more votes, that, more equivalently, the Democrats are
10 more efficient at translating their votes to seats. And a
11 negative value is the converse; that is, the Republicans
12 are wasting less votes; they are more efficient at
13 converting their votes to seats.
14 Q. Is there any commonly used threshold of an
15 efficiency gap that suggests partisan bias in a commonly
16 held view?
17 A. Yeah. The value that I've seen bantered about
18 in litigation and in popular press is about 8 percentage
19 points.
20 Q. Did you calculate the efficiency gap for the
21 New York Senate map?
22 A. I did. It's for the Senate map without
23 incumbents. The results can be found in the first full
24 paragraph on Page 14 of my report. And so basically what
25 we do --

1 Q. Let's just pause a moment so people can turn the
2 page. Thanks.
3 And what did you find?
4 A. Again, using the estimates from Table 2, we can
5 calculate this wasted votes, and the efficiency gap is
6 minus 0.5 percent; that is, the Republicans waste slightly
7 fewer of their votes converting to seats than the
8 Democrats but, again, substantively small. An efficiency
9 gap less than 1 percent is very small.
10 Q. What does that mean with respect to the idea of
11 wasted votes?
12 A. It means that the Republicans are wasting
13 slightly fewer votes than the Democrats.
14 Q. Is .5 percent commonly viewed as a sufficiently
15 high threshold of the efficiency gap to be meaningful?
16 A. No. It's substantively small. It suggests that
17 there is not a difference between the two parties.
18 Q. Did you calculate the efficiency gap with your
19 assumption of which incumbents may run in future Senate
20 districts?
21 A. I did. That can be found on Page 18 in my
22 report in the paragraph -- the second from the last
23 paragraph.
24 Q. What did you find as far as the efficiency gap
25 with assuming incumbents will run in the Senate?

1 A. Again, the efficiency gap increased a little
2 bit. It's now negative 1.3 percent. So it's still a
3 small magnitude, but it's also still in the Republican
4 direction; that is, the Republicans are wasting slightly
5 fewer votes than Democrats, or the Republicans are more
6 efficient at turning their votes into seats in this map
7 than the Democrats, slightly.
8 Q. Is that a high level of efficiency gap?
9 A. No. Again, that's a relatively small level of
10 difference in wasted votes.
11 Q. And in both cases the efficiency gap for the
12 Senate you found to favor Republicans slightly?
13 A. That's correct.
14 Q. To the extent the efficiency gap is a reliable
15 measure of partisan bias in the New York Senate map, what
16 does it tell us?
17 A. It suggested that there was no partisan
18 unfairness; the map is partisan fair.
19 Q. Do you know what the term packing is with
20 respect to redistricting?
21 A. Certainly. It's the idea that one way to
22 disadvantage your opponent is to pack as many of their
23 voters into a small number of districts so that, as we
24 talked about with wasted votes, they're wasting their
25 votes; they're winning a district with 90 -- 80, 90, 100

1 percent of the vote. They would rather shift some of
2 those votes to other seats that might help them -- that
3 they might then be able to win.
4 Q. In your opinion, does the enacted Senate map
5 reflect packing of Republicans in order to favor
6 Democrats?
7 A. Again, I don't think that's the right way to
8 think about it. You have to think about the relative
9 packing. So in both -- there are packed Democratic
10 districts in the Senate map, and there are packed
11 Republican districts. The question is the relative
12 amount, and that's captured in this idea of estimating the
13 full partisan bias of the map.
14 Q. And what is your overall conclusion about the
15 partisan bias of the enacted Senate map?
16 A. There's no statistically significant evidence of
17 partisan bias for either party in the enacted Senate map.
18 Q. In your opinion, is the enacted Senate map a
19 Democratic gerrymander?
20 A. Again, no. Since there's no evidence of
21 partisan bias in their favor, it's not what one would call
22 a Democratic gerrymander.
23 Q. In your opinion, is the enacted Senate map
24 unfair to Republicans?
25 A. Again, since it shows no partisan bias against

1 them in elections, no, it's not.
2 MR. MULLKOFF: No further questions.
3 THE COURT: This may be a good time to take
4 a ten-minute break, and we'll come back after that
5 and continue. Thank you.
6 (A recess was taken.)
7 THE COURT: Just to get a sense, if you
8 know, Respondents, how many more witnesses, roughly?
9 MR. GOLDENBERG: Your Honor, we have one
10 more witness, and we anticipate completing his
11 testimony today.
12 THE COURT: Okay. Very good.
13 All right. We're on cross-examination.
14 Mr. Tseytlin?
15 You're still under oath, sir.
16 THE WITNESS: Yes, your Honor.
17 MR. TSEYTLIN: Thank you, your Honor.
18 CROSS-EXAMINATION
19 BY MR. TSEYTLIN:
20 Q. And good to see you again, Dr. Katz.
21 I'd like to begin by doing a little exercise
22 based on something that's been confusing me throughout
23 this case as I've heard the various experts. Could you
24 please turn to Page 9 of your report? And I'd like to do
25 a little exercise here. Do you see where it says

1 District 52 there near the bottom?
2 A. I do.
3 Q. And can you tell me what that second column is
4 after 52?
5 A. The Democratic -- expected Democratic vote share
6 in that district is 50.2 percent.
7 Q. Right. And then what is the fourth column?
8 A. The probability the Democrat wins that seat,
9 assuming it's open, is 51.3 percent.
10 Q. I'd like to do that same exercise with
11 District 40.
12 A. Certainly. In District --
13 THE COURT: Where is that? Okay. I've got
14 it. Go ahead.
15 A. District 40, the predicted Democratic vote share
16 is 54.2 percent, and the predicted probability that a
17 Democrat wins is 68.6 percent.
18 Q. And then just one more district, 38.
19 A. Certainly. The predicted Democratic vote share
20 is 80.2 percent, and the probability that a Democrat wins
21 is effectively 100 percent.
22 Q. Would you say that Democrats have a different
23 probability of winning each of those three seats?
24 A. Yes.
25 Q. What would you think of an expert analysis that

1 would just call all of those three Democrat seats without
2 differentiating between how likely Democrats are to win
3 any of those seats?
4 A. That's not correct. They have quite a different
5 probability of electing a Democrat.
6 Q. And so what would you think of an expert
7 analysis that just treated them all as Democrat seats
8 without --
9 MR. MULLKOFF: Objection. Asked and
10 answered.
11 THE COURT: I'm going to let him delve in a
12 little.
13 Go ahead.
14 A. Again, I would -- the correct analysis is to do
15 this probability calculation, and they're quite different
16 probabilities.
17 Q. So if someone were to -- if an expert were to
18 treat those three simply as Democrat seats without doing
19 anything more, you would say that would be an incorrect
20 analysis?
21 A. It wouldn't be how I would do it.
22 Q. Thank you.
23 Now, turning to your conclusions, you stated, I
24 believe, in questioning from my friend that you do not
25 have any ultimate conclusion on whether this map was drawn

1 with the intent of favoring the Democratic party?
2 A. I can just tell you what the data suggests, my
3 analysis suggests. It's not -- but, no, I do not know the
4 intent.
5 Q. You also do not have any conclusion about
6 whether the map was drawn to favor or disfavor any
7 particular incumbents in the state Senate; is that
8 correct?
9 A. I didn't do an analysis to see if it favored any
10 particular incumbent.
11 Q. And so I've certainly heard in partisan symmetry
12 cases experts, including yourself, say that, and it seems
13 a little counterintuitive, so I'd like to explore a little
14 bit one reason why, despite the numbers that you talked
15 about, you're not really opining on partisan intent. So
16 I've got a couple questions on that. Isn't it true that
17 nothing in your report rules out the possibility that the
18 state Senate map is more pro-Democrat than 5,000
19 computer-generated maps done without considering partisan
20 intent -- partisan considerations?
21 A. It's not a well-framed question. What
22 simulations? Will they, in fact, generate legal maps?
23 And it -- I will tell you that my analysis shows that the
24 enacted map, from my estimate, shows no partisan bias.
25 Q. Let me tell you -- let me ask you another one.

1 Is there anything in your report that excludes the
2 possibility that the state Senate map here is the most
3 pro-Democrat map under your metric than any map that could
4 possibly be drawn complying with all of the New York
5 constitutional criteria except the prohibition against
6 partisan intent?
7 A. I don't know that.
8 Q. So you cannot exclude and nothing in your report
9 excludes that the map that the Democrats adopted for the
10 state Senate is the most pro-Democrat map possible under
11 the New York constitutional criteria putting aside the
12 prohibition against --
13 MR. HECKER: Objection, your Honor. There
14 is no evidence whatsoever, even from Mr. Trende, that
15 this is the most Democrat map possible. It is
16 completely baseless and an improper question.
17 THE COURT: Well, he's asking if he can
18 rule it out.
19 MR. HECKER: Rule out that this is
20 literally the most pro-Democratic map that any human
21 being could have drawn? That's the question?
22 THE COURT: If he can answer.
23 MR. HECKER: Go ahead. Answer that
24 question, Dr. Katz.
25 THE COURT: Overruled.

1 Go ahead. You can answer.
2 BY MR. TSEYTLIN:
3 A. I honestly have no idea.
4 Q. Tweaking that question further, is there
5 anything in your report that would conclude that this is
6 not among the 5 percent most pro-Democratic maps that
7 could be drawn by someone who is seeking to draw the most
8 pro-Democrat map possible complying with all New York
9 constitutional criteria except for the prohibition against
10 partisan gerrymander?
11 A. I don't know how we could possibly enumerate
12 every possible map. There's literally trillions.
13 Q. Is there anything in your report that identifies
14 any map, any potential map in New York, that would be more
15 pro-Democrat than the map that the Legislature enacted?
16 A. I only analyzed one map, the enacted map.
17 Q. Is it possible based upon your methodology that
18 a state or locality has such a political geography that it
19 is not possible to draw a map that scores as pro-Democrat
20 on your methodology?
21 A. I don't understand the question. I'm sorry.
22 Q. Is it possible --
23 MR. TSEYTLIN: Could you please read that
24 back?
25 (The record was read back by the court

1 reporter.)
2 BY MR. TSEYTLIN:
3 A. One, this map doesn't show pro-Democrat. It
4 shows it's fair. And, two, again, I don't know how to
5 enumerate every possible map, so I don't know how to
6 answer that question.
7 Q. What is a confidence interval?
8 A. The formal definition of a confidence interval
9 is a data point such that we cannot rule out a given null
10 hypothesis.
11 Q. So can you please turn to Page 12 of your
12 report? So in Figure 2, those lines there, the far right
13 side of those lines, what is the far right side of those
14 lines?
15 A. The far right side is the upper -- the most --
16 the largest expected possible Democratic bias that's
17 consistent with the data I observed.
18 Q. So if I understand this correctly, is it true
19 that this means that you think it is possible that the
20 Senate map has -- in fact, has the value on the right side
21 of that line?
22 A. Possible but not likely. The most -- the most
23 density will be towards the center, towards that center
24 dot. But, yes, it's possible.
25 Q. It is possible.

1 And then what would be the number of seats that
2 the map would be biased with Democrats if, in fact, you're
3 on that right side of the confidence interval on all five?
4 A. That's not exactly -- that's not exactly -- the
5 maximal number of seats the Democrats could estimate, as I
6 previously testified to, is 49 seats.
7 Q. Sorry. Let me rephrase. It says on the bottom
8 here bias in percent of seats. Within your confidence
9 interval, how biased could this map be towards Democrats?
10 A. At what point of the seats-votes curve?
11 Q. The rightmost part of the confidence interval
12 for all five parts.
13 A. I don't know the exact number on any of these
14 points.
15 Q. Could you give an approximation?
16 A. It looks like the maximal is somewhere about
17 4 1/2 percent, if I'm eyeballing it correctly.
18 Q. So how many seats would that be?
19 A. I'm terrible at math on the spot. 4.5. -- 0.45
20 times 63. Anyone have a calculator? It's -- well, 10
21 percent would be six seats, so about -- a little less than
22 three seats.
23 Q. So under your analysis it's entirely possible
24 that the map is biased in favor of Democrats by three
25 seats with --

1 MR. HECKER: Objection. That's not what he
2 said at all.
3 THE COURT: Well, ask him the question.
4 Q. Is it possible and within your confidence
5 interval that the state Senate map actually favors the
6 Democratic party by three seats?
7 A. Possible but not likely.
8 Q. It is within your confidence interval?
9 A. That's what I said. It's possible.
10 MR. TSEYTLIN: Thank you.
11 THE COURT: Redirect?
12 MR. MULLKOFF: Just very briefly, your
13 Honor.
14 REDIRECT EXAMINATION
15 BY MR. MULLKOFF:
16 Q. Dr. Katz, looking at Page 12 of your report,
17 where you were just focused, I believe he was asking you
18 about the far right edge of those lines, correct?
19 A. I believe he was referring to Page 9 but --
20 Q. Oh. Pardon me. Let's go to Page 9. I'm
21 talking about the partisan bias chart.
22 A. Oh, sorry. That's Page 12. My bad.
23 Q. Page 12. In your interpretation of results of
24 partisan bias, do you generally focus on the far right
25 side alone as a useful indicator of the results?

1 A. No. You want to look at the whole range. So
2 the map could also be biased in favor of the Republicans
3 by about that amount for some regions.
4 Q. If you were to look to the far left side of
5 those lines, what would those indicate?
6 A. They would indicate -- there looks to be a bias
7 of 5 percent, and the very lowest range is bias almost up
8 to 8 percent in favor of Republicans. It's possible,
9 again, not likely, to be fair. The most likely points are
10 towards the center, towards the point estimates.
11 Q. Is it equally possible that the far left side of
12 the lines would apply, which would be more pro-Republican,
13 as the far right side of the lines would apply, which
14 would be more pro-Democrat?
15 A. That's correct. They have equal probabilities.
16 Q. What is the most useful place to focus on this
17 chart with respect to estimating the partisan bias of the
18 Senate map?
19 A. Again, I think it's important to look at
20 confidence interval, but the point of highest probability
21 is that center dot, the point estimate.
22 MR. MULLKOFF: No further questions.
23 THE COURT: Recross?
24 MR. TSEYTLIN: Nothing further, your Honor.
25 THE COURT: Thank you. You can step down,

1 sir.
2 THE WITNESS: Thank you, your Honor.
3 THE COURT: Thank you.
4 THE WITNESS: Am I released?
5 THE COURT: Yes.
6 Do you want him released?
7 MR. HECKER: Yes, your Honor.
8 (The witness was excused.)
9 MR. MULLKOFF: Your Honor, before we go off
10 the record, I personally need to leave the courtroom.
11 I just wanted to let you know.
12 (Mr. Mullkoff left the room.)
13 TODD A. BREITBART,
14 called herein as a witness, having been first duly sworn,
15 was examined and testified as follows:
16 THE DEPUTY: State and spell your name for
17 the Court, please.
18 THE WITNESS: First name is Todd, T-o-d-d,
19 two Ds. The middle initial is A. The last name is
20 Breitbart -- there are nine letters --
21 B-r-e-i-t-b-a-r-t.
22 THE COURT: Okay. Mr. Breitbart, I'm going
23 to ask you to keep your voice up so I can hear you
24 well. Even though I'm close to you, I'm a little
25 hard of hearing.

1 THE WITNESS: Am I all right now?
2 THE COURT: Fine. Fine. Thank you.
3 All right. Mr. Goldenberg?
4 MR. GOLDENBERG: Thank you.
5 DIRECT EXAMINATION
6 BY MR. GOLDENBERG:
7 Q. Good afternoon, Mr. Breitbart. I'm just going
8 to start by going through some of your relevant
9 qualifications that brings you here today. Am I correct
10 that you began working for the New York State Legislature
11 in 1975?
12 A. The very end of 1975, yes.
13 Q. And you were initially employed by the Assembly;
14 is that correct?
15 A. That is correct.
16 Q. And in 1980 you began your employment with the
17 New York State Senate; is that correct?
18 A. Yes. I began working for the Minority --
19 successive Minority Leaders that are state Democratic
20 leaders of the New York State Senate as the director of
21 the staff work on redistricting.
22 Q. And, Mr. Breitbart, for how long did you serve
23 in that position, as the head of redistricting for the
24 state Senate Democrats?
25 A. From 1980 through the end of 2005, when I

1 retired and took my pension.
2 Q. Can you please describe for the Court your
3 professional duties with the Legislature when working as
4 the head of redistricting for the Senate Minority Leader?
5 A. Yes. I developed analyses of the possible ways
6 in which redistricting plans could be drawn. I developed
7 proposals that could be used in negotiation or else as the
8 basis for eventual litigation. I analyzed the legal and
9 constitutional aspects of drawing plans in various ways
10 and also analyzed the political consequences.
11 Q. And, Mr. Breitbart, in connection with that
12 employment, were you ever involved in redistricting
13 litigation?
14 A. Yes. In 1982, when there was an impasse in the
15 Legislature as to how the districts should be drawn and
16 when they should be drawn, I advised the lawyers who were
17 working for the Senate Minority Leader in that litigation.
18 And then after the passage of the redistricting bills in
19 1992 and 2002, I advised the lawyers who were involved in
20 challenging the constitutionality of those --
21 constitutionality and legality under the Voting Rights Act
22 of those redistricting plans, and I was principally
23 responsible for marshaling the evidence and the challenges
24 to those redistricting plans.
25 Q. Can you please briefly describe for the Court

1 some of the knowledge and skills that you obtained with
2 respect to redistricting through your work at the
3 Legislature?
4 A. Well, I began working on -- I was asked to begin
5 working on redistricting because I had experience
6 targeting political campaigns, so I was in a position to
7 reckon the political consequences of drawing districts in
8 one way or another. But then in the course of my work, I
9 had to learn a great deal about geography, demography,
10 statistics, and the applicable law.
11 Q. And, Mr. Breitbart, am I correct that in 2012,
12 after your retirement, you were also involved in matters
13 relating to redistricting in that cycle?
14 A. Yes. I --
15 Q. Can you briefly describe for the Court what you
16 did?
17 A. I submitted a proposed Senate redistricting plan
18 to the Reapportionment Task Force; I consulted with other
19 organizations, especially advocates of minority voting
20 rights about the plans -- the proposals they were
21 submitting; and I testified at length several times before
22 the Redistricting Task Force; and then I was involved in
23 the lawsuits challenging the plans that had been enacted.
24 In one of those lawsuits, I was one of the complainants,
25 in the lawsuit over the manipulation of the formula that

1 determines the number of Senate districts.
2 And in the lawsuit challenging the plans that
3 were enacted on other grounds, I was, again, principally
4 responsible for marshaling the evidence for the
5 plaintiffs, and I had submitted a proposed 62-district
6 plan to the Reapportionment Task Force. I revised that,
7 in connection with the legislation, with a plan -- a
8 63-district plan showing that, quite apart from the
9 controversial -- with the size of the Senate, the
10 criticisms that I had made on the basis of my 62-district
11 plan would still be valid, and I also submitted testimony
12 in that second lawsuit.
13 Q. And, Mr. Breitbart, in addition to this work as
14 a professional employee of the Legislature and other work
15 in connection with litigation, am I correct that you have
16 written about redistricting in New York and served as a
17 consultant both to the Bar Committee and to the New York
18 State Attorney General in connection with redistricting
19 litigation that they were involved in?
20 A. Yes. I was the principal advisor to the
21 Election Law Committee of the Bar Association in the City
22 of New York in developing the proposal that they published
23 in 2007 proposing a reform of the New York State
24 redistricting process, proposing an amendment to the
25 New York State Constitution, and I drafted the text of the

1 report.

2 In -- what was it -- 2016, I think -- or 2014 or

3 2016, when New York City -- when New York State submitted

4 an amicus brief in the case of Evenwel v. Abbott, a

5 challenge to the Texas legislative redistricting which was

6 based on the argument that the legislative redistricting

7 should be based only upon citizen voting-age population,

8 not the total population, I briefed and consulted with the

9 lawyers on the staff of the New York State Solicitor

10 General, who submitted an amicus brief on behalf of

11 New York State, several other states, and several

12 municipalities supporting the principle that it was proper

13 for legislative redistricting to be based on the total

14 population. And so they were, in effect, supporting the

15 position that was being argued principally in court by the

16 Attorney General of the State of Texas. There were many

17 other amicus briefs in that case submitted by nonpartisan

18 organizations.

19 I also consulted with the lawyers in the state

20 Attorney General's Office who were responsible for the

21 lawsuit of New York versus Department of Commerce, which

22 successfully prevented the addition of a citizenship

23 question to the 2020 census, and I submitted an affidavit

24 as a witness in that case.

25 I'm also the co-author of the chapter --

1 Chapter 4, the chapter on redistricting, in the book
2 published by the State University press in 2016,
3 New York's Broken Constitution.
4 Q. Mr. Breitbart, I just want to ask you a question
5 because you were previously employed by the Legislature.
6 In connection with this year's redistricting in 2022, did
7 you have any role at all in the drafting or enactment of
8 that plan?
9 A. None whatsoever. And to the best of my
10 knowledge, I had no communication whatsoever with whoever
11 was responsible for drafting any of the plans.
12 Q. After the commencement of this litigation, were
13 you retained as an expert in this matter?
14 A. Yes, by your firm.
15 Q. And our firm retained you as an expert for what
16 party in the case?
17 A. For the Majority Leader of the state Senate.
18 Q. And are you being paid for your expert --
19 A. Yes, at the rate of $300 per hour.
20 Q. Does your pay in any way depend on the nature of
21 the opinions you give in this matter?
22 A. No. You and your colleagues have made it very
23 clear that that is not the case.
24 MR. GOLDENBERG: Your Honor, I would move
25 to qualify Mr. Breitbart as an expert with respect to

1 the process, recent history, and constitutional
2 requirements for Senate redistricting in New York
3 State.
4 THE COURT: Petitioners?
5 MR. TSEYTLIN: No objection.
6 THE COURT: Qualifying him as such.
7 Please proceed.
8 BY MR. GOLDENBERG:
9 Q. Mr. Breitbart, what were you retained to do in
10 this case?
11 A. I was asked to examine the '22 Senate
12 redistricting plan, the 2012 Senate redistricting plan,
13 the maps and demographic data regarding those plans,
14 Mr. Lavigna's report regarding the Senate districts in
15 particular, and to evaluate the constitutionality of the
16 2022 Senate plan, especially in comparison with the 2012
17 Senate plan, and also to examine point by point what
18 Mr. Lavigna had to say about the 2022 Senate plan.
19 Q. In connection with this work, did you prepare an
20 affidavit?
21 A. Yes, I did.
22 (Respondents' Exhibits S-20 and S-21 were
23 marked for identification.)
24 MR. GOLDENBERG: May I approach?
25 THE COURT: You may.

1 BY MR. GOLDENBERG:
2 Q. Mr. Breitbart, I've handed you for
3 identification -- what's been marked for identification as
4 S-20 and S-21. Because of the way the documents were
5 printed, S-20 is the affidavit that was filed in this
6 litigation and S-21 are the exhibits that accompanied that
7 affidavit when filed. Mr. Breitbart, if you could briefly
8 look at the documents I've handed to you. Can you please
9 confirm whether that is the affidavit that you wrote in
10 this matter and the exhibits that were accompanied with
11 it?
12 A. Yes, it is.
13 MR. GOLDENBERG: Your Honor, I would move
14 to admit the affidavit and exhibits into the record.
15 THE COURT: Petitioners?
16 MR. TSEYTLIN: No objection.
17 THE COURT: No objection?
18 MR. TSEYTLIN: No objection.
19 THE COURT: Admitted.
20 MR. GOLDENBERG: Thank you, your Honor.
21 (Respondents' Exhibits S-20 and S-21 were
22 received in evidence.)
23 BY MR. GOLDENBERG:
24 Q. Mr. Breitbart, for the sake of time, I will
25 direct your attention to Paragraph 8 of your affidavit and

1 just ask you to confirm whether it accurately reflects the
2 materials and documents that you reviewed in connection
3 with your work in this matter.
4 A. Yes. That's correct.
5 Q. And, Mr. Breitbart, are you familiar, in
6 addition to the constitutional amendments that were in
7 place at the time that you were an employee of the
8 Legislature, with the amendments that were added to the
9 Constitution and the principles that were added to the
10 Constitution for redistricting in 2014?
11 A. Yes, I am.
12 Q. And were those principles and amendments to the
13 Constitution addressed in part of what was written about
14 in the chapter of the Broken Constitution that you
15 co-authored?
16 A. Yes.
17 Q. After conducting your review in this matter, did
18 you reach any conclusions about the enacted Senate plan?
19 A. Yes. I concluded that in many respects the
20 enacted Senate plan in 2022 complied with provisions --
21 important provisions of the New York State Constitution
22 and did so where those provisions were violated by the
23 2012 plan. To give you some examples, the Constitution
24 forbids the division of a town that does not have
25 sufficient population for a whole Senate district. There

1 are three such towns on the boundary between Nassau and
2 Suffolk Counties. In Nassau County there is the Town of
3 Oyster Bay, which extends along the entirety of the county
4 boundary from the Long Island Sound to the Atlantic Ocean.
5 And in Suffolk County there are two such towns, the Town
6 of Huntington to the north and the Town of Babylon to the
7 south. In order to draw districts that have appropriate
8 population deviations, it is necessary to divide the Town
9 of Oyster Bay in some way and to divide one of the two
10 towns that lie along that boundary in Suffolk County, that
11 is, say, the Town of Huntington and Town of Babylon.
12 The 2012 plan unnecessarily divided both the
13 Town of Huntington and the Town of Babylon. The Town --
14 the 2022 plan keeps the Town of Huntington intact within a
15 single district within Suffolk County and so also reduces
16 the number of bi-county districts, that is, Nassau-Suffolk
17 Districts from two to what? It's not necessary to have
18 two districts combining parts of those same two counties
19 in order to achieve appropriate population deviations. It
20 is only necessary to have one. The 2012 had two. The
21 2022 plan has one.
22 And in Exhibit E -- Exhibit A there's a map that
23 shows how Huntington was divided in 2012 with extremely
24 convoluted boundaries. It was divided into three pieces,
25 two of which were part of another district in Suffolk

1 County, one of which extended across the county boundary
2 into Oyster Bay in Nassau County, whereas in the 2022 plan
3 the Town of Huntington is kept intact within a single
4 district and is attached to adjoining areas in the
5 northern part of the Town of Babylon to create a compact
6 district wholly within one county and avoiding the
7 unnecessary division of a town.
8 Also, the 2012 plan had many unnecessarily
9 non-compact districts. If you look at the map that is the
10 first map under -- of Exhibit B, the 2012 Senate districts
11 in New York City --
12 THE COURT: One second now.
13 THE WITNESS: Yes.
14 THE COURT: Which page are you on?
15 THE WITNESS: I'm going --
16 MR. GOLDENBERG: It's Page 1 of Exhibit B,
17 your Honor.
18 THE WITNESS: Yeah.
19 MR. GOLDENBERG: I believe it is four or
20 five pages into the exhibit document.
21 THE WITNESS: It is this page (indicating).
22 THE COURT: I think I'm with you.
23 THE WITNESS: Yes, that's right.
24 BY MR. GOLDENBERG:
25 A. -- you will see that there are many extremely,

1 one might say, wildly non-compact districts in
2 New York City. One of these is District 22, which is
3 further illustrated on the next page. District 22, as it
4 was drawn in 2012, which extends from the Bay Ridge
5 neighborhood through a corridor that is in some places
6 only one block wide to the Marine Park neighborhood in
7 Brooklyn, was picking up -- designed to pick up as many
8 Republican voters as possible along the way.
9 But there are other examples. There's
10 District 20, which includes -- is mostly in the
11 Crown Heights neighborhood but then has this very peculiar
12 corridor, sometimes only one block wide, that extends
13 first northwest and then southwest for over a mile to pick
14 up a group of blocks in Sunset Park. You have
15 District 19, which includes the Canarsie area of Brooklyn
16 but then has this corridor extending around part of the
17 convoluted District 22 to pick up a group of blocks over
18 here. And there are these highly -- these intricate
19 boundaries in Queens County that one could hardly make out
20 on a map of this scale, if you compare that with the map
21 at the same scale of the Senate districts that were drawn
22 in 2022, it's obvious just at a glance that the 2022 map
23 creates districts that are much more compact.
24 Q. Mr. Breitbart, did you make any observations in
25 the 2022 enacted plan with respect to population

1 deviations and constitutional principles related to
2 population equality?
3 A. Yes, and there's a remarkable contrast with the
4 2012 plan. The 2012 plan, the total deviation -- that is
5 the difference in population between the largest and
6 smallest district expressed as a percentage of the mean
7 district population -- is 8.8 percent. In the 2022 plan
8 it is, I believe -- I have it in my report. I think it's
9 1.62 percent.
10 But the problem with the 2012 plan is not just
11 that there was a very large population deviation but that
12 the district population deviations were accumulated in
13 such a way that there was a regional malapportionment.
14 All of the districts in Long Island and New York City had
15 a population deviation well above the mean, and all of the
16 districts to the north had a population deviation below
17 the mean with the result that New York City alone had
18 one -- very nearly one district less than its share of the
19 state's population would have warranted. The area to the
20 north had 1 1/6 districts more than its share of the
21 state's population would have warranted.
22 The 2022 plan is a remarkable contrast with
23 that. Because the population deviations are so small,
24 however you may define any region of the state, that
25 region will have a share of the total number of Senate

1 districts that is approximately equal to its share of the
2 state's population. And one resulting change is that
3 because the 2012 plan had given the Upstate area one
4 district at a fraction more than it was entitled to on the
5 basis of its population and because also of the shift --
6 or change in the distribution of the state's population as
7 revealed in the 2020 census, the 2022 plan reapportions
8 two whole districts from Upstate to New York City, but it
9 does so without playing games with the deviation.
10 It does so by creating districts throughout the
11 state that are very close to the same district population.
12 The shift of one district from Upstate to New York City
13 amounts to a correction of the malapportionment in the
14 2012 plan, and the shift of the second district from
15 Upstate to New York City reflects changes in the
16 distribution of the state's population that occurred
17 during the previous decade and are shown in the 2020
18 census.
19 And I might add that if the Democrats in the
20 Senate had done a favor for themselves in 2022 like the
21 one that the Republican Majority in 2012 did for
22 themselves in dealing with the apportionment of Senate
23 districts, there would have been a shift of three
24 districts from Upstate to New York City. But that is not
25 the case. They didn't play around with the deviations or

1 the apportionment in the way it was done in the 2012 plan.
2 They simply apportioned the districts in strict
3 proportionality to the distribution of the population
4 throughout the state.
5 Q. Mr. Breitbart, am I correct that the first new
6 principle annunciated in the Constitution in 2014 -- by
7 "the first" I mean Paragraph 1 in the relevant section --
8 A. Yes.
9 Q. -- relates to fairness for racial and language
10 minority groups?
11 A. Yes. That was the first time that principle,
12 which is similar to the Voting Rights Act but not exactly
13 the same, has been incorporated into the New York State
14 Constitution.
15 Q. Did you make any observations with respect to
16 the Legislature's compliance with that principle in the
17 2022 plan?
18 A. Yes. And, again, this was a departure from
19 previous practice. As I showed in the testimony that I
20 submitted to the Reapportionment Task Force in 2011 and
21 2012, in the previous four decades, there had been a
22 systematic splitting of minority communities both in
23 Nassau and Suffolk Counties, and I note in my testimony
24 that I submitted there, which I also quote in my
25 affidavit, that in the Town of -- in the Village of

1 Brentwood and the Town of Islip, there is a line running
2 through the Village of Brentwood that divides the black
3 and Hispanic communities in the Town of Islip, and that
4 line -- even as districts are redrawn around it, that line
5 was identical in 1982, 1992, 2002, and 2012.
6 In 2022, happily, that line no longer appears.
7 The minority communities in the Town of Islip are now kept
8 together. And although they don't create a district where
9 the minority group voters would necessarily form -- where
10 a part of the minority group voters would necessarily form
11 a majority of the voters -- so it's not a situation where
12 you could have made a complaint under Section 2 of the
13 federal Voting Rights Act -- it is in compliance with the
14 New York State constitutional rule of providing fair
15 opportunities for members of minority groups to
16 participate in the political process.
17 Q. Mr. Breitbart, you testified earlier about your
18 observations with respect to towns in the 2022 enacted
19 plan. Can you speak to any observations regarding
20 splitting cities and counties in the 2022 plan?
21 A. Yes. Well, let's start with counties first, and
22 then I'll go to cities because there is a stronger rule,
23 and has been for a while, in the state Constitution
24 against dividing counties. The 2012 plan chopped up
25 Ulster County and the Hudson Valley among four Senate

1 districts. The 2022 plan keeps Ulster County intact
2 within a single district.
3 The 2012 plan cut up Tompkins County into three
4 parts. One of those districts extended north to the
5 shores of Lake Ontario. Another of those districts
6 extended east in the Hudson Valley. The 2022 plan keeps
7 Tompkins County intact within a single compact district
8 and united with other areas with which it has more in
9 common, extending down into Broome County and including
10 the City of Binghamton.
11 The 2012 plan split St. Lawrence County among
12 three districts. The 2012 plan, I should say, split
13 Lawrence County among three districts. The 2022 plan
14 keeps Lawrence County intact in a single district.
15 The 2012 plan split Delaware County among three
16 districts. The 2022 keeps Delaware County intact in a
17 single district.
18 As to the division of cities, if you look at the
19 map in Exhibit C, okay, Page 2 of Exhibit C, there's a map
20 of 2012 District 35.
21 THE COURT: I don't think I have Exhibit C.
22 THE WITNESS: It's part of the same
23 document. A, B, and C are part of the same document.
24 THE COURT: There it is. What page of
25 Exhibit C?

1 THE WITNESS: The second page of Exhibit C.
2 THE COURT: Thank you.
3 THE WITNESS: The first page has maps of
4 the whole Upstate area, and then the second page is
5 what I'm referring to.
6 BY MR. GOLDENBERG:
7 A. You will see that District 35 includes the
8 western part of the City of Yonkers and then extends north
9 into some towns. It divides the City of White Plains in
10 half, and then it extends south, and it splits up the City
11 of New Rochelle with an extremely complex, convoluted
12 boundary, and then there's an adjoining district that,
13 similarly, because of the way it goes around
14 District 35 -- I explained that in detail in my
15 affidavit -- you know, along with District 35, splits up
16 the City of New Rochelle with this crazy boundary. The
17 plan enacted in 2022 has a large part of the City of
18 Yonkers, which because of its large population, does have
19 to be divided, but then it goes to the north, Greenburgh,
20 Mount Pleasant, New Castle.
21 THE COURT: Still splits White Plains,
22 doesn't it?
23 THE WITNESS: It takes a few blocks from
24 the western part of White Plains, just a few blocks,
25 which have to be taken out because of the operation

1 of the "block on border" rule, which unfortunately
2 does require removing a few blocks sometimes from a
3 city that could otherwise be kept intact. Towns are
4 protected from being divided in that way, by the
5 "block on border" rule, but cities are not.
6 And unfortunately we do not have in this
7 grouping a detailed map of the City of White Plains.
8 There is one available on the Reapportionment Task
9 Force website, and you would be able to see there
10 that the -- where the old map divided White Plains in
11 half, the new map keeps the City of White Plains
12 almost entirely intact within a single district, but
13 there are a few blocks that have to be cut out
14 because of the "block on border" rule, the same
15 thing, it looks like --
16 Q. Mr. Breitbart, let me just stop you for a moment
17 because there's been a lot of talk about the "block on
18 border" rule in this case, but most of those with whom it
19 was discussed were not familiar with the rule. Can you
20 very briefly describe for the Court why the "block on
21 border" rule required this cut into White Plains?
22 A. The rule says that if you have two adjoining
23 districts and the boundary between the districts is not a
24 town line or a county line and there's a population
25 deviation between the two districts, if there's any block

1 within the more populous district that has a smaller
2 population than the difference between the two districts,
3 it has to be moved to the other district. So to take a
4 simple example, let's suppose you have two adjoining
5 Senate districts, and we'll leave aside the fact that
6 these are not populations that would be possible, you
7 know, with the current state population. But let's say
8 you have one -- and let's say these districts are both in
9 Brooklyn so we're not dealing with town boundaries or
10 county boundaries. You have two adjoining districts. One
11 has a population of 300,000. That's District A.
12 District B has a population of 300,003. If on the
13 boundary between the two there is a block in District B,
14 the district that has a population of 300,003, with a
15 population of two persons, that block has to be moved into
16 District A. Now, this -- because towns are supposed to be
17 kept intact. Towns are protected from being divided by
18 the rule. Counties are protected from being divided by
19 the rule. Unfortunately cities are not protected from
20 being divided by the rule. So where you have a boundary
21 that goes along a city boundary, if the city is in the
22 more populous district, then some blocks may have to be
23 taken out of the city to comply with the "block on border"
24 rule.
25 And that explains why even in the 2022 plan,

1 although the City of White Plains is kept mostly intact
2 within a single district -- and it's not District 37.
3 It's the adjoining district over here. I forget now what
4 the number is. Actually, I can find out from the next
5 page. I think it's District 39. Even a few blocks --
6 Q. I think it's 42.
7 A. You'll also see, if you look at the map that
8 shows the district that includes the City of Niagra Falls,
9 there are just a few blocks in one corner of the City of
10 Niagra Falls that have been cut out of the City of Niagra
11 Falls in the 2022 plan. It was something that had to be
12 done to comply with the same rule.
13 THE COURT: I understand.
14 Q. Mr. Breitbart, based on your analysis of the
15 2022 plan, did you find that the Legislature complied with
16 the "block on border" and "town on border" rules?
17 A. Yes. That is why you will see that in
18 Long Island -- in the region comprising Long Island,
19 New York City, and the Westchester Town of -- Westchester
20 City of Mount Vernon and the Town of Pelham, the districts
21 all have a population within two persons of one another.
22 It's also why the two districts that divide the City of
23 Syracuse are exactly equal in population; the two
24 districts that divide the City of Rochester are exactly
25 equal in population. It's why the two districts that

1 divide Buffalo are exactly equal in population and are
2 equal in population to that district that takes in the
3 rest of Niagara County, other than Niagara Falls, where
4 the populations were equalized by cutting those few blocks
5 out of the City of Niagra Falls.
6 Q. Did you make any observations with regard to the
7 2022 enacted plan's respect for communities of interest?
8 A. Yes. Well, first of all, where the division of
9 the minority communities in the Town of Islip has ended,
10 you would regard that as showing respect for communities
11 of interest. The ending of those wildly non-compact,
12 intricate districts in Brooklyn and Queens and the drawing
13 of the obviously compact districts that I called attention
14 to before would show a respect for communities of
15 interest. Keeping all the towns in Tompkins County in the
16 same district rather than attaching some of them to
17 communities on the shore of Lake Ontario and others to
18 communities in the Hudson Valley shows respect for
19 maintaining communities of interest.
20 And you can also say the same of what was done
21 in changing the district boundaries for the City of
22 Rochester. In the 2012 plan the City of Rochester was
23 divided among three districts, and an area in the southern
24 end of the City of Rochester, which was notable for having
25 a particularly large black population, was attached to an

1 extremely non-compact district that extends west through
2 Genesee County and then through Erie County to the Buffalo
3 City line.
4 There are now just two districts that divide the
5 City of Rochester. That black community in the southern
6 end of the City of Rochester is now included in one of
7 those districts. Both of those districts are entirely
8 within Monroe County. And where Monroe County was
9 previously divided among six districts, it's now divided
10 among three districts, two of which are entirely within
11 the county.
12 Q. Mr. Breitbart, Mr. Lavigna in his report
13 discusses a number of Senate districts and alleges that
14 the district lines for those districts can only be
15 explained as a result of improper partisan gerrymandering.
16 What conclusions did you reach regarding Mr. Lavigna's
17 analysis?
18 A. You will see that in my affidavit I discuss in
19 detail every one of the examples that he gives, and in
20 each case I show that where he says he can conceive of no
21 reason other than partisan intent for the difference
22 between the 2012 plan and the 2022 plan, I show how those
23 differences can be explained by adherence to
24 constitutional principles. He makes no reference to or
25 does not take into account of the reapportionment --

1 regional reapportionment that was necessary in order to
2 give each region of the state its proportional share of
3 districts equal to its proportion of the state's
4 population.
5 And so, for example, he complains that there's
6 an Upstate district where two Republican incumbents are
7 attached in the same district and says that can only be
8 explained by partisan intent. But since -- a proper
9 apportionment correcting the malapportionment of the 2012
10 plan and also taking account of the changed distribution
11 of the state's population must necessarily involve
12 reducing the number of Upstate Senate districts by two and
13 increasing the number of New York City districts by two.
14 Mr. Lavigna does not attempt to explain how you can reduce
15 the number of Upstate's districts by two without in any
16 place uniting or combining two incumbents in the same
17 district. It's impossible to do.
18 He says that the changes to Senate District 3 in
19 Long Island can only be explained by partisan intent but
20 doesn't take into account the way the minority communities
21 in Islip were divided in the 2012 plan and not divided in
22 the 2022 plan. He says that the way District 5, the
23 district that now includes all of the Town of Huntington,
24 was drawn could only be explained in terms of partisan
25 intent, but he doesn't take into account the fact that the

1 2012 plan unnecessarily violated the state constitutional
2 rule against dividing towns and the fact that the 2022
3 plan abides by that rule.
4 He says that communities in Tompkins County have
5 now been disconnected from communities with which they
6 have a historical connection and connected to communities
7 with which they do not have such a connection. He
8 apparently believes that the towns in Tompkins County that
9 were formally attached to a district that went to the
10 shore of Lake Ontario, that those towns had some
11 historical connection with communities on the shore of
12 Lake Ontario and that those towns that were attached to
13 part of a district that extended to the Hudson Valley had
14 a historical connection with communities in the Hudson
15 Valley but doesn't seem to think that the towns in
16 Tompkins County have any historical connection with one
17 another.
18 Q. Mr. Breitbart --
19 THE COURT: Mr. Breitbart (sic), I'm not
20 trying to hurry you --
21 MR. GOLDENBERG: Yeah.
22 THE COURT: -- but I just want you to know
23 the latest I can go is quarter or ten of. I mean, I
24 have to give the staff time to get back to their
25 office.

1 MR. GOLDENBERG: And I know that there's --
2 THE COURT: We can go on tomorrow. I'm not
3 going to hurry you.
4 MR. GOLDENBERG: No, I understand.
5 THE COURT: If we have to go on tomorrow,
6 we can go on tomorrow.
7 MR. GOLDENBERG: And I know there's
8 individuals in the courtroom who also have travel
9 plans that need to be accommodated.
10 BY MR. GOLDENBERG:
11 Q. So I'm going to ask you one more question,
12 Mr. Breitbart. You were present for Mr. Lavigna's
13 testimony, correct?
14 A. Yes, I was.
15 Q. And during that testimony Mr. Lavigna
16 acknowledged that in his analysis he didn't consider
17 certain constitutional principles like "block on border"
18 and "town on border" and minority voting rights and also
19 that his report doesn't address other factors, for
20 example, population equality and splitting cities or
21 towns. Do you have an opinion on the validity of an
22 analysis of a Senate plan that does not account for or
23 address relevant constitutional principles like these?
24 A. Well, obviously one cannot analyze or evaluate
25 the validity of a plan without considering the

1 constitutional rules that are supposed to govern the
2 drawing of the districts, and the fact that he ignored
3 those constitutional rules may explain why he can imagine
4 no reason except partisanship for districts that can
5 actually be -- districting decisions that can actually be
6 explained as adhering to those constitutional rules.
7 MR. GOLDENBERG: Thank you, Mr. Breitbart.
8 No further questions.
9 MR. HECKER: Your Honor, can I just state
10 for the record that if it were 2:00 o'clock, we would
11 do significantly more with Mr. Breitbart. We think
12 we've given you a flavor. His affidavit is very
13 detailed. It's in the record. And we assume that
14 your Honor will look at the Lavigna report and the
15 Breitbart report in detail on your own time and that
16 it's not necessary for Mr. Breitbart to do more than
17 he's already done verbally.
18 THE COURT: And that's fine. I will look
19 at his report again. I have read it, but I will look
20 at it again. But I also want you to know,
21 Mr. Hecker, I'm here tomorrow anyway. I'm willing to
22 do this into tomorrow if need be.
23 MR. HECKER: And so am I for the record.
24 It's actually Petitioners' counsel that we're trying
25 to accommodate.

1 THE COURT: Thank you.
2 All right. Cross?
3 MS. DiRAGO: While we really do thank you,
4 but we're fine staying as well. Don't cut it short
5 for us. I mean, I do appreciate it, but honestly --
6 MR. HECKER: I think we're good.
7 MS. DiRAGO: -- this is more important.
8 MR. HECKER: I think we're good.
9 MS. DiRAGO: I just wanted to make sure.
10 MR. TSEYTLIN: Your Honor, if I could ask,
11 I think, two minutes of questions --
12 THE COURT: Yes.
13 MR. TSEYTLIN: -- and, you know --
14 THE COURT: I'm not --
15 MR. TSEYTLIN: No, I mean, I just have
16 one --
17 THE COURT: Cross-examination?
18 MR. TSEYTLIN: I have maybe two or three
19 questions.
20 CROSS-EXAMINATION
21 BY MR. TSEYTLIN:
22 Q. Hello, sir.
23 Is it your testimony that the 2022 Senate map
24 complies with all constitutional requirements?
25 A. I don't know whether you can find a place in the

1 map -- a place where the map does not comply with some
2 constitutional requirements. It is obviously a great
3 improvement of the 2022 map -- 2012 map in the way that I
4 described and describe in more detail in my affidavit.
5 What I did examine was every single point in Mr. Lavigna's
6 report, so I have not attempted to determine whether there
7 is someplace where one could make a complaint that no one
8 has yet made about the 2022 plan.
9 Q. I heard you say earlier -- and please correct me
10 if I'm not correct -- that you believe that the
11 Legislature used the new constitutional provision with
12 regard to minority voters to consider racial
13 considerations over other district criteria, like core
14 retention, more than Section 2 of the VRA requirements.
15 A. No. That is not what I said. What I -- my
16 comparison was that in the case law governing Section 2,
17 you cannot complain about the way, let's say, the
18 districts in Suffolk County were drawn unless you can show
19 that it's possible to create a district in which either a
20 single minority group or two minority groups that are
21 politically cohesive will be able to form a voting
22 majority. The provisions in the New York State
23 Constitution do not include such a rule. They say only
24 that the Legislature should take into account the question
25 of whether minority groups are given a fair opportunity

1 and an equal opportunity with other voters to participate
2 in the political process.
3 And what I said was that the way District 3 was
4 drawn was a significant improvement over the way the
5 minority groups in Suffolk County had been systematically
6 split during the four decades. I didn't say that it gave
7 priority over to minority group representation over other
8 redistricting criteria. In fact, as I point out in my
9 affidavit, the Suffolk County districts are more compact.
10 Especially the districts in the Town of Islip are more
11 compact than the 2012 districts that they replace.
12 MR. TSEYTLIN: Thank you for that
13 clarification. I have nothing further.
14 THE COURT: Thank you.
15 Any redirect?
16 MR. GOLDENBERG: No, your Honor. Thank
17 you.
18 THE COURT: Thank you. You can step down.
19 Thank you, sir.
20 (The witness was excused.)
21 THE COURT: Any other witnesses by the
22 respondents?
23 MR. HECKER: Not for the Senate Minority --
24 Majority.
25 THE COURT: Governor?

1 MS. McKAY: None for the Governor.
2 THE COURT: Lieutenant Governor?
3 (No response.)
4 THE COURT: Assembly?
5 MR. BUCKI: None for the Assembly, although
6 I would like to address a few housekeeping matters --
7 THE COURT: A few what?
8 MR. BUCKI: -- before we conclude.
9 THE COURT: A few what?
10 MR. BUCKI: Housekeeping matters.
11 THE COURT: Yes. Yes. I'm concerned now
12 with closing and closing arguments. Do you wish to
13 do those in person, or are you asking to do those in
14 writing? Is there a consensus?
15 MR. TSEYTLIN: Your Honor, if the Court
16 would accept submissions in writing, that would
17 certainly be preferable from our position.
18 MR. HECKER: I guess the question is when,
19 your Honor. There's a tremendous record. If we're
20 doing it in writing, we're going to need the
21 transcripts to get finalized. And it's a huge amount
22 of work, so I wouldn't even be comfortable committing
23 to doing a project like that in even a week. So on a
24 case like this, I think would be appropriate to do
25 that. I just don't know if it's practical.

1 THE COURT: It may not be practical. Are
2 you saying, Mr. Hecker, you don't think by the 25th
3 of -- that's next Friday.
4 MS. DiRAGO: Can we ask when the
5 transcripts would be done?
6 (A discussion was held off the record with
7 the court reporter.)
8 MR. BUCKI: On behalf of the Assembly, I
9 would submit that in our view, it would be impossible
10 to try to put together written submissions dealing
11 with three days' worth of transcripts without having
12 the transcript in front of us --
13 THE COURT: I understand.
14 MR. BUCKI: -- and so I would submit that
15 absent a transcript being ready in advance of
16 April 4, if we were to do a closing argument, that it
17 should be done orally in person.
18 THE COURT: I think it's necessitated here.
19 I don't think we're going to have a transcript for
20 you to look at to do a written closing.
21 MR. HECKER: Under the circumstances we
22 agree.
23 THE COURT: So that brings us to still time
24 needed to get your thoughts together to present a
25 closing argument. I can either do that Friday of the

1 25th, if that gives you enough time to gather your
2 thoughts. I'd rather do it earlier, but I'm trying
3 to give you a little time. I'm sorry. It would have
4 to be Monday the 28th. Let me just look. Well, it's
5 either that or this Friday. I'm not available Monday
6 through Friday of next week, so that either puts this
7 Friday or the 21st of March -- I'm sorry -- the 28th
8 of March.
9 MR. TSEYTLIN: Your Honor, certainly I
10 understand about the transcripts. But, I mean, if
11 people are putting together oral arguments, they're
12 writing it out, so it's still, I think, better for
13 parties to be able to put down what they can in a
14 summation submission. These options -- this Friday,
15 that's very soon. And the 28th, that's pretty far;
16 that's close to the decision point. You know, I'm
17 not going to trouble your Honor with personal
18 schedules, but that would be extremely difficult on
19 my end. I think a written submission would convey
20 the same information of things we want to convey in
21 the --
22 MR. HECKER: Your Honor, the other problem
23 with written submissions is then we can't do
24 simultaneous written submissions. It's their burden.
25 It is the highest burden known in the law literally.

1 They would need to put in their position, and you'd
2 have to give us, I would say, a week to respond,
3 certainly not a couple of days. We're open to that,
4 but I just don't think it's practicable given the
5 constitutional deadline.
6 MR. BUCKI: And I would agree with
7 Mr. Hecker. I would submit this is a trial. Oral
8 arguments in summation are done in trials routinely,
9 whether bench or jury, and this case should be no
10 different particularly in the absence of a
11 transcript.
12 THE COURT: Oral argument on the 28th,
13 9:30. You can submit anything in writing you want
14 but oral argument. I've got to give you more than
15 tomorrow to put your thoughts together.
16 MR. HECKER: Your Honor, respectfully, it
17 wouldn't be fair to allow Petitioners to put in like
18 a massive brief the day before the 28th. I think
19 that we either need a briefing schedule so that we
20 can respond to any of their submissions or we should
21 do what Mr. Bucki said, which is the same in every
22 trial.
23 THE COURT: Oral arguments.
24 MR. HECKER: Thank you.
25 THE COURT: Just oral arguments. We'll

1 leave it at that.
2 MR. BUCKI: And I would agree.
3 And then a further housekeeping matter,
4 perhaps much more minor in nature, what I simply
5 wanted the record to reflect, because I was looking
6 at the various exhibits that have been marked and
7 admitted into evidence, is -- first of all, is it
8 correct that the stenographer, when the transcript
9 does come out, will have a manifest of which exhibits
10 have which identification numbers and which exhibits
11 have been admitted versus simply marked for
12 identification?
13 (A discussion was held off the record with
14 the court reporter.)
15 MR. BUCKI: I did just want to clarify for
16 the record also, in case it was not already clear,
17 because I know that in certain instances various
18 experts' affidavits and curricula vitarum were
19 admitted into evidence separately, I'd like to
20 reflect for the record that in Dr. Barber's case
21 those were attached to each other because the
22 curriculum vitae was an exhibit to the affidavit, and
23 so they are combined under a single exhibit, and both
24 were admitted into evidence as Exhibit A-2 without
25 objection yesterday.

1 THE COURT: And what are you asking?
2 MR. BUCKI: I just wanted to reflect that
3 on the record.
4 THE COURT: On the record?
5 MR. BUCKI: Yes.
6 THE COURT: Yes, Mr. Tseytlin.
7 MR. TSEYTLIN: Your Honor, if it has to be
8 on the 28th, it can be. I'm wondering if it's
9 possible for it to be on the 30th or 31st at all,
10 especially the 31st. I mean, I don't want to trouble
11 the Court with personal commitments but...
12 THE COURT: Can you do the 30th?
13 MR. BUCKI: Yes.
14 THE COURT: 30th?
15 MS. McKAY: I cannot do the 30th.
16 THE COURT: You're not giving me many
17 choices. I mean, I've got to have everybody on
18 board.
19 MS. McKAY: I could do the 31st. The 30th
20 I have a not-changeable trial scheduling conference.
21 THE COURT: All right. Mr. Hecker, 31st?
22 MR. HECKER: 31st would work.
23 THE COURT: 31st, 9:30.
24 MR. TSEYTLIN: Thank you so much, your
25 Honor.

1 THE COURT: Oral argument. Thank you all.

2 *Certified to be a true and accurate transcript.*

3 _____

Tara D. MacNaughton, CSR, RPR, NYACR

4 Official Court Reporter

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Sequential Monte Carlo for Sampling Balanced and Compact Redistricting Plans*

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Abstract

Random sampling of graph partitions under constraints has become a popular tool for evaluating legislative redistricting plans. Analysts detect partisan gerrymandering by comparing a proposed redistricting plan with an ensemble of sampled alternative plans. For successful application, sampling methods must scale to large maps with many districts, incorporate realistic legal constraints, and accurately and efficiently sample from a selected target distribution. Unfortunately, most existing methods struggle in at least one of these areas. We present a new Sequential Monte Carlo (SMC) algorithm that draws representative redistricting plans from a realistic target distribution of choice. Because it samples directly, the SMC algorithm can efficiently explore the relevant space of redistricting plans better than the existing Markov chain Monte Carlo (MCMC) algorithms that yield dependent samples. Our algorithm can simultaneously incorporate several constraints commonly imposed in real-world redistricting problems, including equal population, compactness, and preservation of administrative boundaries. We validate the accuracy of the proposed algorithm by using a small map where all redistricting plans can be enumerated. We then apply the SMC algorithm to evaluate the partisan implications of several maps submitted by relevant parties in a recent high-profile redistricting case in the state of Pennsylvania. We find that the proposed algorithm is roughly 40 times more efficient in sampling from the target distribution than a state-of-the-art MCMC algorithm. Open-source software is available for implementing the proposed methodology.

Key Words: gerrymandering, graph partition, importance sampling, spanning trees

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1 Introduction

In first-past-the-post electoral systems, legislative districts serve as the fundamental building block of democratic representation. In the United States, congressional redistricting, which redraws district boundaries in each state following decennial Census, plays a central role in influencing who is elected and hence what policies are eventually enacted. Because the stakes are so high, redistricting has been subject to intense political battles. Parties often engage in *gerrymandering* by manipulating district boundaries in order to amplify the voting power of some groups while diluting that of others.

In recent years, the availability of granular data about individual voters has led to sophisticated partisan gerrymandering attempts that cannot be easily detected. At the same time, many scholars have focused their efforts on developing methods to uncover gerrymandering by comparing a proposed redistricting plan with a large collection of alternative plans that satisfy the relevant legal requirements. A primary advantage of such an approach over the use of simple summary statistics is its ability to account for idiosyncrasies of physical and political geography specific to each state.

For its successful application, a sampling algorithm for drawing alternative plans must (1) be efficient enough to scale to large maps with thousands of geographic units and many districts, (2) simultaneously incorporate a variety of real-world legal constraints such as population balance (Section 3.1), geographical compactness (Section 3.3), and the preservation of administrative boundaries (Section 4.4), and (3) ensure these samples are representative of a specific target population, against which a redistricting plan of interest can be evaluated. Although some have been used in several recent court challenges to existing redistricting plans, existing algorithms run into limitations with regards to at least one of these three key requirements.

Optimization-based (e.g., Mehrotra et al., 1998; Macmillan, 2001; Bozkaya et al., 2003; Liu et al., 2016) and constructive Monte Carlo (e.g., Cirincione et al., 2000; Chen and Rodden, 2013; Magleby and Mosesson, 2018) methods can be made scalable and incorporate many constraints. But they are not designed to sample from any specific target distribution. As a result, the resulting plans tend to differ systematically, for example, from a uniform distribution under certain constraints (Cho and Liu, 2018; Fifield et al., 2020a,b). The absence of an explicit target distribution makes it difficult to interpret the ensembles generated by these methods and use them for statistical outlier analysis to detect gerrymandering.

MCMC algorithms (e.g., Mattingly and Vaughn, 2014; Wu et al., 2015; Chikina et al., 2017; DeFord et al., 2021; Carter et al., 2019; Fifield et al., 2020a) can in theory sample from a specific target distribution, and incorporate constraints through the use of an energy function. In practice, however, existing algorithms struggle to mix and traverse through a highly complex sampling space, making scalability difficult and accuracy hard to prove. Some of these algorithms make proposals by flipping precincts at the boundary of existing districts (e.g., Mattingly and Vaughn, 2014; Fifield et al., 2020a), rendering it difficult to transition between points in the state space, especially as more constraints are imposed. More recent algorithms by DeFord et al. (2021) and Carter et al. (2019) use spanning trees to make their proposals, and this has allowed these algorithms to yield more global moves and improve mixing. Yet the very essence of the MCMC approach is to generate dependent samples, and on large-scale problems, this dependence may lead to low efficiency.

In Sections 3 and 4, we present a new Sequential Monte Carlo (SMC) algorithm, based on a similar but not identical spanning tree construction to DeFord et al. (2021) and Carter et al. (2019), that addresses the above three key challenges. Unlike optimization-based and constructive Monte Carlo methods, the SMC algorithm samples from a specific and customizable target distribution. Our algorithm scales better than MCMC algorithms because it generates diverse, high-quality samples while directly incorporating the three most common constraints imposed on the redistricting process—contiguity, population balance, and geographic compactness. SMC also removes the need to draw enough samples to ensure the entire sample space is explored, which is essential for the successful application of MCMC algorithms.

The proposed algorithm proceeds by splitting off one district at a time, building up the redistricting plan piece by piece (see Figure 2 for an illustration). Each split is accomplished by drawing a spanning tree and removing one edge, which splits the spanning tree in two. We also extend the SMC algorithm so that it preserves administrative boundaries and certain geographical areas as much as possible, which is another common constraint considered in many real-world redistricting cases. An open-source software package is available for

implementing the proposed algorithm (Kenny et al., 2020).

In Section 5, we validate the SMC algorithm using a 50-precinct map, for which all potential redistricting plans can be enumerated (Fifield et al., 2020b). We demonstrate that the proposed algorithm samples accurately from a range of target distributions on these plans. Section 6 applies the SMC algorithm to the 2011 Pennsylvania congressional redistricting, and compares its performance on this problem with the existing approaches. We find that the proposed SMC algorithm is roughly 40 times more efficient in sampling than a state-of-the-art MCMC algorithm applied to the same problem. Section 7 concludes and discusses directions for future work.

2 The 2011 Pennsylvania Congressional Redistricting

We study the 2011 Pennsylvania congressional redistricting because it illustrates the salient features of the redistricting problem. We begin by briefly summarizing the background of this case and then explain the role of sampling algorithms used in the expert witness reports.

2.1 Background

Pennsylvania lost a seat in Congress during the reapportionment of the 435 U.S. House seats following the 2010 Census. In Pennsylvania, the General Assembly, which is the state's legislative body, draws new congressional districts, subject to gubernatorial veto. At the time, the General Assembly was controlled by Republicans, and Tom Corbett, also a Republican, served as governor. In the 2012 election, which took place under the newly adopted 2011 districting map, Democrats won 5 seats while Republicans took the remaining 13. This result stands in contrast to a 7–12 split after the 2010 election and a 12–7 Democratic advantage before 2010.

In June 2017, the League of Women Voters of Pennsylvania filed a lawsuit alleging that the 2011 plan adopted by the Republican legislature violated the state constitution by diluting the political power of Democratic voters. The case worked its way through the state court system, and on January 22, 2018, the Pennsylvania Supreme Court issued its ruling, writing that the 2011 plan "clearly, plainly and palpably violates the Constitution of the Commonwealth of Pennsylvania, and, on that sole basis, we hereby strike it as unconstitutional." (League of Women Voters v. Commonwealth, 2018).

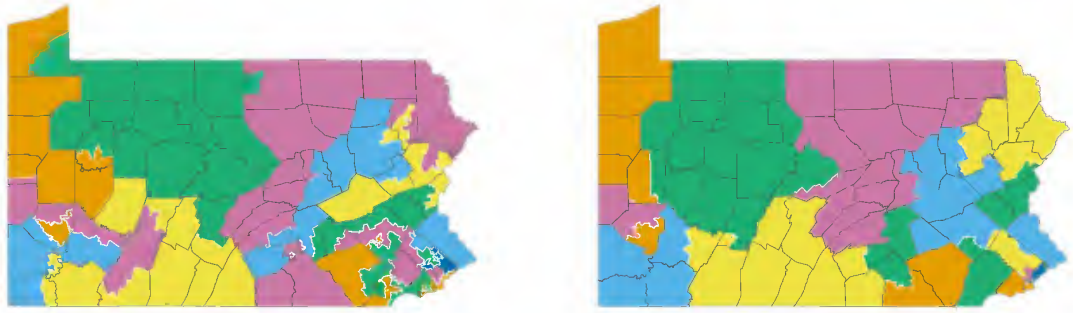
The court ordered that the General Assembly adopt a remedial plan and submit it to the governor, who would in turn submit it to the court, by February 15, 2018. In case no plan was submitted to and approved by that deadline, the court provided that all of the parties to the lawsuit could submit their own plans by the same date, and the court would review them and itself impose a final remedial plan. In its ruling, the court laid out specific requirements that must be satisfied by all proposed plans:

> any congressional districting plan shall consist of: congressional districts composed of compact and contiguous territory; as nearly equal in population as practicable; and which do not divide any county, city, incorporated town, borough, township, or ward, except where necessary to ensure equality of population.

While the compactness and administrative boundary constraints are not required by the U.S. or Pennsylvania constitutions, they have been historically held up as "guiding principles" in many states.

The leaders of the Republican Party in the General Assembly drew a new map, but the Democratic governor, Tom Wolf, refused to submit it to the court, claiming that it, too, was an unconstitutional gerrymander. Instead, the court received remedial plans from seven parties: the petitioners, the League of Women Voters; the respondents, the Republican leaders of the General Assembly; the governor, a Democrat; the lieutenant governor, also a Democrat; the Democratic Pennsylvania House minority leadership; the Democratic Pennsylvania Senate minority leadership; and the intervenors, which included Republican party candidates and officials. Ultimately, the Supreme Court drew its own plan and adopted it on February 19, 2018, arguing that it was "superior or comparable to all plans submitted by the parties." Figure 1 shows the remedial plan created by the Supreme Court as well as the 2011 map adopted by the General Assembly, which were found on the court's case page.

The constraints explicitly laid out by the court, as well as the numerous remedial plans submitted by the parties, make the 2011 Pennsylvania redistricting a useful case study that evaluates redistricting plans.



(a) 2011 General Assembly map (b) 2018 Pennsylvania Supreme Court map

Figure 1: Comparison of the 2011 map drawn by the General Assembly and the final map imposed by the Supreme court in 2018. County lines are shown in dark gray, and district boundaries that do not coincide with county boundaries are in white.

2.2 The Role of Sampling Algorithms

The original finding that the 2011 General Assembly plan was a partisan gerrymander was in part based on different outlier analyses performed by two academic researchers, Jowei Chen and Wesley Pegden, who served as the petitioner's expert witnesses. Chen randomly generated two sets of 500 redistricting plans according to a constructive Monte Carlo algorithm based on Chen and Rodden (2013). He considered population balance, contiguity, compactness, avoiding county and municipal splits, and, in the second set of 500, avoiding pairing off incumbents. Pegden ran an MCMC algorithm for one trillion steps, and computed upper bounds of p-values using the method of Chikina et al. (2017). This method was also used in a follow-up analysis by Moon Duchin, who served as an expert for the governor (Duchin, 2018). Both petitioner experts concluded that the 2011 plan was an extreme outlier according to compactness, county and municipal splits, and the number of Republican and Democratic seats implied by statewide election results.

The respondents also retained several academic researchers as their expert witnesses. One of them, Wendy Tam Cho, directly addressed the sampling-based analyses of Chen and Pegden. Cho criticized Chen's analysis for not sampling from a specified target distribution. She also criticized Pedgen's analysis by arguing that his MCMC algorithm only made local explorations of the space of redistricting plans, and could not therefore have generated a representative sample of all valid plans (see also Cho and Rubinstein-Salzedo, 2019, and Chikina et al. (2019)). We do not directly examine the intellectual merits of the specific arguments put forth by the expert witnesses. However, these methodological debates are also relevant for other cases where simulation algorithms have been extensively used by expert witnesses (e.g., Rucho v. Common Cause (2019); Common Cause v. Lewis (2019); Covington v. North Carolina (2017); Harper v. Lewis (2020)).

The expert witness reports in the Pennsylvania case highlight the difficulties in practically applying existing sampling algorithms to actual redistricting problems. First, the distributions that some of these algorithms sample from are not made explicit, leaving open the possibility that the generated ensemble is systematically different from the true set of all valid plans. Second, even when the distribution is known, the MCMC algorithms used to sample from it may be prohibitively slow to mix and cannot yield a representative sample. These challenges motivate us to design an algorithm that generates more diverse samples from a specific target distribution and incorporates most common redistricting constraints, while minimizing the impact on scalability, theoretical validity, and empirical performance.

3 Sampling Balanced and Compact Districts

In this section, we formally characterize the target distribution of our sampling algorithm. Our goal is to sample redistricting plans with contiguous districts which are both balanced in population and geographically compact.

3.1 The Setup

Redistricting plans are ultimately aggregations of geographic units such as counties, voting precincts, or Census blocks. The usual requirement that the districts in a plan be contiguous necessitates consideration of the spatial relationship between these units. The natural mathematical structure for this consideration is a graph $G = (V, E)$, where $V = \{v_1, v_2, \ldots, v_m\}$ consists of m nodes representing the geographic units of redistricting and E contains edges connecting units which are legally adjacent.

A redistricting plan on G consisting of n districts is described by a function $\xi : V \to \{1, 2, \ldots, n\}$, where $\xi(v) = i$ implies that node v is in district i. We let $V_i(\xi)$ and $E_i(\xi)$ denote the nodes and edges contained in district i under a given redistricting plan ξ, so $G_i(\xi) = (V_i(\xi), E_i(\xi))$ represents the induced subgraph that corresponds to district i under the plan. We suppress the dependence on ξ when it is clear from context, writing $G_i = (V_i, E_i)$. Since each node belongs to only one district, we have $V = \bigcup_{i=1}^{n} V_i(\xi)$ and $V_i(\xi) \bigcap V_{i'}(\xi) = \varnothing$ for any redistricting plan ξ. In addition, we require that all nodes of a given district be connected.

Beyond connectedness, redistricting plans are almost always required to have nearly equal population in every district. To formalize this requirement, let $\mathrm{pop}(v)$ denote the population of node v. Then the population of a district is given by

$$\mathrm{pop}(V_i) \;:=\; \sum_{v \in V_i(\xi)} \mathrm{pop}(v).$$

We quantify the discrepancy between a given plan and this ideal by the *maximum population deviation*,

$$\mathrm{dev}(\xi) \;:=\; \max_{1 \le i \le n} \left| \frac{\mathrm{pop}(V_i)}{\mathrm{pop}(V)/n} - 1 \right|,$$

where $\mathrm{pop}(V)$ denotes the total population. Some courts and states have imposed hard maximums on this quantity, e.g., $\mathrm{dev}(\xi) \le D = 0.05$ for state legislative redistricting.

The proposed algorithm samples plans by way of spanning trees on each district, i.e., subgraphs of $G_i(\xi)$ which contain all vertices, no cycles, and are connected. Let T_i represent a spanning tree for district i whose vertices and edges are given by $V_i(\xi)$ and a subset of $E_i(\xi)$, respectively. The collection of spanning trees from all districts together form a spanning forest $F = (T_1, \ldots, T_n)$. Each spanning forest implies a redistricting plan where $\xi(F)(v) = i$ for all $v \in T_i$. However, a single redistricting plan may correspond to multiple spanning forests because each district may have more than one spanning tree.

For a given redistricting plan, we can compute the exact number of spanning forests in polynomial time using the determinant of a submatrix of the graph Laplacian, according to the Matrix Tree Theorem of Kirchhoff (see Tutte (1984)). Thus, for a graph H, if we let $\tau(H)$ denote the number of spanning trees on the graph, we can represent the number of spanning forests that correspond to a redistricting plan ξ as

$$\tau(\xi) \;:=\; \prod_{i=1}^{n} \tau(G_i(\xi)).$$

This fact will play an important role in the definition of our sampling algorithm and its target distribution.

3.2 The Target Distribution

The algorithm is designed to sample a plan ξ with probability

$$\pi(\xi) \propto \exp\{-J(\xi)\}\tau(\xi)^{\rho} \mathbf{1}_{\{\xi \text{ connected}\}} \mathbf{1}_{\{\mathrm{dev}(\xi) \le D\}}, \tag{1}$$

where the indicator functions ensure that the plans meet population balance and connectedness criteria, $\tau(\xi)$ measures the compactness of the districts in ξ (see Section 3.3), and J encodes additional constraints on the types of plans preferred. As done in Section 6, we often use a reasonably strict population constraint such as $D = 0.001$. The parameter $\rho \in \mathbb{R}_0^+$ is chosen to control the compactness of the generated plans.

This target distribution has both substantive and theoretical justifications. First, it directly incorporates two universal constraints: contiguity and population deviation. Second, it represents the unique maximum entropy

distribution on the set of redistricting plans, satisfying these two universal constraints and the moment conditions implied by the other constraints, i.e., $\mathbb{E}_\pi[\log \tau(\xi)] = \mu_\tau$ and $\mathbb{E}_\pi[J(\xi)] = \mu_J$ for some constants μ_τ and μ_J (see Cover and Thomas, 2006, Theorem. 12.1.1, originally of Boltzmann).

Thus, our target distribution ensures that all plans meet contiguity and population requirements, and *on average* satisfy a compactness standard as well as any other additional constraints (through the function J). It is no surprise, therefore, that this class of target distributions has been used by other work developing redistricting sampling algorithms (Herschlag et al., 2017; Fifield et al., 2020a).

The generality of the additional constraint function J is intentional, as its exact form and number imposed on the redistricting process varies by state and by the type of districts being drawn; any type of constraint may be incorporated by choosing a J which is small for preferred plans and large otherwise. For example, a preference for plans close to an existing plan ξ_{sq} may be encoded as

$$\begin{aligned} J_{\text{sq}}(\xi) &= -\frac{\beta}{\log n}\text{VI}(\xi, \xi_{\text{sq}}) \\ &:= -\frac{\beta}{\log n}\sum_{i,j=1}^{n} \frac{\text{pop}(V_i(\xi)\cap V_j(\xi_{\text{sq}}))}{\text{pop}(V)}\left(\log\left(\frac{\text{pop}(V_i(\xi)\cap V_j(\xi_{\text{sq}}))}{\text{pop}(V_j(\xi_{\text{sq}}))}\right) + \log\left(\frac{\text{pop}(V_i(\xi)\cap V_j(\xi_{\text{sq}}))}{\text{pop}(V_j(\xi))}\right)\right), \end{aligned} \tag{2}$$

where $\beta \in \mathbb{R}^+$ controls the strength of the constraint. The function $\text{VI}(\cdot, \cdot)$ represents the variation of information (also known as the shared information distance), which is the difference between the joint entropy and the mutual information of the distribution of population over the new districts ξ relative to the existing districts ξ_{sq} (Cover and Thomas, 2006). When ξ is any relabelling of ξ_{sq}, then $J_{\text{sq}}(\xi) = 0$. In contrast, when ξ evenly splits the nodes of each district of ξ_{sq} between the districts of ξ, then $J_{\text{sq}}(\xi) = \beta$. This distance measure will prove useful later in measuring the diversity of a sample of redistricting plans (see also Guth et al., 2020).

There exist other formulations of constraints, and considerations in choosing a set of weights that balance constraints against each other (see e.g., Bangia et al., 2017; Herschlag et al., 2017; Fifield et al., 2020a). Here, we focus on sampling from the broad class of distributions characterized by Equation (1), which have been used in other work; we do not address the important but separate problem of picking a specific instance of this class for a given redistricting problem.

The algorithm operates efficiently only when the additional constraints imposed by J are not too severe. Even a small number of strong constraints incorporated into J can dramatically limit the number of valid plans and considerably complicate the process of sampling. The Markov chain algorithms developed to date partially avoid this problem by moving toward maps with lower J over a number of steps, but in general including more constraints makes it even more difficult to transition between valid redistricting plans. Approaches such as simulated annealing (Bangia et al., 2017; Herschlag et al., 2017) and parallel tempering (Fifield et al., 2020a) have been proposed to handle multiple constraints, but these can be difficult to calibrate in practice and provide few, if any, theoretical guarantees.

In practice, we usually find that the most stringent constraints are those involving population deviation, compactness, and administrative boundary splits. As shown later, we address this issue by designing our algorithm to directly satisfy these constraints. Weak additional constraints do not generally have a substantial effect on the sampling efficiency, though there are exceptions. Monitoring the distribution of the weights and the overall sampling efficiency is crucial to obtaining a good sample.

3.3 Spanning Forests and Compactness

One common redistricting requirement is that districts be geographically compact, though nearly every state leaves this term undefined. Dozens of numerical compactness measures have been proposed, with the Polsby–Popper score (Polsby and Popper, 1991) perhaps the most popular. Defined as the ratio of a district's area to that of a circle with the same perimeter as the district, the Polsby–Popper score is constrained to $[0, 1]$, with higher scores indicating more compactness. The Polbsy–Popper score has been shown to correlate reasonably well with humans' subjective evaluation (Kaufman et al., 2020), but it is far from a perfect measure. One challenge is its sensitivity to the underlying geography and the scale on which it is measured. This sensitivity makes it difficult to compare the compactness redistricting plans across states,

To address this challenge, some have proposed a graph-theoretic measure known as *edge-cut compactness* (Dube and Clark, 2016; DeFord et al., 2021). This measure counts the number of edges that must be removed from the original graph to partition it according to a given plan. Formally, it is defined as

$$\mathrm{rem}(\xi) \;:=\; 1 - \frac{\sum_{i=1}^{n} |E_i(\xi)|}{|E(G)|},$$

where we have normalized to the total number of edges.

Plans that involve cutting many edges will necessarily have long internal boundaries, driving up their average district perimeter (and driving down their Polsby–Popper scores), while plans that cut as few edges as possible will have relatively short internal boundaries and much more compact districts. Additionally, given the high density of voting units in urban areas, plans which cut fewer edges will tend to avoid drawing district lines through the heart of these urban areas. This has the welcome side effect of avoiding splitting cities and towns, and in doing so helping to preserve "communities of interest," another common redistricting consideration.

Empirically, this graph-based compactness measure is highly correlated with $\log \tau(G) - \log \tau(\xi)$. Indeed, we often observe a correlation in excess of 0.99. It is difficult to precisely characterize this relationship except in special cases because $\tau(\xi)$ is calculated as a matrix determinant (McKay, 1981). However, this quantity is strongly controlled by the product of the degrees of each node in the graph, $\prod_{i=1}^{m} \deg(v_i)$ (Kostochka, 1995). Removing an edge from a graph decreases the degree of the vertices at either end by one, so we would expect $\log \tau(G)$ to change by approximately $2\{\log \bar{d} - \log(\bar{d}-1)\}$ with this edge removal, where $\bar{d}$ is the average degree of the graph. This implies a linear relation $\log \tau(G) - \log \tau(\xi) \overset{\propto}{\sim} \mathrm{rem}(\xi) \cdot 2\{\log \bar{d} - \log(\bar{d}-1)\}$, and hence

$$\tau(\xi)^{\rho} \;\overset{\propto}{\sim}\; \exp(-C\,\rho\,\mathrm{rem}(\xi)),$$

where C is some constant depending on the details of the map. The implied moment constraint in the target distribution is then $\mathbb{E}_{\pi}[\mathrm{rem}(\xi)] \approx \mu_{\mathrm{rem}}$.

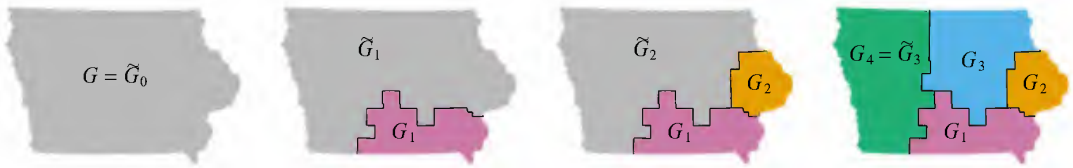
As a result, a greater value of ρ in the target distribution corresponds to a preference for fewer edge cuts and therefore a redistricting plan with more compact districts. This and the considerations given in the literature (Dube and Clark, 2016; DeFord et al., 2021) suggest that the target distribution in Equation (1) with $\rho = 1$ (or another positive value) is a good choice for sampling compact districts. The choice of $\rho = 1$ is computationally convenient, as it allows us to avoid calculating $\tau(\xi)$ as part of sampling (an asymptotic bottleneck), and yet usually produces satisfactorily compact districts. Of course, if another compactness metric is desired, one can simply set $\rho = 0$ and incorporate the alternative metric into J. This will preserve the algorithm's efficiency to the extent that the alternative metric correlates with the edge-removal measure of compactness.

4 The Proposed Algorithm

The proposed algorithm samples redistricting plans by sequentially drawing districts over $n-1$ iterations of a splitting procedure. This is fundamentally different than existing MCMC approaches, which change an existing plan according to some transition kernel. The iterations of the proposed algorithm are from district to district within a single plan where as the iterations in an MCMC algorithm are from plan to plan.

Our algorithm begins by partitioning the original graph $G = (V, E) = (\widetilde{V}_0, \widetilde{E}_0) = \widetilde{G}_0$ into two induced subgraphs: $G_1 = (V_1, E_1)$, which will constitute a district in the final map, and the remainder of the graph $\widetilde{G}_1 = (\widetilde{V}_1, \widetilde{E}_1)$, where $\widetilde{V}_1 = V \setminus V_1$ and $\widetilde{E}_1$ consists of all the edges between vertices in $\widetilde{V}_1$. Next, the algorithm takes $\widetilde{G}_1$ as an input graph and partitions it into two induced subgraphs, one which will become a district G_2 and the remaining graph $\widetilde{G}_2$. The algorithm repeats the same splitting procedure until the final $(n-1)$-th iteration whose two resulting partitions, G_{n-1} and $\widetilde{G}_{n-1} = G_n$, become the final two districts of the redistricting plan.

Figure 2 provides an illustration of this sequential procedure. To sample a large number of redistricting plans from the target distribution given in Equation (1), at each iteration, the algorithm samples many candidate partitions, discards those which fail to meet the population constraint, and then resamples a certain number of the remainder according to importance weights, using the resampled partitions at the next iteration. The rest of this section explains the details of the proposed algorithm.



(a) Initial map (b) Iteration 1 (c) Iteration 2 (d) Iteration 3

Figure 2: The sequential splitting procedure applied to the state of Iowa, where four congressional districts are created at the county level.

4.1 The Splitting Procedure

We first describe the splitting procedure, which is similar to the merge-split Markov chain proposals of DeFord et al. (2021) and Carter et al. (2019). It proceeds by drawing a random spanning tree T, identifying the k_i most promising edges to cut within the tree, and selecting one such edge at random to create two induced subgraphs. Spanning trees are an attractive way to split districts, as the removal of a single edge induces a partition with two connected components, and spanning trees can be sampled uniformly (Wilson, 1996).

As part of the full sampling procedure (Algorithm 2), after splitting, the resulting partition is checked for compliance by ensuring the population of the new district G_i falls within the bounds

$$P_i^- = \max\left\{\frac{\text{pop}(V)}{n}(1-D),\ \text{pop}(\widetilde{V}_{i-1}) - \frac{n-i}{n}\text{pop}(V)(1+D)\right\} \quad \text{and}$$
$$P_i^+ = \min\left\{\frac{\text{pop}(V)}{n}(1+D),\ \text{pop}(\widetilde{V}_{i-1}) - \frac{n-i}{n}\text{pop}(V)(1-D)\right\}.$$

These bounds also ensure that it will be possible for future iterations to generate valid districts out of $\widetilde{G}_i$. If $\text{pop}(V_i) \notin [P_i^-, P_i^+]$, then the entire redistricting plan is rejected and the sampling process begins again. While the rate of rejection varies by map and by iteration, we generally encounter acceptance rates at each iteration between 5% and 30%, which are not so low as to make sampling from large maps intractable. Algorithm 1 details the steps of the splitting procedure, where at the first iteration we take $\widetilde{G}_0 = G$.

4.2 The Sampling Probability

The above sequential splitting procedure does not generate plans from the target distribution π. We denote the sampling measure by q, and write the sampling probability for a given connected plan ξ at iteration i as $q(G_i \mid \widetilde{G}_{i-1})$, since each new district G_i depends only on the leftover map area $\widetilde{G}_{i-1}$ from the previous iteration. This probability can be written as the probability that we cut an edge along the boundary of the new district, integrated over all spanning trees which could be cut to form the district, i.e.,

$$q(G_i \mid \widetilde{G}_{i-1}) = \sum_{T \in \mathcal{T}(\widetilde{G}_{i-1})} q(G_i \mid T)\, \tau(\widetilde{G}_{i-1})^{-1}, \tag{3}$$

where $\mathcal{T}(\cdot)$ represents the set of all spanning trees of a given graph, and we have relied on the fact that Wilson's algorithm draws spanning trees uniformly.

The key is that for certain choices of k_i (the number of edges considered to be cut at iteration i), the probability that an edge is cut is independent of the trees that are drawn. Let $ok(T)$ represent the number of edges on any spanning tree T that induce balanced partitions with population deviation below D, i.e.,

$$ok(T) \ \coloneqq\ |\{e \in E(T) : d_e \leq D\}|.$$

Then define $K_i \coloneqq \max_{T \in \mathcal{T}(\widetilde{G}_{i-1})} ok(T)$, the maximum number of such edges across all spanning trees. Furthermore, let $\mathcal{C}(G, H)$ represent the set of edges joining nodes in a graph G to nodes in a graph H. We have the following result for the splitting probability for new districts whose populations lie inside the bounds defined above (Appendix A for the proof).

Algorithm 1 Splitting procedure to generate one district

Input: initial graph $\widetilde{G}_{i-1}$ and a parameter $k_i \in \mathbb{Z}^+$.

(a) Draw a single spanning tree T on $\widetilde{G}_{i-1}$ uniformly from the set of all such trees using Wilson's algorithm.

(b) Each edge $e \in E(T)$ divides T into two components, $T_e^{(1)}$ and $T_e^{(2)}$. For each edge, compute the following population deviation for the two districts that would be induced by cutting T at e,

$$d_e^{(1)} = \left| \frac{\sum_{v \in T_e^{(1)}} \text{pop}(v)}{\text{pop}(V)/n} - 1 \right| \quad \text{and} \quad d_e^{(2)} = \left| \frac{\sum_{v \in T_e^{(2)}} \text{pop}(v)}{\text{pop}(V)/n} - 1 \right|.$$

Let $d_e = \min\{d_e^{(1)}, d_e^{(2)}\}$, and index the edges in ascending order by this quantity, so that we have $d_{e_1} \leq d_{e_2} \leq \cdots \leq d_{e_{m_i-1}}$, where $m_i = |V_i|$.

(c) Select one edge e^* uniformly from $\{e_1, e_2, \ldots, e_{k_i}\}$ and remove it from T, creating a spanning forest $(T_{e^*}^{(1)}, T_{e^*}^{(2)})$ which induces a partition $(G_i^{(1)}, G_i^{(2)})$.

(d) If $d_{e^*}^{(1)} \leq d_{e^*}^{(2)}$, i.e., if $T_{e^*}^{(1)}$ induces a district that is closer to the optimal population than $T_{e^*}^{(2)}$ does, set $G_i = G_i^{(1)}$ and $\widetilde{G}_i = G_i^{(2)}$; otherwise, set $G_i = G_i^{(2)}$ and $\widetilde{G}_i = G_i^{(1)}$.

Lemma 1. *The probability of splitting a* valid *new district G_i from an existing area $\widetilde{G}_{i-1}$ using Algorithm 1 with parameter $k_i \geq K_i$ is*

$$q(G_i \mid \widetilde{G}_{i-1}, \text{pop}(V_i) \in [P_i^-, P_i^+]) = \frac{\tau(G_i)\tau(\widetilde{G}_i)}{\tau(\widetilde{G}_{i-1})k_i} |\mathcal{C}(G_i, \widetilde{G}_i)|. \tag{4}$$

4.3 Sequential Importance Sampling

We follow a sequential Monte Carlo approach (Doucet et al., 2001; Liu et al., 2001) to generate draws from the target distribution, rather than simply peforming $n-1$ iterations of Algorithm 1 and resampling or reweighting at the final stage. A sequential approach is also useful in operationalizing the rejection procedure to enforce the population constraint.

The proposed procedure is presented as Algorithm 2. The algorithm is governed by a parameter $\alpha \in (0, 1]$, which has no effect on the target distribution nor the asymptotic accuracy of the algorithm. Rather, α is chosen to maximize the efficiency of sampling. To generate S redistricting plans, at each iteration of the splitting procedure $i \in \{1, 2, \ldots, n-1\}$, we resample and split the existing plans one at a time, rejecting those which do not meet the population constraints, until we obtain S new plans for the next iteration. This rejection process can be viewed as a form of partial rejection control (Liu et al., 1998, 2001), or a version of the AliveSMC algorithm (LeGland and Oudjane, 2005; Peters et al., 2012).

One last resampling of S plans using the outputted weights can be performed to generate a final sample. Alternatively, the weights can be used directly to estimate the expectation of some statistics of interest, which are functions of redistricting plans, under the target distribution, i.e., $H = \mathbb{E}_\pi(h(\xi))$, where π is given in Equation (1), using the self-normalized importance sampling estimate, $\widehat{H} = \sum_{j=1}^S h(\xi^{(j)})w^{(j)} / \sum_{j=1}^S w^{(j)}$.

The sampled plans are not completely independent, because the weights in each step must be normalized before resampling, and because the resampling itself introduces some dependence. Precisely quantifying the amount of dependence is difficult. However, as we demonstrate in Section 5, most choices of target distribution π are close to the sampling distribution q, which means that the weights are not too extreme and hence, the dependence is minimized. And as we show in Section 6, compared with MCMC algorithms, samples generated by the SMC algorithm are more diverse, since there is none of the autocorrelation found in MCMC algorithms.

The two asymptotically slowest steps of the SMC algorithm are computing $\tau(G_i)$ for every district G_i and drawing a spanning tree using Wilson's algorithm for each iteration. All other steps, such as computing d_e and

Algorithm 2 Sequential Monte Carlo (SMC) Algorithm

Input: graph G to be split into n districts, target distribution parameters $\rho \in \mathbb{R}_0^+$ and constraint function J, and sampling parameters $\alpha \in (0, 1]$ and $k_i \in \mathbb{Z}^+$, with $i \in \{1, 2, \ldots, n-1\}$.

(a) Generate an initial set of S plans $\{\widetilde{G}_0^{(1)}, \widetilde{G}_0^{(2)}, \ldots, \widetilde{G}_0^{(S)}\}$ and corresponding weights $\{w_0^{(1)}, w_0^{(2)}, \ldots, w_0^{(S)}\}$, where each $\widetilde{G}_0^{(j)} := G$ and $w_0^{(j)} = 1$.

(b) For each splitting iteration $i \in \{1, 2, \ldots, n-1\}$:

(1) Until there are S valid plans:

(i) Sample a partial plan $\widetilde{G}_{i-1}$ from $\{\widetilde{G}_{i-1}^{(1)}, \widetilde{G}_{i-1}^{(2)}, \ldots, \widetilde{G}_{i-1}^{(S)}\}$ according to weights $\left(\prod_{l=1}^{i-1} w_l^{(j)}\right)^{\alpha}$.

(ii) Split off a new district from $\widetilde{G}_{i-1}$ through one iteration of the splitting procedure (Algorithm 1), creating a new plan $(G_i, \widetilde{G}_i)$.

(iii) If the newly sampled plan $(G_i, \widetilde{G}_i)$ satisfies $\text{pop}(V_i) \in [P_i^-, P_i^+]$, save it; otherwise, reject it.

(2) Calculate weights for each of the new plans

$$w_i^{(j)} \;=\; \tau(G_i^{(j)})^{\rho-1} \frac{k_i}{|\mathcal{C}(G_i^{(j)}, \widetilde{G}_i^{(j)})|}.$$

(c) Calculate final weights

$$w^{(j)} \;=\; \exp\{-J(\xi^{(j)})\} \left(\prod_{i=1}^{n-2} w_i^{(j)}\right)^{(1-\alpha)} w_{n-1}^{(j)} \left(\tau(G_n^{(j)})\right)^{\rho-1}. \tag{5}$$

(d) Output the S final plans $\{\xi^{(j)}\}_{j=1}^S$, where $\xi^{(j)} = (G_1^{(j)}, \ldots, G_{n-1}^{(j)}, G_n^{(j)})$, and the final weights $\{w^{(j)}\}_{j=1}^S$.

$|\mathcal{C}(G_i^{(j)}, \widetilde{G}_i^{(j)})|$, are linear in the number of vertices, and are repeated at most once per iteration.[1] Computing $\tau(G_i)$ requires computing a determinant, which currently has computational complexity $O(|V_i(\xi)|^{2.373})$ though most implementations are $O(|V_i(\xi)|^3)$. Since this must be done for each district of size roughly m/n, the total complexity for sampling one plan is $O(n \cdot (m/n)^{2.373})$. For the spanning trees, the expected runtime of Wilson's algorithm is the mean hitting time of the graph, which is $O(m^2)$ in the worst case. Alhtough we sample a smaller and smaller tree each iteration, the complexity is still $\sum_{i=1}^{n-1} O\left(\frac{n-i}{n} \cdot m\right)^2 = O(nm^2)$. Then, the total complexity for each sample is $O(nm^2 + m^{2.373} n^{-1.373})$. Note that when $\rho = 1$, we need not compute $\tau(G_i)$, and the total complexity is $O(nm^2)$. It is difficult to precisely characterize the computational complexity of the entire procedure since the rejection sampling introduces a random component, which depends on the difficulty of sampling a new district within the population bounds. This random complexity is also shared by existing MCMC approaches, which must redraw proposals which are invalid.

The weights in the proposed algorithm are chosen to match existing general SMC algorithms with partial rejection control. These existing algorithms provide guarantees as to the convergence of the samples to the target distribution. One such result, which will suffice for our purposes, is the following central limit theorem.

Proposition 1. *Let $\pi_S = \sum_{j=1}^S w^{(j)} \delta_{\xi^{(j)}}$ be the weighted particle approximation generated by Algorithm 2. Then for all measurable h and as $S \to \infty$,*

$$\sqrt{S}(\mathbb{E}_{\pi_S}[h(\xi)] - \mathbb{E}_{\pi}[h(\xi)]) \xrightarrow{d} \mathcal{N}(0, V_{SMC}(h)),$$

[1] To compute d_e, we walk depth-first over the tree and store, for each node, the total population of that node and the nodes below it. This allows for $O(1)$ computation of d_e for all edges.

for some asymptotic variance $V_{SMC}(h)$.

A proof is given in Appendix A, along with details on V_{SMC}. This central limit theorem implies consistency (in S) of any derived quantities from the weighted samples. However, since this convergence is in probability (w.r.t. the algorithm's sampling probability), the proposition does not establish that $\pi_S \xrightarrow{d} \pi$ almost surely. While the almost sure convergence result exists for a standard SMC algorithm (Del Moral et al., 2006), we do not know of an extension to the case of partial rejection control.

In some cases, the constraints incorporated into $J(\xi)$ admit a natural decomposition to the district level as $\prod_{i=1}^{n} J'(G_i)$—for example, a preference for districts which split as few counties as possible, or against districts which would pair off incumbents. In these cases, an extra term of $\exp\{-J'(G_i^{(j)})\}$ can be added to the weights $w_i^{(j)}$ in each stage, and the same term can be dropped from the final weights $w^{(j)}$. This can be particularly useful for more stringent constraints; incorporating J' in each stage allows the importance resampling to "steer" the set of redistricting plans towards those which are preferred by the constraints.

As regards the parameter α, larger values are more aggressive in pruning out unlikely plans (those which are overrepresented in q versus π), which may lead to less diversity in the final sample, while smaller values of α are less aggressive, which can result in more variable final weights and more wasted samples; Liu et al. (2001) recommend a default choice of $\alpha = 0.5$, which we find appropriate for our setting.

4.3.1 Choosing k_i

The accuracy of the algorithm is theoretically guaranteed only when the number of edges considered for removal at each stage is at least the maximum number of edges across all graphs which induce districts G_i with $\text{dev}(G_i) \leq D$, i.e., $k_i \geq K_i$. Unfortunately, K_i is generally unknown in practice. If we set $k_i = m - 1$, where m represents the total number of nodes in the graph, then this condition is certainly satisfied. However, such a choice results in a prohibitively inefficient algorithm—the random edge selected for removal will with high probability induce an invalid partition, leading to a rejection of the entire map. Conversely, if we set $k_i = 1$, we gain efficiency by maximizing the chance that the induced districts satisfy the constraint, but lose the theoretical guarantee.

A natural approach is to draw a moderate number of spanning trees $\mathcal{T}_i \subseteq \mathcal{T}(\widetilde{G}_i)$ and compute $ok(T)$ for each $T \in \mathcal{T}_i$. The sample maximum, or the sample maximum plus some small buffer amount, would then be an estimate of the true maximum $\widehat{K}_i$ and an appropriate choice of k_i. In practice, we find little noticeable loss in algorithmic accuracy even if $k_i < K_i$. The following proposition theoretically justifies this finding.

Proposition 2. *The probability that an edge e is selected to be cut at iteration i, given that the tree T containing e has been drawn, and that e would induce a valid district, satisfies*

$$\max\left\{0, q(d_e \leq d_{e_{k_i}} \mid \mathcal{F})\left(1 + \frac{1}{k_i}\right) - 1\right\} \leq q(e = e^* \mid \mathcal{F}) \leq \frac{1}{k_i},$$

where $\mathcal{F} = \sigma(\{T, \text{pop}(V_i) \in [P_i^-, P_i^+]\})$.

The proof is in Appendix A. If $k_i \geq K_i$, then $q(e = e^* \mid \mathcal{F})$ is exactly k_i^{-1}, a fact which is used in the proof of Proposition 1. This result, which is proved using a simple Fréchet bound, shows that as long as $q(d_e \leq d_{e_{k_i}} \mid \mathcal{F})$ is close to 1, using k_i^{-1} in Proposition 1 is a good approximation to the true sampling probability.

Having sampled $\mathcal{T}_i$, we can compute for each value of k the sample proportion of trees where a randomly selected edge e among the top k of edges of the tree is also among the top k for the other trees—in effect estimating $q(d_e \leq d_{e_{k_i}} \mid \mathcal{F})$. We may then choose k_i to be the smallest k for which this proportion exceeds a pre-set threshold (e.g., 0.99). We have found that this procedure, repeated at the beginning of each sampling stage, efficiently selects k_i without compromising the ability to sample from the target distribution.

Appendix C further discusses the use of truncation for stabilizing importance weights (Ionides, 2008), which we have found useful in practice when the compactness parameter ρ is far from 1 and/or strong additional constraints need to be imposed.

(a) The Erie graph. Edges that cross from one administrative unit to another are colored black.

(b) Spanning trees drawn on each administrative unit.

(c) The quotient multigraph. The number of edges connecting each node is the number of edges that connect each unit in the original graph.

(d) The final spanning tree, with a spanning tree on the quotient multigraph used to connect the spanning trees on each administrative unit.

Figure 3: The two-step spanning tree sampling procedure applied to the city of Erie, Pennsylvania, with three arbitrary administrative units indicated by the colored sections of each map.

4.4 Incorporating Administrative Boundary Constraints

Another common requirement for redistricting plans is that districts "to the greatest extent possible" follow existing administrative boundaries such as county and municipality lines.[2] In theory, this constraint can be formulated using a J function which penalizes maps for every county line crossed by a district. In practice, however, we can more efficiently generate desired maps by directly incorporating this constraint into our sampling algorithm.

Fortunately, with a small modification to the proposed algorithm, we can sample redistricting plans proportional to a similar target distribution but with the additional constraint that the number of administrative splits not exceed $n-1$. In most states, the number of administrative units that are considered (such as counties) is much larger than the number of districts n, so this constraint represents a significant improvement from the baseline algorithm, which can in theory yield up to $n-1$ splits. Together with this constraint, a further preference for fewer administrative splits can be incorporated through the J function.

Let A be the set of administrative units, such as counties. We can relate these units to the nodes by way of a labeling function $\eta : V \to A$ that assigns each node to its corresponding unit. Thus, our modified algorithm works for non-administrative units so long as they can be represented by this labeling function. This function induces an equivalence relation $\sim_\eta$ on nodes, where $v \sim_\eta u$ for nodes v and u iff $\eta(v) = \eta(u)$. If we quotient G by this relation, we obtain the administrative-level multigraph $G \,/\, \sim_\eta$, where each vertex is an administrative unit and every edge corresponds to an edge in G which connects two nodes in different administrative units. We can write the number of administrative splits as

$$\mathrm{spl}(\xi) = \left(\sum_{a \in A} \sum_{i=1}^{n} C(\eta^{-1}(a) \cap \xi^{-1}(i)) \right) - |A|,$$

where $C(\cdot)$ counts the number of connected components in the subgraph $\eta^{-1}(a) \cap \xi^{-1}(i)$.

To implement this constraint, we draw the spanning trees in step (a) of Algorithm 2 in two substeps such that we sample from a specific subset of all spanning trees. First, we use Wilson's algorithm to draw a spanning tree on each administrative unit $a \in A$, and then we connect these spanning trees to each other by drawing a spanning tree on the quotient multigraph $\widetilde{G}_i \,/\, \sim_\eta$. Figure 3 illustrates this process. This approach is similar to the independently-developed multi-scale merge-split algorithm of Autry et al. (2020).

Drawing the spanning trees in two steps limits the trees used to those which, when restricted to the nodes $\eta^{-1}(a)$ in any administrative unit a, are still spanning trees. The importance of this restriction is that cutting any edge in such a tree will either split the map exactly along administrative boundaries (if the edge is on the quotient multigraph) or split one administrative unit in two and preserve administrative boundaries everywhere

[2] If a redistricting plan must always respect these boundaries, we can simply treat the administrative units as the nodes of the original graph to be partitioned.

else. Since the algorithm has $n-1$ stages, this limits the support of the sampling distribution to maps with no more than $n-1$ administrative splits.

This modification does not make theoretical analysis intractable. Indeed, the two-step construction makes clear that the total number of such spanning trees is given by

$$\tau_\eta(\widetilde{G}_i) \;=\; \tau(\widetilde{G}_i \,/\, \sim_\eta) \prod_{a \in A} \tau(\widetilde{G}_i \cap \eta^{-1}(a)), \tag{6}$$

where $\widetilde{G}_i \cap \eta^{-1}(a)$ denotes the subgraph of $\widetilde{G}_i$ which lies in unit a, and we take $\tau(\varnothing) = 1$. Replacing τ with τ_η in the expression for the weights $w_i^{(j)}$ and $w^{(j)}$ then gives the modified algorithm that generates a properly weighted sample from

$$\pi_\eta(\xi) \;\propto\; \exp\{-J(\xi)\}\tau_\eta(\xi)^\rho \mathbf{1}_{\{\xi \text{ connected}\}} \mathbf{1}_{\{\text{dev}(\xi) \leq D\}} \mathbf{1}_{\{\text{spl}(\xi) \leq n-1\}}. \tag{7}$$

This idea can in fact be extended to arbitrary levels of nested administrative hierarchy. We can, for example, limit not only the number of split counties but also the number of split cities and Census tracts to $n-1$ each, since tracts are nested within cities, which are nested within counties. To do so, we begin by drawing spanning trees using Wilson's algorithm on the smallest administrative units. We then connect spanning trees into larger and larger trees by drawing spanning trees on the quotient graphs of each higher administrative level. Even with multiple levels of administrative hierarchy, the calculation of the number of spanning trees is still straightforward, by analogy to Equation (6).

5 An Empirical Validation Study

Although the proposed algorithm has desirable theoretical properties, it is important to empirically assess its performance (Fifield et al., 2020b). We examine whether or not the proposed algorithm can produce a sample of redistricting maps that is actually representative of a target distribution. We use a 50-precinct map taken from the state of Florida, and use the efficient enumeration algorithm of Fifield et al. (2020b) to obtain all possible redistricting maps with three contiguous districts. While there are over 4.2 million (4,266,875 to be exact) partitions, only a small number satisfy realistic population and compactness constraints. We demonstrate that the proposed algorithm can efficiently approximate several target distributions on this set under different sets of constraints. Appendix B contains an additional validation study in which this same map is split into four districts.

We sample from three different target measures on the validation map, and compare the samples to the true reference distribution based on the enumeration. When there are only a handful of valid partitions, we directly compare the sample frequency for each partition to the desired uniform distribution. When there are too many partitions to make these individual comparisons, we compare the samples to the reference enumeration by using the Republican dissimilarity index (Massey and Denton, 1988), a commonly-used measure of spatial segregation. Appendix B contains a map of the 50 precincts and four administrative units, along with a plot showing the distribution of compactness and Republican dissimilarity across partitions.

We also compare the accuracy of the SMC algorithm to that of the "merge-split" spanning tree-based MCMC algorithm (Carter et al., 2019),[3] which uses a spanning tree-based proposal similar to the splitting procedure described in Algorithm 1: it merges adjacent districts, draws a spanning tree on the merged district, and splits it to ensure the population constraint is met. Although the parametrization is different, the stationary distribution of this algorithm is exactly that of Equation (1). The merge-split algorithm can also incorporate additional constraints into its Metropolis step, but we do not include any here.

It is difficult to directly compare SMC and MCMC algorithms when run for the same number of iterations. SMC samples require no burn-in period, while MCMC samples are generally autocorrelated and require convergence monitoring. The comparisons here are intended to highlight the performance of the two algorithms when run for a moderate but reasonable number of iterations. They are not meant to establish the maximum achievable performance of either algorithm when run under optimal settings, since the MCMC algorithm has been shown is known to converge, at least theoretically, with enough samples.

[3] We use their open-source implementation at `https://git.math.duke.edu/gitlab/gjh/mergesplitcodebase` (accessed July 30, 2020).

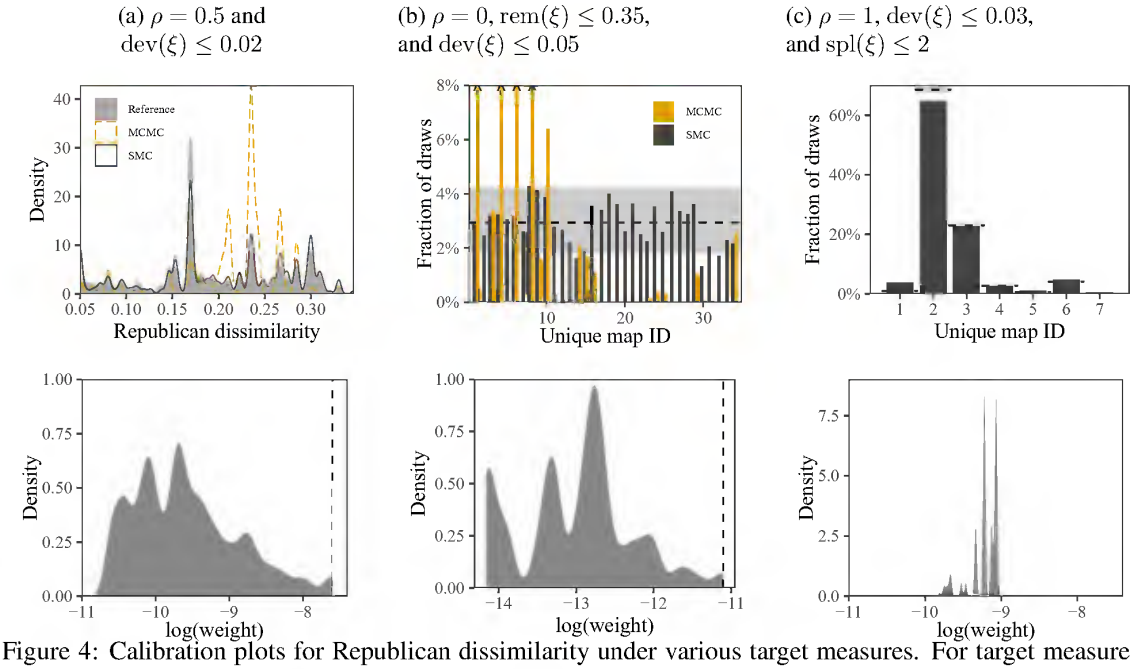


Figure 4: Calibration plots for Republican dissimilarity under various target measures. For target measure (a), density estimates of the the algorithm output and the reweighted enumeration are plotted. For target measures (b) and (c), the sample frequency of individual maps is plotted in gray, with the horizontal line indicating the target frequency and the shaded area indicating the expected range of random variation given the number of effective samples. The distribution of truncated importance weights for each sample is shown below each plot, with the truncation value marked with a vertical line. For target measures (a) and (b), the output of the merge-split MCMC algorithm is also plotted in orange, with values exceeding plot bounds market with a caret (‘ˆ’).

First, we target a moderately constrained target distribution by choosing $\rho = 0.5$ in Equation (1) and setting the population constraint to $\mathrm{dev}(\xi) \leq 0.02$. There are only 814 partitions (or 0.019% of all maps) that satisfy this population constraint in the reference enumeration. Since the target distribution is not uniform, we reweight the enumerated maps according to $\tau(\xi)^{0.5}$. We sampled 10,000 plans and reweighted them according to the importance weights, using a normalized weight truncation of $w_{\max} = 0.05 \times \sqrt{10,000}$ (see the lower panel of Figure 4a for the distribution of weights after truncation). We ran the MCMC merge-split algorithm for 20,000 iterations, and discarded the first 10,000 samples.

The upper panel of Figure 4a shows the resulting density estimates. While the target distribution is highly multimodal, there is good agreement between the SMC sample and reference distribution. In contrast, the MCMC samples fail to accurately capture the left tail of the distribution, and oversample certain values in the right tail.

Second, we target a uniform distribution on the set of maps with $\mathrm{dev}(\xi) \leq 0.05$ and $\mathrm{rem}(\xi) \leq 0.35$. Note that the median fraction of removed edges across all partitions under 5% population deviation was 53%. There are a total of only 34 maps (or 0.0008% of all maps) that satisfy these two constraints. As before, we sampled 10,000 plans truncate to the same value of $w_{\max}$ (see the lower panel of Figure 4b for the distribution of truncated weights). We discarded any samples which did not meet the compactness constraint, leaving 2,995 SMC samples and 1,364 MCMC samples.

The upper panel of the figure shows the results. Since there are only 34 maps, we can individually identify each and plot the observed map frequencies versus the expected frequency of 1/34. While the SMC samples do not perfectly approximate the target distribution, the variation in sample frequencies is generally within the range that would be expected due to binomial variation with the number of effective samples obtained here (indicated by a grey band). In comparison, the MCMC algorithm was not able to sample accurately from this target distribution in 20,000 iterations.

Finally, to demonstrate the administrative boundary constraint, we sample from the distribution with $\rho = 1$, $\mathrm{dev}(\xi) \leq 0.03$, and $\mathrm{spl}(\xi) \leq 2$, using the arbitrary administrative boundaries shown in the left plot of Figure 8. The combination of these constraints is extremely strong, allowing only at most two county splits. Indeed, only 7 partitions (or approximately 0.00016%) satisfy them all. Since the merge-split MCMC algorithm is not specifically designed to enforce this hard constraint, we do not present its results. We sample 10,000 plans using the modified SMC algorithm of Section 4.4. We do not truncate the weights since with $\rho = 1$ their variance is small, as shown in the lower panel of Figure 4c. As in the first validation exercise, the target measure is not uniform, and the upper panel of Figure 4c plots the sample frequencies of the 7 maps versus their density under the target measure. Despite the severe constraints, the proposed algorithm continues to perform well, although map 1 is oversampled and map 2 is slightly undersampled.

6 Analysis of the 2011 Pennsylvania Redistricting

As discussed in Section 2, in the process of determining a remedial redistricting plan to replace the 2011 General Assembly map, the Pennsylvania Supreme Court received submissions from seven parties. In this section, we compare four of these maps to both the original 2011 plan and the remedial plan ultimately adopted by the court. We study the governor's plan and the House Democrats' plan; the petitioner's plan (specifically, their "Map A"), which was selected from an ensemble of 500 plans used as part of the litigation; and the respondent's plan, which was drawn by Republican officials.

6.1 The Setup

To evaluate these six plans, we drew 1,500 reference maps from the target distribution given in Equation (7) by using the proposed algorithm along with the modifications presented in Section 4.4 to constrain the number of split counties to 17 (out of a total of 67), in line with the court's mandate. We set $\rho = 1$ to put most of the sample's mass on compact districts, and enforced $\mathrm{dev}(\xi) \leq 0.001$ to reflect the "one person, one vote" requirement. The parameters k_i were selected according to the automated procedures laid out in Section 4.3.1, with a threshold value of 0.95. The rejection rate at each iteration averaged 15.1%.

This population constraint translates to a tolerance of around 700 people, in a state where the median precinct has 1,121 people. Like most research on redistricting, we use precincts because they represent the smallest geographical units for which election results are available. To draw from a stricter population constraint we would need to use the 421,545 Census blocks in Pennsylvania rather than the 9,256 precincts, which would significantly increase the computational burden.

6.2 Comparison with a State-of-the-Art MCMC Algorithm

We first compare the computational efficiency of the SMC algorithm with the merge-split MCMC algorithm used in the empirical validation above.[4] To make the comparison, we use the merge-split algorithm to draw 1,500 Pennsylvania redistricting maps of 18 districts with $\mathrm{dev}(\xi) \leq 0.001$ and $\rho = 1$, the same settings as were used to generate the SMC samples. However, the MCMC algorithm does not enforce a hard constraint on the number of county splits. While these preferences can be encoded in an energy function, for the sake of comparison, we did not enforce any additional constraints. Since additional constraints generally lead to substantially less efficiency in MCMC settings, we do not expect this simplification to affect our qualitative findings.

To calculate the efficiency of the MCMC algorithm, we use the standard autocorrelation-based formula (see, e.g. Geyer, 2011), using the Republican dissimilarity index described above as the summary statistic. For the SMC algorithm, we use the effective sample size calculation for functions of interest given in Owen (2013), which uses the distribution of importance sampling weights. However, to avoid the complications that arise from importance resampling being performed at every step of the SMC algorithm, for this comparison only we perform no resampling (i.e., we set $\alpha = 0$) in between iterations of the algorithm, performing only one final resampling after the algorithm has terminated. Since this deprives the algorithm of the ability to "prune" bad samples, the effective sample size calculated here should be considered a conservative lower bound.

[4] We do not make a comparison to the recombination ("ReCom") algorithm of DeFord et al. (2021), which pioneered the spanning tree-based proposal used in the merge-split algorithm, as it does not sample from a specific target distribution.

	Republican dissimilarity		Unique plans	
	SMC	Merge-split	SMC	Merge-split
Nominal Samples	1500	1500	1500	1500
Effective samples	235.6	5.6	467	86
Efficiency	15.7%	0.4%	31.3%	5.7%

Table 1: Comparison of efficiency of the proposed Sequential Monte Carlo (SMC) algorithm and the merge-split MCMC algorithm with spanning tree-based proposals.

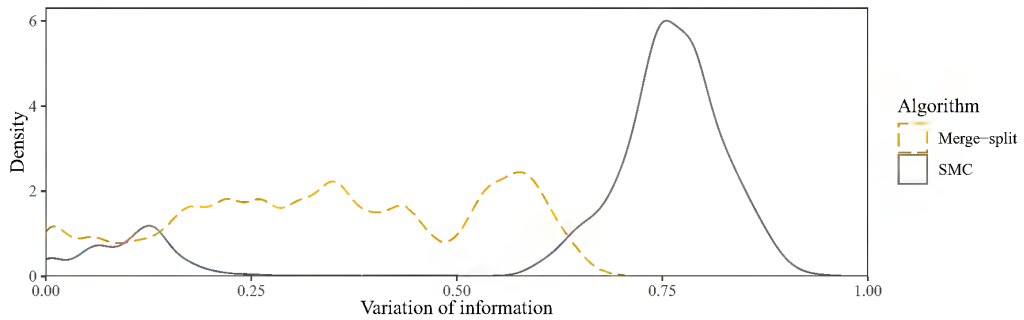


Figure 5: The distribution of the variation of information between all pairs of samples from the SMC and two MCMC algorithms.

We also count the number of unique redistricting plans generated by each algorithm, as another measure of sampling efficiency that is agnostic to the type of algorithm used. The results are shown in Table 1. The SMC algorithm is 42 times more efficient than the MCMC algorithm, according to the usual effective sample calculations. And the SMC algorithm generates 5.4 times more unique samples in the same number of iterations.

Another way to view the algorithmic efficiency is by measuring how different the samples are from each other, using the variation of information metric shown in Equation (2). Similar plans will have a variation of information near zero, while plans which are extremely different will have a variation of information near the maximum value of 1. Figure 5 shows the distribution of the pair-wise variation of information distance for each algorithm. The distance between most pairs of SMC sample plans is greater than the maximum distance between any pairs of MCMC plans, due to the autocorrelation inherent in Markov chain methods.

We cannot directly compare these algorithms in terms of their runtime since that depends on the specific implementation of each algorithm. An exact theoretical comparison is also difficult. Although the computational complexity for a sample from the SMC algorithm is $O(nm^2)$ (see Section 4.3), while the complexity of the MCMC proposals is $O(m^2)$, the MCMC algorithm only changes two districts at a time, whereas an SMC sample redraws all n districts. For this particular application, the specific implementations of the the SMC and merge-split MCMC algorithms we used took 52 and 11 minutes to sample, respectively. This implies that SMC is several times more effective than the state-of-the-art MCMC algorithm in terms of runtime per effective sample. Although additional study is warranted, our results suggest that the proposed algorithm may be substantially more efficient when applied to real-world redistricting problems.

6.3 Compactness and County Splits

In contrast with the simulations used to compare the proposed algorithm with existing MCMC approaches, the remainder of this section uses plans that were sampled using resampling after each iteration ($\alpha = 0.5$).

Figure 6 shows distribution of the fraction of edges removed ($\mathrm{rem}(\xi)$) and the number of county splits ($\mathrm{spl}(\xi)$) across the reference maps generated by our algorithm (grey histograms). The figure also plots these values for each of the six plans using vertical lines of various types. The 2011 General Assembly plan is a clear

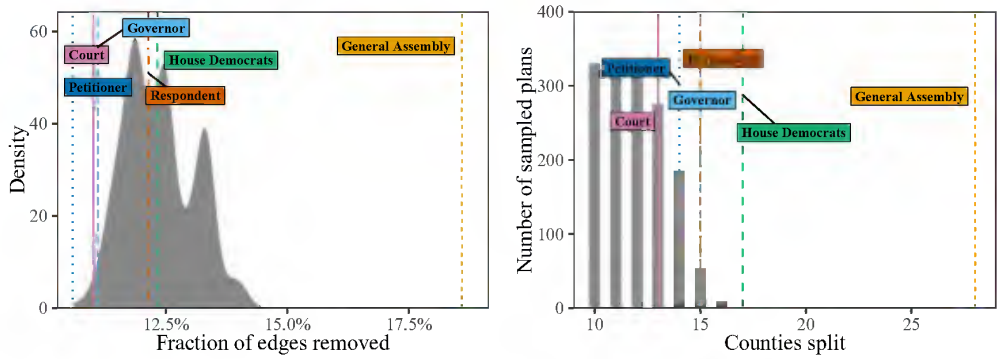


Figure 6: Summary statistics for the six plans, compared to their distribution under the target measure. The left plot shows $\mathrm{rem}(\xi)$, where smaller values indicate more compact districts. The right plot shows $\mathrm{spl}(\xi)$, whose median value under the target measure is 12.

outlier for both statistics, being far less compact and splitting far more counties than any of the reference plans and all of the remedial plans. Among the remedial plans, the petitioner's is the most compact, followed by the court's and the governor's, according to the $\mathrm{rem}(\xi)$ statistic. The House Democratic plan and the respondent's plan were the least compact based on both statistics, though still well within the normal range, according to the reference maps. In fact, the petitioner's plan appears to be an outlier in being *too* compact, although this is perhaps not surprising—the map was generated by an algorithm explicitly designed to optimize over criteria such as population balance and compactness (Chen, 2017).

The right plot of Figure 6 shows that all of the submitted plans split between 13 and 17 counties, with the court's adopted plan splitting the fewest. Yet around half of the reference maps split fewer than 13 counties, with some splitting only 10. This may be a result of the strict population constraint (all six plans were within 1 person of equal population across all districts), or a different prioritization between the various constraints imposed.

6.4 Partisan Analysis

While important, the outlier status of the General Assembly plan as regards compactness and county splits is not sufficient to show that it is a *partisan* gerrymander. To evaluate the partisan implications of the six plans, we take a precinct-level baseline voting pattern and aggregate it by district to explore hypothetical election outcomes under the six plans and the reference maps. The baseline pattern is calculated by averaging the vote totals for the three presidential elections and three gubernatorial elections that were held in Pennsylvania from 2000 to 2010.[5] These election data were also used during litigation. While being far from a perfect way to create counterfactual election outcomes, this simple averaging of statewide results is often used in academic research and courts.

Then within each plan, we number the districts by their baseline Democratic two-party vote share, so District 1 is the least Democratic and District 18 the most. Figure 7, analogous to Figure 7 in Herschlag et al. (2017), presents the distribution of the Democratic two-party vote share for each of the districts across the reference maps, and also shows the values for the General Assembly plan (orange triangles) and the court's adopted plan (purple circles). When compared to the reference maps and the court's plan, the General Assembly plan tends to yield smaller Democratic vote share in competitive districts (p-values of 0.008, 0.0007, and 0.041 for Districts 8–10 compared to the reference set) while giving larger Democratic vote share in non-competitive districts. This finding is consistent with the view that the General Assembly plan is gerrymandered in favor of Republicans by packing Democratic voters in non-competitive districts.

Appendix D discusses the partisan aspects of the plans further.

[5]Data from Ansolabehere, S. and Rodden, J. (2011). Pennsylvania Data Files. Available at https://doi.org/10.7910/DVN/FJHHDS.

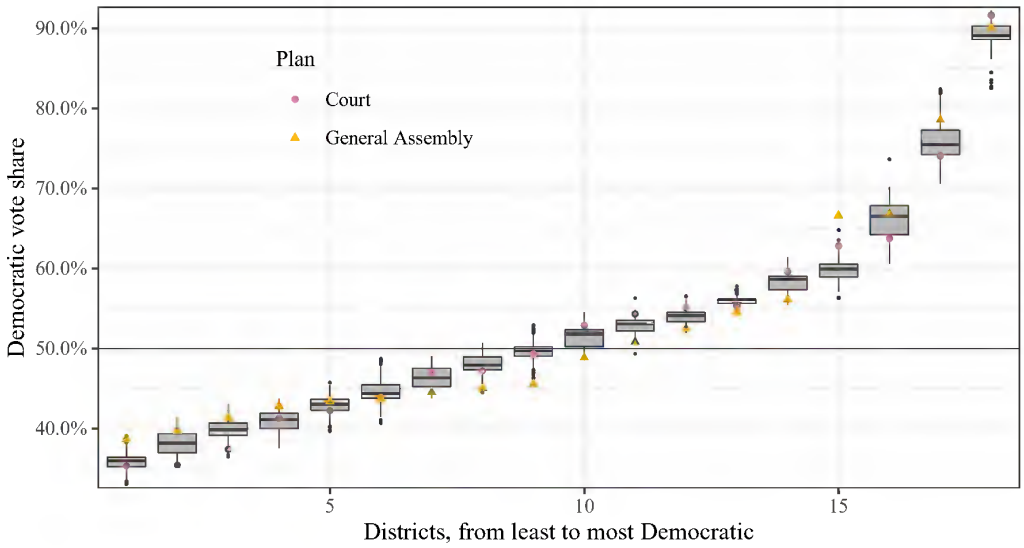


Figure 7: Democratic two-party vote share by districts, where within each plan districts are ordered by Democratic vote share.

7 Concluding Remarks

Redistricting sampling algorithms allow for the empirical evaluation of a redistricting plan by generating alternative plans under a certain set of constraints. Researchers and policymakers can compute various statistics from the redistricting plan of interest and compare them with the corresponding statistics based on these sampled plans. Unfortunately, existing approaches often struggle when applied to real-world problems, owing to the scale of the problems and the number of constraints involved.

The SMC algorithm presented here is able to sample from a specific target distribution, but does not face the same kinds of scalability problems as many existing MCMC algorithms. It also incorporates, by design, the common redistricting constraints of population balance, geographic compactness, and minimizing administrative splits. Additionally, the algorithm's direct sampling leads to increased efficiency compared to highly dependent Markov chains and greatly reduces concerns about mixing and the need to monitor convergence. We expect these advantages of the proposed SMC algorithm to substantially improve the reliability of outlier analysis in real-world redistricting cases.

Future research should explore the possibility of improving several design choices in the algorithm to further increase its efficiency. Wilson's algorithm, for instance, can be generalized to sample from edge-weighted graphs. Choosing weights appropriately could lead to trees which induce maps that are more balanced or more compact. And the procedure for choosing edges to cut, while allowing for the sampling probability to be calculated, introduces inefficiencies by leading to many rejected maps. Further improvements in either of these areas should allow us to better sample and investigate redistricting plans over large maps and with even more complex sets of constraints.

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A Proofs of Propositions

Lemma 1. *The probability of splitting a* valid *new district G_i from an existing area $\widetilde{G}_{i-1}$ using Algorithm 1 with parameter $k_i \geq K_i$ is*

$$q(G_i \mid \widetilde{G}_{i-1}, \mathrm{pop}(V_i) \in [P_i^-, P_i^+]) \;=\; \frac{\tau(G_i)\tau(\widetilde{G}_i)}{\tau(\widetilde{G}_{i-1})k_i}|\mathcal{C}(G_i, \widetilde{G}_i)|. \tag{4}$$

Proof. Any spanning tree can be decomposed into two other trees and an edge joining them. Let $T \cup e \cup T'$ denote the spanning tree obtained by joining two other spanning trees, T and T', with an edge e. Then Equation (3) can be written as

$$q(G_i \mid \widetilde{G}_{i-1}) = \sum_{\substack{T^{(1)} \in \mathcal{T}(G_i) \\ T^{(2)} \in \mathcal{T}(\widetilde{G}_i)}} \sum_{e \in \mathcal{C}(T^{(1)}, T^{(2)})} q(G_i \mid T^{(1)} \cup e \cup T^{(2)})\, \tau(\widetilde{G}_{i-1})^{-1}.$$

Now, $q(G_i \mid T^{(1)} \cup e \cup T^{(2)})$ is determined by whether whether $e^* = e$, i.e., if e is the edge selected to be cut. If e has d_e in the top k_i (if it induces one of the best k_i balanced splits), then it has a $1/k_i$ probability of being selected in step (c) and cut. If d_e is not in the top k_i, then this probability is zero.

Everything written to this point holds regardless of whether G_i is a valid district (i.e., satisfies $\mathrm{pop}(V_i) \in [P_i^-, P_i^+]$). From here onwards we will restrict our attention to valid districts only. Notice that the forward-looking bounds P_i^- and P_i^+ are stricter than merely ensuring $\mathrm{dev}(G_i) \leq D$. That is, conditional on $\mathrm{pop}(V_i) \in [P_i^-, P_i^+]$, we must also have $\mathrm{dev}(G_i) \leq D$.

Therefore, if a sorted edge e_j *in any spanning tree* induces such a balanced partition, we must have $j \leq K_i$, where as in the main text K_i counts the maximum number of such edges across all possible spanning trees. Thus, so long as we set $k_i \geq K_i$, we will have $d_e \leq D$.

Furthermore, across all spanning trees $T^{(1)} \in \mathcal{T}(G_i)$ and $T^{(2)} \in \mathcal{T}(\widetilde{G}_i)$, and connecting edges $e \in E(T^{(1)}, T^{(2)})$, the value of d_e is constant, since removing e induces the same districting. Combining these two facts, we have, conditional on satisfying the bounds P_i^- and P_i^+,

$$q(e^* = e \mid T^{(1)} \cup e \cup T^{(2)}, \mathrm{pop}(V_i) \in [P_i^-, P_i^+]) \;=\; k_i^{-1},$$

which does not depend on $T^{(1)}$, $T^{(2)}$, or e. We may therefore write the conditional sampling probability as

$$\begin{aligned} q(G_i \mid \widetilde{G}_{i-1}, \mathrm{pop}(V_i) \in [P_i^-, P_i^+]) \;&=\; \sum_{\substack{T^{(1)} \in \mathcal{T}(G_i) \\ T^{(2)} \in \mathcal{T}(\widetilde{G}_i)}} \sum_{e \in \mathcal{C}(T^{(1)}, T^{(2)})} \frac{1}{k_i \tau(\widetilde{G}_{i-1})} \\ &=\; \frac{\tau(G_i)\tau(\widetilde{G}_i)}{\tau(\widetilde{G}_{i-1})k_i}|\mathcal{C}(G_i, \widetilde{G}_i)|, \end{aligned} \tag{8}$$

where as in the main text we let $\mathcal{C}(G, H)$ represent the set of edges joining nodes in a graph G to nodes in a graph H. □

Proposition 1. *Let $\pi_S = \sum_{j=1}^{S} w^{(j)} \delta_{\xi^{(j)}}$ be the weighted particle approximation generated by Algorithm 2. Then for all measurable h and as $S \to \infty$,*

$$\sqrt{S}(\mathbb{E}_{\pi_S}[h(\xi)] - \mathbb{E}_{\pi}[h(\xi)]) \xrightarrow{d} \mathcal{N}(0, V_{SMC}(h)),$$

for some asymptotic variance $V_{SMC}(h)$.

The proof proceeds by showing that the weights in Algorithm 2 are of a form derived from an existing SMC algorithm with an established central limit theorem.

Proof. Recall that a redistricting plan ξ is just a tuple of graph partitions $(G_1, G_2, \ldots, G_n)$. Let us first extend our target measure $\pi(\xi)$ to a series of measures on partial plans,

$$\begin{aligned}\pi_i(G_1, G_2, \ldots, G_i) &:\propto \prod_{j=1}^{i} \frac{\tau(G_j)^\rho \tau(\widetilde{G}_j)}{\tau(\widetilde{G}_{j-1})} \mathbf{1}_{\mathrm{pop}(V_j)\in[P_j^-, P_j^+]} \\ &\propto \tau(\widetilde{G}_j) \prod_{j=1}^{i} \tau(G_j)^\rho \mathbf{1}_{\mathrm{pop}(V_j)\in[P_j^-, P_j^+]},\end{aligned}$$

for $1 \le i \le n-2$, and where we have simplified the telescoping product in the second equality. Recall that the $\widetilde{G}_i$ are determined completely by $G_1, G_2, \ldots, G_i$.

For $i = n-1$, the above definition would yield

$$\pi_i(G_1, G_2, \ldots, G_i) :\propto \tau(\widetilde{G}_{n-1}) \prod_{j=1}^{n-1} \tau(G_j)^\rho \mathbf{1}_{\mathrm{pop}(V_j)\in[P_j^-, P_j^+]}, = \tau(\xi)\tau(G_n)^{1-\rho} \mathbf{1}_{\mathrm{dev}(\xi)\le D},$$

which is close to but not quite the target measure. So we instead define $\pi_{n-1} := \pi$; i.e., we add the additional term $\exp(-J(\xi))$ and adjust for $\tau(G_n)^{1-\rho}$.

With these partial-plan measures defined, notice that the incremental weight $w_i^{(j)}$ for partial plans with $1 \le i \le n-2$ and $\mathrm{pop}(V_j) \in [P_j^-, P_j^+]$ may be written as

$$\begin{aligned} w_i^{(j)} &= \tau(G_i^{(j)})^{\rho-1} \frac{k_i}{|\mathcal{C}(G_i^{(j)}, \widetilde{G}_i^{(j)})|} \\ &= \frac{\tau(G_i^{(j)})^\rho \tau(\widetilde{G}_i^{(j)})}{\tau(\widetilde{G}_{i-1}^{(j)})} \left(\frac{\tau(G_i^{(j)})\tau(\widetilde{G}_i^{(j)})}{\tau(\widetilde{G}_{i-1}^{(j)})} \frac{|\mathcal{C}(G_i^{(j)}, \widetilde{G}_i^{(j)})|}{k_i} \right)^{-1} \\ &= \frac{\pi_i(G_1, \ldots, G_i)}{\pi_{i-1}(G_1, \ldots, G_{i-1}) q(G_i \mid \widetilde{G}_{i-1}, \mathrm{pop}(V_i) \in [P_i^-, P_i^+])}. \end{aligned} \tag{9}$$

For the final weighting at split $i = n-1$, the incremental weight (i.e., not including the residual previous weights $\left(\prod_{i=1}^{n-2} w_i^{(j)}\right)^{1-\alpha}$ given by step (c) of Algorithm 2 is

$$\begin{aligned} &\exp\Big(-J(\xi^{(j)})\Big) w_{n-1}^{(j)} \Big(\tau(G_{n-1}^{(j)})\Big)^{\rho-1} \\ &\qquad = \frac{\pi_{n-1}(G_1, \ldots, G_{n-1})}{\pi_{n-2}(G_1, \ldots, G_{n-2}) q(G_{n-1} \mid \widetilde{G}_{n-2}, \mathrm{pop}(V_{n-1}) \in [P_{n-1}^-, P_{n-1}^+])}, \end{aligned}$$

since this weight includes exactly the same additional terms as π_{n-1} mentioned above. So in fact Equation (9) holds for all $1 \le i \le n-1$.

These incremental weights are precisely those of the SMC partial rejection control algorithm of Peters et al. (2012) (see also LeGland and Oudjane (2005)), with the weights set to zero for invalid samples and the partial rejection threshold set to the minimum possible nonzero weight. So we gain immediately the theorem proved in that work (its Equation 6), viz., that for all measurable h and as $S \to \infty$, we have

$$\sqrt{S}(\mathbb{E}_{\pi_S}[h(\xi)] - \mathbb{E}_\pi[h(\xi)]) \xrightarrow{d} \mathcal{N}(0, V_{\mathrm{SMC}}(h)),$$

for asymptotic variance $V_{\mathrm{SMC}}(h)$ given by Equation 7 of the same work. □

Proposition 2. *The probability that an edge e is selected to be cut at iteration i, given that the tree T containing e has been drawn, and that e would induce a valid district, satisfies*

$$\max\left\{0, q(d_e \le d_{e_{k_i}} \mid \mathcal{F})\left(1 + \frac{1}{k_i}\right) - 1\right\} \le q(e = e^* \mid \mathcal{F}) \le \frac{1}{k_i},$$

where $\mathcal{F} = \sigma(\{T, \mathrm{pop}(V_i) \in [P_i^-, P_i^+]\})$.

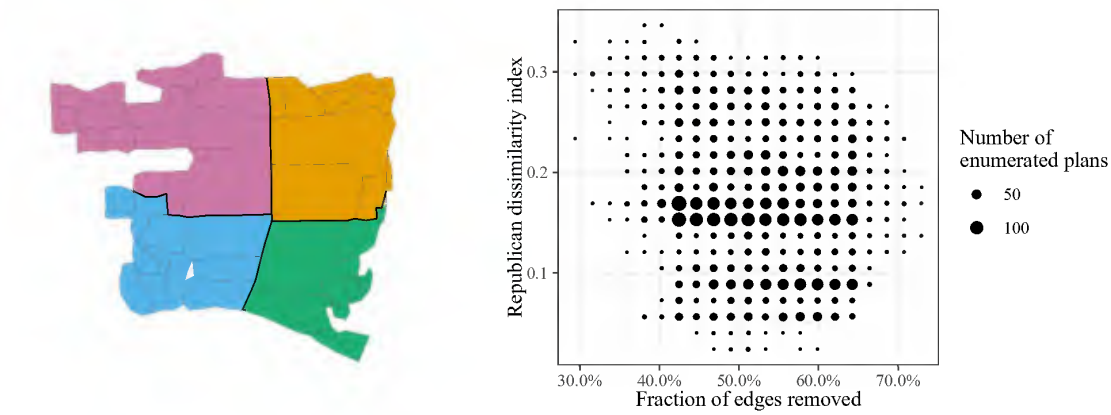


Figure 8: The 50-precinct Florida map used for validation, arbitrarily divided into four administrative units (left), and the joint distribution of Republican dissimilarity and compactness on the map over all partitions into three districts with $\mathrm{dev}(\xi) \leq 0.05$ (right).

Proof. We can write

$$q(e = e^* \mid \mathcal{F}) \;=\; q(e = e^*, d_e \leq d_{e_{k_i}} \mid \mathcal{F}) \;=\; \frac{1}{k_i} q(d_e \leq d_{e_{k_i}} \mid \mathcal{F}),$$

This holds because the edge e will not be cut unless $d_e \leq d_{e_{k_i}}$, i.e., if e is among the top k_i edges. We then have immediately that $q(e = e^* \mid \mathcal{F}) \leq k_i^{-1}$. Additionally, using the lower Fréchet inequality, we find the lower bound

$$\begin{aligned} q(e = e^* \mid \mathcal{F}) \;&=\; q(e = e^*, d_e \leq d_{e_{k_i}} \mid \mathcal{F}) \\ &\geq\; \max\left\{0, q(e = e^* \mid \mathcal{F}) + q(d_e \leq d_{e_{k_i}} \mid \mathcal{F}) - 1\right\} \\ &=\; \max\left\{0, \frac{1}{k_i} q(d_e \leq d_{e_{k_i}} \mid \mathcal{F}) + q(d_e \leq d_{e_{k_i}} \mid \mathcal{F}) - 1\right\} \\ &=\; \max\left\{0, q(d_e \leq d_{e_{k_i}} \mid \mathcal{F})\left(1 + \frac{1}{k_i}\right) - 1\right\}. \end{aligned}$$

□

B Additional Validation Example

This section reports the results of another validation study applied to the same 50-precinct Florida map used in Section 5. Here, however, we study partitions into four contiguous districts, rather than three, of which there are over 333 million. In this example, too, the proposed SMC algorithm can efficiently approximate several target distributions on this set of partitions under different sets of constraints.

The left plot of Figure 8 below shows the validation map, which we have divided into four arbitrary administrative units. The right plot of the figure shows that with this validation map, the dissimilarity index is particularly sensitive to the compactness of districts. This makes the Republican dissimilarity index a good test statistic for comparing distributions that differ primarily in their average compactness.

First, we target a distribution with moderate compactness and parity constraints by choosing $\rho = 0.5$ in Equation (1) and setting the population constraint to $\mathrm{dev}(\xi) \leq 0.025$. There are only 1386 partitions (or 0.00042% of all maps) that satisfy this population constraint in the reference enumeration. Since the target distribution is not uniform, we reweight the enumerated maps according to $\tau(\xi)^{0.5}$. We sampled 10,000 plans using the proposed algorithm and reweighted them according to the importance weights, using a normalized weight truncation of $w_{\max} = 0.1 \times \sqrt{10,000}$ (see the lower panel of Figure 9b for the distribution of weights after truncation). The upper panel of Figure 9b shows the resulting density estimates. While the target distribution is highly multimodal

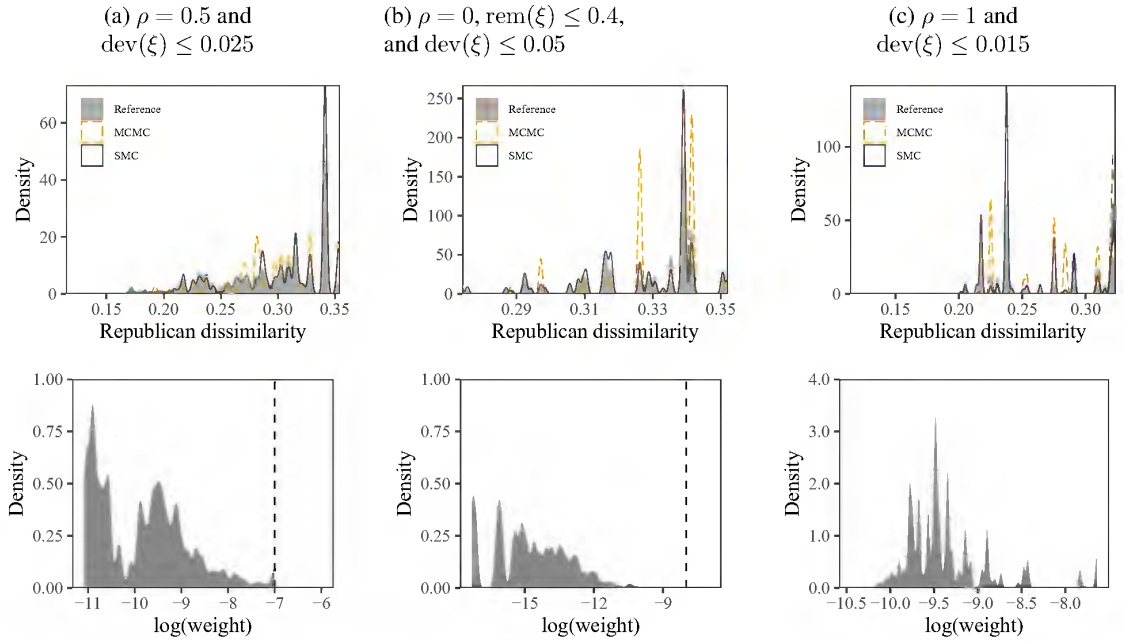


Figure 9: Calibration plots for Republican dissimilarity under various target measures, showing density estimates of the algorithm output and the reweighted enumeration. The distribution of importance weights for each sample is shown below each plot, with the truncation value (if applicable) marked with a vertical line.

under this summary statistic, there is good agreement between the SMC sample and reference distribution. The MCMC algorithm, too, performs relatively well, despite some spurious peaks in the 0.26–0.33 range, and a lack of samples for the mode at ≈0.23.

Second, we target a uniform distribution on the set of maps with $\mathrm{dev}(\xi) \leq 0.05$ and $\mathrm{rem}(\xi) \leq 0.4$. The median fraction of removed edges across all partitions under 5% population deviation was 63%. There are a total of only 108 maps (or 0.00003% of all maps) that satisfy these two constraints. As before, we sampled 10,000 plans and truncated weights to $w_{\max} = 0.04 \times \sqrt{10,000}$ (see the lower panel of Figure 9a for the distribution of truncated weights). We discarded any samples which did not meet the compactness constraint, leaving 6,873 samples. The upper panel of the figure shows the results. While the SMC algorithm again agrees well with the reference distribution, the MCMC algorithm undersamples the main mode, and significantly oversamples the peaks at ≈0.325 and ≈0.34.

Finally, we sample from a distribution with a strong population parity constraint and compactness constraint by choosing $\mathrm{dev}(\xi) \leq 0.015$ and setting $\rho = 1$. Only 277 maps (or 0.00008% of all maps) that satisfy this population constraint. We sample 10,000 plans but do not truncate the importance weights, since with $\rho = 1$ their variance is small, as shown in the lower panel of Figure 9c. As in the first validation exercise, the target measure is not uniform, and the upper panel of Figure 9c shows the density estimates for the generated sample and reference set. Once again the agreement between the two is excellent. The MCMC algorithm, in contrast, significantly oversamples several modes while missing the main mode at ≈0.24 completely.

C Stabilizing Importance Weights

When $\rho \neq 1$ or when the constraints imposed by J are severe, there can be substantial variance in the importance sampling weights. For large maps with $\rho = 0$, for instance, since $\log \tau(\xi) \underset{\sim}{\propto} \mathrm{rem}(\xi)$, the weights will generally span hundreds if not thousands of orders of magnitude. This reflects the general computational difficulty in sampling uniformly from constrained graph partitions. As Najt et al. (2019) show, sampling of node-balanced graph partitions is computationally intractable in the worst case. In such cases, the importance sampling estimates will be highly variable, and resampling based on these weights may lead to degenerate samples with only one

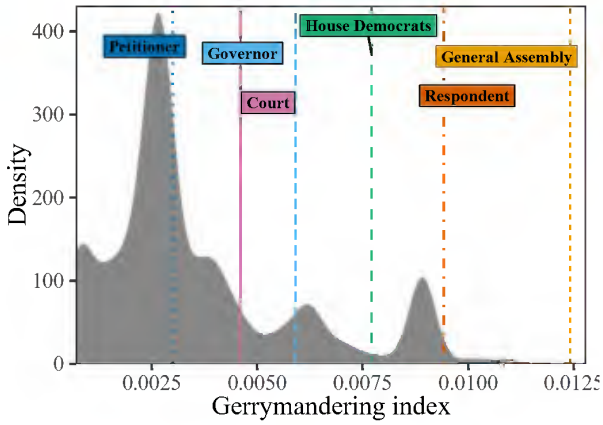


Figure 10: The gerrymandering index for the simulated and comparison redistricting plans.

unique map.

When the importance weights are variable but not quite so extreme, we find it useful to truncate the normalized final weights (such that their mean is 1) from above at a value $w_{\max}$ at the end of sampling. The theoretical basis for this maneuver is provided by Ionides (2008), who proved that as long as $w_{\max} \to \infty$ and $w_{\max}/S \to 0$ as $S \to \infty$, the resulting estimates are consistent and have bounded variance (since the truncation occurs only after the final SMC step, these conclusions, which were made in the context of importance sampling, carry over.) One such choice we have found to work well for the weights generated by this sampling process is $w_{\max} = S^{0.4}/100$, though for particular maps other choices of exponent and constant multiplier may be superior.

Truncation is no panacea, however. As with any method that relies on importance sampling, it is critical to examine the distribution of importance weights to ensure that they will yield acceptable resamples.

D Additional Partisan Analysis of the Pennsylvania Redistricting

From the district-vote share relationship shown in Figure 7, we can compute the so-called "gerrymandering index" proposed by Bangia et al. (2017) by summing the squared deviations from the mean vote share in each district. Figure 10 shows the distribution of this index based on the reference maps and indicates the values of the six maps. By this metric, the General Assembly plan is a clear outlier, as are the respondent's plan and the House Democrats' plan. The petitioner's plan has the smallest gerrymandering index among the six studied plans, while the plans adopted by the Governor and the court are within the normal range, according to the reference maps.

While the gerrymandering index is a useful summary of the district-vote share relationship, it weights all deviations equally and does not consider their direction. To address this, we group the districts and sum the deviations from median vote share for each district within the group. Positive deviations within a group indicate that voters in these districts tilt more Democratic than would otherwise be expected, while negative deviations indicate the same for Republicans.

Figure 11 shows the results. The General Assembly plan has outlier deviations for all four groups, clearly packing Democratic voters into safe Republican (1–5) and safe Democratic (15–18) districts, while cracking them and diluting their vote shares in the competitive districts (6–10 and 11-14). The respondent's remedial plan, while not as extreme, maintains the packing in Districts 15–18 and cracking in 6–14. In contrast, the House Democrats' plan tries the opposite tack, cracking Republican voters Districts 11–14 and packing them into the heavily Republican Districts 1–5. Intriguingly, the court's adopted plan has a similar pattern to the House Democrats' plan, while the petitioner's plan appears to be the most balanced. This may explain the general surprise expressed in the media that Democrats unexpectedly benefited from the court's new plan.[6]

[6]See, e.g., Cohn, N. (February 21, 2018). Democrats didn't even dream of this Pennsylvania map. How did it happen? *The New York Times.*

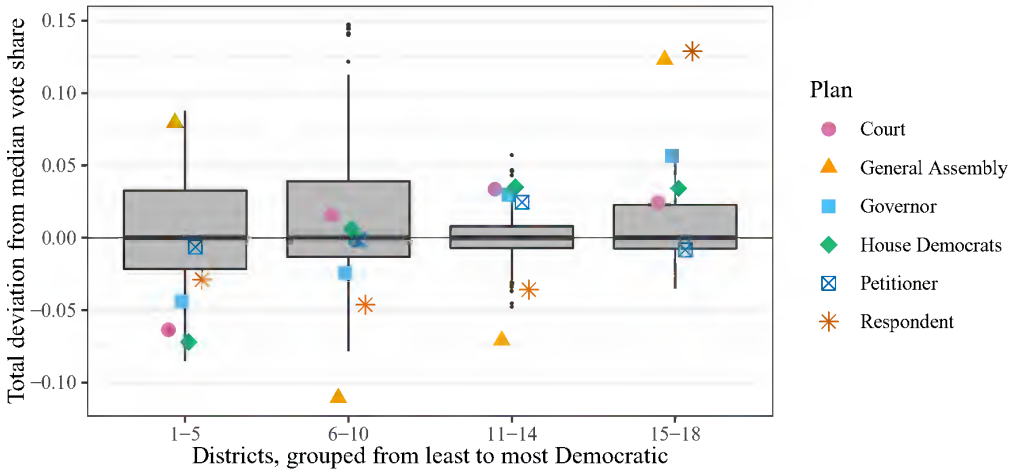
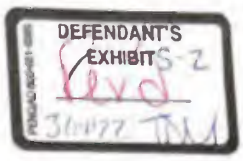


Figure 11: The eighteen districts are put into four groups depending on their Democratic vote share, and the total deviation from the median vote share of each group is plotted for each plan and the reference ensemble. The points are horizontally jittered to improve the visualization without altering their values. Gerrymandering is visible as a pattern of cracking voters in the middle two groups and packing them into the outer groups, diluting their voting power in competitive districts.

SENATE EXHIBIT S2:
MEMO TO VA SUPREME COURT CO-WRITTEN BY TRENDE [3208 - 3262]



memo

To: The Chief Justice and Justices of the Supreme Court of Virginia

From: Bernard Grofman, Ph.D. and Sean Trende

CC:

Date: 12/7/2021*

Re: Redistricting maps

INTRODUCTION

We are pleased to present this Court with three draft maps for its review. As described in this Court's Redistricting Appointment Order ("Redistricting Order"), we have proposed "a single redistricting map for the Virginia House of Delegates, a single redistricting map for the Senate of Virginia, and a single redistricting map for Virginia's representatives to the United States House of Representatives." Redistricting Order at 1-2.

We are also pleased to report that we have "work[ed] together to develop any plan to be submitted to the Court for its consideration," Code § 30-399(F). These maps reflect a true joint effort on our part. We agreed on almost all issues initially, and the few issues on which we initially disagreed were resolved by amicable discussion.

When drawing these maps, we have worked diligently to craft maps that comply with the statutory and constitutional provisions enumerated by this Court. *See* Redistricting Order at 2-3. The purpose of this memo is to relate our approach to the various constitutional provisions to this Court, and then to explain the reasoning for choices that we made in the specific districts. We

**With typos and clerical errors corrected thereafter as discovered.*

further anticipate that when we release the plans for public comment, the Court may wish to include this memo with that release.

We first emphasize, however, that our prime directive for drawing these maps comes not from the constitutional or statutory provisions described by this Court, but rather from the Court's order itself. In particular, we took seriously the Court's command that, although we were nominated by the political parties, we would behave in "an apolitical and nonpartisan manner." *Id* at 3. Our duty is owed not to the parties that nominated us, but rather to the Court that appointed us and to the residents of the Commonwealth that it serves.

SPECIFIC CONSTITUTIONAL AND STATUTORY PROVISIONS

This Court commanded us to comply fully with:

- Article I § 2 of the United States Constitution and the 14th Amendment to that constitution;
- The Voting Rights Act of 1965 ("VRA"), as amended;
- Article II §§ 6 to 6-A of the Constitution of Virginia;
- Code §§ 30-399(E) and 24.2-304.04;
- Other applicable federal and state constitutional and statutory provisions.

Although we were instructed to first follow the 14th Amendment, followed by the VRA, we begin instead with the requirements of Code § 24.2-304.04 (hereinafter "Statutory Criteria"), which provides the standards and criteria for congressional and legislative districts. We do so because the equal protection provisions of the 14th Amendment and the VRA are inextricably linked with the requirements of the Statutory Criteria, while the 14th Amendment's equal population requirements are listed first in the Code. We also note at the outset that the Statutory Criteria comprise a wide range of considerations, which can only be implemented when taken in

conjunction with one another. In our work, however, we followed the Court's command and prioritized federal constitutional and statutory requirements, as well as those in the Virginia Constitution.

To summarize our approach: we carefully drew districts that met constitutional and statutory population requirements. In doing so, we minimized county and city splits, while respecting natural boundaries and communities of interest ("COIs") to the extent possible. We attempted to draw compact districts, although equal population requirements and Virginia's geography often conspired to limit our ability to do so. While we were mindful of federal and state requirements to draw districts that would elect the minority candidate of choice, we did so within the confines of the criteria above. In other words, we drew districts that would elect the candidate of choice of a minority group only if the district could be drawn in a compact fashion that did not needlessly split counties. Despite these strictures, we believe we have drawn more districts where minority groups will be empowered to elect their candidate of choice than exist under the current maps.

Equal Representation: Clause 1 of the Statutory Criteria commands that "[d]istricts shall be so constituted as to give, as nearly as is practicable, representation in proportion to the population of the district. A deviation of no more than five percent shall be permitted for state legislative districts." This mirrors the constitutional command that congressional districts must be drawn with populations "as nearly as practicable" to equality. *Karcher v. Daggett*, 462 U.S. 725 (1983), see also *Gray v. Sanders*, 372 U.S. 368, 381 (1963); *Wesberry v. Sanders*, 376 U.S. 1 (1963). We worked diligently to ensure that the congressional districts were reasonably close to equipopulous.

The maximum five percent deviation the Statutory Criteria describe for state legislative districts fits well within the 10% deviation guideline that the Court has allowed for state

legislative districts, *Brown v. Thompson*, 462 U.S. 835 (1983), and therefore does not raise immediate constitutional concerns. The ideal population of a state senate district is 215,785. Therefore, populations for state senate districts were kept in a range between 210,390 and 221,179. The ideal population of a House of Delegates district is 86,314. Therefore, populations for House of Delegates districts were kept in a range between 84,157 and 88,471. We were, however, mindful that deviations from absolute equality must still be justified by a legitimate governmental objective. *Cox v. Larios*, 542 U.S. 947 (2004).

Equal Protection and Ability-to-Elect Districts: The next Statutory Criteria requires that "[d]istricts shall be drawn in accordance with the requirements of the Constitution of the United States, including the Equal Protection Clause of the Fourteenth Amendment, and the Constitution of Virginia; federal and state laws, including the federal Voting Rights Act of 1965, as amended; and relevant judicial decisions relating to racial and ethnic fairness." This is covered in the succeeding paragraph.

> No district shall be drawn that results in a denial or abridgement of the right of any citizen to vote on account of race or color or membership in a language minority group. No district shall be drawn that results in a denial or abridgement of the rights of any racial or language minority group to participate in the political process and to elect representatives of their choice. A violation of this subdivision is established if, on the basis of the totality of the circumstances, it is shown that districts were drawn in such a way that members of a racial or language minority group are dispersed into districts in which they constitute an ineffective minority of voters or are concentrated into districts where they constitute an excessive majority. The extent to which members of a racial or language minority group have been elected to office in the state or the political subdivision is one circumstance that may be considered. Nothing in this subdivision shall establish a right to have members of a racial or language minority group elected in numbers equal to their proportion in the population.

The subsequent Statutory Criteria is related; it demands that "[d]istricts shall be drawn to give racial and language minorities an equal opportunity to participate in the political process

and shall not dilute or diminish their ability to elect candidates of choice either alone or in coalition with others."

We therefore endeavored, where practicable to do so consistently with the 14th Amendment, to draw districts that would elect a minority group's candidate of choice, without placing an excessive number of minority group members within the district. We note that the statutory language here suggests more than simply drawing districts in areas where the drawing of a minority opportunity district would be required by the VRA Section 2 feasible litigation threshold of a minimum 50% minority Citizens Voting Age Population ("CVAP") as set down in *Bartlett v. Strickland*.

We are mindful, however, that the Supreme Court of the United States has repeatedly held that the use of race in drawing legislative districts can trigger strict scrutiny. *Shaw v. Reno*, 509 U.S. 630 (1993). Strict scrutiny is triggered when race is the "predominant factor" in drawing district lines. The U.S. Supreme Court has assumed, without deciding, that compliance with the VRA reflects a compelling governmental interest; thus when the VRA preconditions established in *Thornburg v Gingles*, 478 U.S. 30 (1986), are met and the totality of the circumstances would demand race-conscious drawing, the 14th Amendment would allow it. The Supreme Court has not, to our knowledge, held that compliance with state statutory or constitutional requirements can satisfy strict scrutiny.

To avoid this question, we simply drew districts without race as the predominant interest. Instead, we began by drawing districts that comply with traditional good government districting criteria (contiguity, minimizing splits in counties and cities, and where feasible in census designated places, compactness, etc.) and considered race only after we had drawn a map fully subject to the constraints of those traditional factors. Indeed, we sought to limit splits of counties and cities to as close as feasible to the mathematical minimum possible. As shown below, we

believe we have provided maps that do at least as well or better as the current map in terms of creating districts where the minority community has a *realistic* opportunity to elect a candidate of choice, while at the same time creating plans that are far superior in terms of limiting county and city splits and in terms of vastly improved compactness. We add that there is also no issue of using politics as a proxy for race, since we only considered political data after the maps were drawn, to see if the districts drawn were indeed ability-to-elect districts.

Communities of Interest ("COIs"): The Statutory Criteria next provide that "[d]istricts shall be drawn to preserve communities of interest. For purposes of this subdivision, a 'community of interest' means a neighborhood or any geographically defined group of people living in an area who share similar social, cultural, and economic interests. A 'community of interest' does not include a community based upon political affiliation or relationship with a political party, elected official, or candidate for office."

This is obviously a broad definition of communities of interest. We sought to add some additional specificity to this to this based on the history, demography, and topography of the Commonwealth of Virginia. First and foremost, we carefully reviewed the communities of interest submitted by Virginia's residents to the Virginia Redistricting Commission. While it was not possible to respect every user-submitted community, we did attempt to incorporate them where possible. Second, we reviewed Virginia data from Representable, a non-profit organization that allows individuals to draw their communities of interest and then stores those communities of interest in digital form.

Third, we were mindful of the Supreme Court of the United States' attempts at defining communities of interest. While there has never been a formal definition given, that Court has listed "shared broadcast and print media, public transport infrastructure, and institutions such as schools and churches" as part of its definition of a community of interest. *Bush v. Vera*, 517 U.S.

952 (1996). We have attempted to incorporate those considerations into our districts as much as possible.

In particular, we were mindful of the Blue Ridge Mountains as an important geographic divider in Virginia's history. We also considered the course of the Shenandoah Valley (served largely by I-81), the federal definition of Appalachia, the historic importance of Southside Virginia and the Piedmont region in general and the Fall Line as important geographic markers. We also were mindful of the Commonwealth's major metropolitan areas and the travel arteries that feed them: Northern Virginia, greater Richmond, and the Hampton Roads area, as defined both by the United States Census Bureau and major media markets. This is not an exclusive list, but simply serves to illustrate to the Court how we interpreted the term "communities of interest" in Virginia.

Finally, we acknowledge there are likely other communities of interest of which we are not aware. We look forward to receiving the commentary of this Court and of the public to help improve the map in this regard.

Contiguity: Clause 6 of the Statutory Criteria provides that "Districts shall be composed of contiguous territory, with no district contiguous only by connections by water running downstream or upriver, and political boundaries may be considered." We identified two potential definitions of contiguity: "census" and "functional" contiguity. Census contiguity includes the broader definition of contiguity, which simply requires that census blocks or Voting Tabulation Districts ("VTDs") be connected to each other by shared borders without regard to the underlying geographic features.

Functional contiguity is more demanding. It effectively requires that a representative be able to travel between any two points within a district without leaving the district.

The Statutory Criteria fall somewhere between this, requiring, under our reading, that we avoid using a river as a connector without also including populations on the banks. We have nevertheless opted to draw districts that are functionally contiguous to the extent possible. We observe, however, that the goals of maintaining functional contiguity, maximizing compactness, minimizing county splits, and adhering to one-person-one-vote standards are often at odds with each other.

Finally, we sought to avoid "fracking," which occurs when a single district traverses a county line more than once (i.e., when two tendrils extend into the county from a neighboring county).

Prisoners: The Statutory Criteria state that prisoners should be counted as residents of the locality where they resided before their incarceration. We understand this to be implemented in Legislative Services' data.

Partisanship: The Statutory Criteria also require that "[a] map of districts shall not, when considered on a statewide basis, unduly favor or disfavor any political party." First, by adhering to the statutory criteria described above, we minimize the risk of any undue favoritism toward either party. It would be difficult to draw gerrymanders under these constraints had we wanted to.

Second, *once the maps were drawn*, we examined the political data in their totality, with particular attention to the median district. Our rough goal was to see if the median district in a Congressional map approximated Joe Biden's and Donald Trump's statewide vote shares for 2020, and if it approximated the Democrats' statewide results for 2017 for state legislative

districts.[1] This is called the "mean-median" standard in discussions of gerrymandering.[2] It was our agreed-upon understanding, however, that since the standard asked that maps not "unduly" favor one party or the other, we would leave the maps in place unless the results were both (a) truly egregious and (b) able to be remedied while adhering to the other criteria above.

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[1] We would have preferred to have available the 2021 data. In most counties and independent cities, the data on mail-in and absentee votes in the 2021 election are centrally collected in each county and has not yet been projected back into that county's voting precincts. Indeed, given that ballots were frequently not marked with the precinct in which the voter who cast them resided, that task may never be accomplished with precision. Because of this, we were unable to use the 2021 election results to assess partisanship in the districts we drew. However, because the pro-Republican vote swing in 2021 affected (increased) both the statewide mean and the statewide median Republican vote, we expect that our analyses of the mean minus median gap would not be substantially different from those we calculated using earlier statewide odd-number year elections.

[2] We chose to focus on this metric because it is easily understood and does not require computer-based simulations of counterfactuals. We have also examined the most widely accepted (but more complex) measures of partisan bias, the Tufte-King approach to measuring partisan symmetry (*see e.g.*, Grofman, Bernard and Gary King. 2007. Partisan Symmetry and the Test for Gerrymandering Claims after *LULAC v. Perry*. *Election Law Journal,* 6 (1):2-35) and reached the same conclusion about the political neutrality of the three maps we drew. Although the partisan symmetry approach is the only one to have been given an axiomatic mathematical justification, no single measure is perfect. Accordingly, we examined a variety of other metrics as well, but all we have examined lead to similar conclusions that the maps we draw were neutrally drawn. We would also note that we are evaluating the degree of neutrality from a political science standpoint, with respect to what might be expected, in principle, were a computer programmed to draw a huge set of possible maps for Virginia without any political information in its data set and relying entirely on standard good government redistricting criteria for map-making. Such simulation results are based upon the actual electoral geography of the state and will be affected by the degree to which the two party's electoral strength is differentially concentrated with respect to geography. (*See e.g.*, Nicholas Eubank & Jonathan Rodden (2020) Who Is My Neighbor? The Spatial Efficiency of Partisanship, *Statistics and Public Policy*, 7:1, 87-100, DOI:10.1080/2330443X.2020.1806762). Thus, we would not expect a mean level of zero partisan bias even in a set of neutrally drawn computer drawn maps. But, of course, the legal judgement as to whether any map satisfies the state's constitutional requirement (§ 24.2-304.04) that "[a] map of districts shall not, when considered on a statewide basis, unduly favor or disfavor any political party" is one that must be made by this Court.

Nesting: Although not explicitly a Statutory Criteria, we agreed to "nest" our districts. That is to say, to the extent practicable, we carved our Senate districts out of U.S. House districts (with a little less than four complete Senate districts in a House district), and then drew the House of Delegates districts out of Senate districts (with roughly five House districts created out of two Senate districts). There are a variety of reasons for this, the most important of which is that having overlapping jurisdictions helps to ensure that the communities of interest that underlay the House of Delegates districts have multiple layers of representation. In other words, a community of interest that lies at the heart of one district is unlikely to be an "add-on" attached to a different Senate district for equal population purposes.

Once again, it was impossible to adhere to this standard religiously in light of competing criteria, but it did guide us when drawing districts. In particular, we tried to adhere to drawing roughly 25 contiguous State House of Delegates districts within an area encompassed by 10 contiguous Senate districts, and to the extent made feasible by geographic constraints we chose the Senate districts to represent areas of the state with similar communities of interest. For example, we sought to draw both Senate and House districts within the Shenandoah Valley, the D.C. Metro area, the Richmond area and the Hampton Roads area.

Incumbency: The Statutory Criteria make no mention of protecting incumbents. *We therefore maintained ignorance about the residences of incumbents*. Even as we submit these plans to the Court, we do not know which incumbents have been placed in districts with other incumbents, with one exception described below. We plan on maintaining that ignorance until the maps are finally approved, unless otherwise instructed by the Court.

Numbering: When the districts are approved by this Court, our preference would be to renumber the districts in a sensible manner. For now, we have opted to retain the traditional regional numbering of the districts for Congressional Districts to facilitate public comment.

Specific descriptions of the districts and highlights of key features of those districts follows.

UNITED STATES CONGRESS

District Descriptions

Districts 8 and 11 (Fairfax and Arlington counties, Alexandria, Fairfax and Falls Church cities:

We began our congressional map drawing with the realization that the counties of Fairfax and Arlington, when paired with the cities of Fairfax, Falls Church, and Alexandria, had a population sufficient to hold two congressional districts entirely, with only 18,000 residents left over.

Taken together, these counties are roughly 50% non-Hispanic White, so we checked to see if a reasonably compact district where a minority group would have the ability to elect a candidate of choice was possible to draw here. We quickly discovered that the minority groups are quite dispersed throughout these counties, and that while it is possible to draw a minority-majority district, it is difficult to push any minority group above even a third of the population. In the absence of evidence that minority groups in Fairfax County routinely form political coalitions and share interests, we concluded that we could not usefully consider race as a factor here.

We examined possible districts that split Fairfax County roughly upon a North/South line but concluded that this configuration split too many communities of interest. We then examined districts that kept one district entirely within the Capital Beltway (District 8). This district was necessarily underpopulated by about 158,000 residents. We examined adding communities of interest toward the west, effectively creating an "Orange Line" district that extended westward from Arlington along I-66. While there was much to commend the "Orange Line" district, the remaining Fairfax district (the 11th) was rendered excessively non-compact. We therefore opted to send the 8th district southward along I-395 and U.S. 1. This version of the 8th had too many people, so we moved Springfield and Franconia into the Fairfax district, with a few precincts

around Lorton moved into the Prince William County district (the newly created 7th district). Finally, a few VTDs were split to smooth the lines, and to assure roughly equal population.

Districts 6 and 9 (Appalachia, Shenandoah Valley)

We next proceeded to draw the 6th and 9th districts. We agreed almost immediately that the Blue Ridge Mountains served as a natural dividing line for communities of interest, especially given the paucity of easy crossings of those mountains. A problem immediately became apparent, however: the population of those counties is approximately 150,000 residents short of supporting two full districts.

We considered having a district that crossed the Blue Ridge in Prince William County (along I-66) as well as one that crossed near Charlottesville (along I-64). We observed, however, that the entire Valley of Virginia from Winchester to Roanoke fit almost perfectly within a district bordered by the Blue Ridge, and that the counties west of the Blue Ridge that remained constituted almost all of the counties in Virginia classified as part of Appalachia by the U.S. Government. (About the Appalachian Region - Appalachian Regional Commission (arc.gov)). We also examined historical maps of Virginia and noted that before the Civil War, the Blue Ridge was typically utilized to divide Virginia's districts, although districts sometimes crossed it to the south. *See generally* Kenneth C. Martis, *The Historical Atlas of United States Congressional Districts:1789-1983* (1982). After the Civil War, the Commonwealth was less solicitous of the Blue Ridge, but this likely reflected an effort to dilute Republican voting strength in the Shenandoah and in southwest Virginia.

We therefore opted to place the counties north of Roanoke and west of the Blue Ridge in a single district representing the Valley of Virginia. Salem is moved back into the same district as Roanoke, and most of the smaller towns surrounding Roanoke were placed in that district as

well. The 9th district retains most of the panhandle and is composed of almost all of the counties in Virginia classified as Appalachian. A few counties east of the Blue Ridge are added for purposes of population equality.

Districts 2 and 3 (Hampton Roads and Virginia Beach)

The Hampton Roads area presently contains one district that consistently elects the candidate of choice of the African-American population. Ultimately, we opted to draw a compact district comprised of the four major cities in the Hampton Roads area: Norfolk, Newport News, Hampton and Portsmouth. We then split the City of Chesapeake roughly at the Hampton Roads Beltway in order to maintain the district's compactness while achieving population equality.

Having drawn a compact district that respected county and city lines to the extent possible, we then examined racial and political data. The district is approximately 44.5% African-American, which is only marginally lower than the current 3rd district's 47.2%. It routinely gives Democratic presidential candidates around two-thirds of the vote. Even under implausible assumptions (such as African-Americans in the region splitting 70-30 between the Democratic and Republican party) African-American voters should still comprise a comfortable majority of voters in the Democratic primary.

This left few options for the 2nd District, which was redrawn to include the Eastern Shore, all of Virginia Beach, and the remainder of Chesapeake City. Suffolk City and Isle of Wight County were added as the next counties out, as were Franklin City and a small portion of Southampton County for population equality reasons. The district loses functional contiguity in the cities of Suffolk and Chesapeake, but the Great Dismal Swamp makes issues of functional contiguity inevitable in that portion of the state.

Districts 4 and 5 (Richmond and Southside)

We next drew metro Richmond. We initially looked at a compact district that included only Richmond City and Henrico/Chesterfield counties, but this district would cause dilution problems under the Statutory Criteria. African-Americans would total a little more than a third of the population, and their candidate of choice might not emerge from the Democratic primary. We ultimately opted for a district that is reasonably compact and that still respects county borders. It picks up the remainder of Southampton County left over from district 2, and then splits only the large suburban counties of Henrico and Chesterfield along east-west lines, roughly at the Fall Line. Some additional smaller counties in the South are added for geographic and population equality purposes. The newly constructed 4th has a 45.3% Black CVAP, which is higher than the 40% Black CVAP in the 4th as presently constituted and would likely continue to elect the African-American population's candidate of choice.

The 5th district continues Virginia's lengthy tradition of placing a district in Southside Virginia. Historically anchored in Danville, today the equal population requirement demands that the district stretch up to Charlottesville and into the Richmond suburbs in Chesterfield County.

Districts 1, 7, and 10 (North Tidewater and outer Northern Virginia)

Both the Selection Committee and the Redistricting Commission opted to use the eight regions identified by the University of Virginia's Weldon Cooper Center. Under this map, Northern Virginia consists of Arlington, Fairfax, Loudoun, Prince William, Clarke, Warren, Rappahannock, Culpeper, Spotsylvania, Stafford and King George counties, as well as the independent cities of Fairfax, Alexandria, Falls Church, Manassas, Manassas Park, and

Fredericksburg. These counties' populations combine for almost exactly four congressional districts. Yet the current map spreads their populations over seven districts, with six of them taking in substantial portions of the region's population.

We sought to remedy this. As noted above the 8th and 11th congressional districts are now placed entirely within Fairfax County and those localities closer to Washington, D.C. We sought to place two additional districts almost entirely within the remainder of Northern Virginia. Our exploration of the area mostly consisted of variants on two basic approaches. The first approach involved a district that traveled across Prince William County into southern Loudoun County, while a second district took in the extended outer areas of Northern Virginia. We referred to this as the "ringed approach." The second approach contained a district wholly anchored in Loudoun County, and one in Prince William County. In this approach, the Prince William District extended southward along I-95 to Fredericksburg, while the Loudoun District turned south down US-29 toward Charlottesville.

We ultimately opted for the second approach, which we thought better reflected travel patterns and communities of interest in the area. But switching over to the ringed approach, if the Court preferred it, would be a trivial task. The remainder of the state fell nicely into a single district that is anchored in the northern Tidewater area, but which then takes in the northern Richmond suburbs and a few lightly populated counties in the northern Piedmont area.

Assessment of Congressional Districts Under Statutory Criteria

Equal Representation: The ideal population size for a Congressional district in Virginia is 784,672. The largest positive deviation from the ideal population comes in district 10, which is overpopulated by 1,797 residents. The largest negative deviation from the ideal population comes in district 1, which is underpopulated by 1,259 residents. All absolute percentage deviations are under 0.25%.

Evaluation of Equal Population Criteria, Draft Virginia Congressional Districts

District	Population	Deviation	Pct. Deviation
1	783,413	−1,259	−0.16%
2	784,453	−219	−0.03%
3	784,353	−319	−0.04%
4	784,366	−306	−0.04%
5	785,740	1,068	0.14%
6	783,436	−1,236	−0.16%
7	783,613	−1,059	−0.13%
8	784,141	−531	−0.07%
9	786,021	1,349	0.17%
10	786,469	1,797	0.23%
11	785,388	716	0.09%

Equal Protection and Ability-to-Elect Districts: The following table provides racial breakdowns for the draft Congressional Districts. Districts three and four are minority-majority districts, and Black voters represent 44.5% and 45.26% of the populations, respectively. We believe this is sufficient to elect a Black candidate of choice in both districts. These minority proportions are very similar to those drawn by the federal court in *Personhuballah v. Alcorn*, No. 3:13cv678 (E.D. Va.).

Evaluation of Racial Criteria, Draft Virginia Congressional Districts							
District	Non-Hispanic White	Total Minority	Hispanic	Black	Asian	Native	API
1	77.57%	22.43%	2.96%	15.35%	3.13%	0.83%	0.83%
2	65.04%	34.96%	5.09%	23.68%	4.94%	0.86%	0.86%
3	45.99%	54.01%	5.20%	44.50%	2.88%	1.05%	1.05%
4	48.04%	51.96%	3.53%	45.26%	2.06%	0.97%	0.97%
5	73.14%	26.86%	2.12%	22.02%	1.98%	0.71%	0.71%
6	86.52%	13.48%	3.08%	8.33%	1.32%	0.58%	0.58%
7	56.74%	43.26%	12.77%	21.74%	7.36%	0.73%	0.73%
8	62.87%	37.13%	11.17%	13.52%	11.35%	0.59%	0.59%
9	90.51%	9.49%	1.44%	6.32%	1.05%	0.56%	0.56%
10	72.89%	27.11%	6.37%	10.64%	9.09%	0.64%	0.64%
11	62.89%	37.11%	8.55%	8.46%	19.15%	0.59%	0.59%

Contiguity: The districts are all contiguous under the census standard for contiguity (described above). As noted above, there is one minor deviation from functional contiguity in the 2nd district, which is demanded by Virginia landforms.

Compactness: Below are the Reock and Polsby-Popper scores for the districts. These are two commonly used measures of spatial compactness. To simplify greatly, Reock scores measure how "stretched" a district is, while Polsby-Popper scores measure how "dimpled" the district is. Under both metrics, higher scores are better.

Districts 2, 6, and 9 score relatively poorly using Reock scores. This is to be expected, given the geographic constraints placed upon them. All of the districts perform well under the Polsby-Popper metric.

Evaluation of Compactness Criteria, Draft Virginia Congressional Districts	
Reock	Polsby-Popper
0.3198	0.3138
0.2320	0.2111
0.4345	0.3377
0.4979	0.3036
0.4754	0.3378
0.2213	0.2220
0.3997	0.2593
0.5273	0.4020
0.1647	0.2020
0.3769	0.2535
0.5711	0.3957

However, since we are drawing a whole map for the state, the most important compactness comparison is for the state as whole. Dave's Redistricting App provides a composite compactness score for a whole map. The Special Masters' ("SMs") congressional map is more compact than the current congressional map, a value of 51 for the SMs map as compared to a value of only 25 for the current map. In other words, we have effectively doubled the degree to which the congressional map is a compact one.

Partisanship: A summary of the average Democratic performance in Virginia statewide races from 2016 to 2020 is provided below. The results are sorted by Democratic vote share. Over this time, the average Democratic performance was 54.01% to the Republicans' 44%. The median district, district 10, went for Democrats by, on average, a seven-point margin, making it a little more than a point more Republican than the Commonwealth overall. In a very good

Republican year, Republicans could win a majority of the seats in Virginia's delegation. Generally, however, we would expect to see a 6-5 Democratic edge in Virginia's delegation. In very good Democratic years, Democrats might perhaps achieve the same 7-4 advantage that they now enjoy from having won two highly competitive seats in 2020. Overall, this map is well-balanced, does not unduly favor any party, and does not require further adjustment.

2016-2020 Composite Election Results, Draft Virginia Congressional Districts
Average Dem Performance = 54.01%

District	Democratic	Republican
8	75.8%	21.8%
3	68.3%	29.8%
11	67.3%	30.5%
4	66.7%	31.6%
7	58.5%	39.5%
10	52.6%	45.3%
2	49.6%	48.3%
5	44.6%	53.6%
1	43.8%	54.2%
6	38.5%	59.5%
9	30.8%	67.6%

SENATE OF VIRGINIA

As explained in greater detail above, our approach was to base state senate districts on congressional districts. Forty does not divide evenly by 11, so we were unable to achieve this goal exactly; it was simply a guiding principle. Because these districts closely adhere to the Congressional District boundaries, these descriptions are briefer.

District Descriptions

Districts 1-7 (Appalachia, Shenandoah Valley)

Each of these districts is anchored in a small city or cities in the region. District 1 is anchored in Winchester. District 2 is anchored in Harrisonburg. District 3 is anchored in Staunton and Waynesboro. District 4 is anchored in Roanoke. District 5 is anchored in Radford and Blacksburg. District 6 is anchored in Bristol and Norton. District 7 is anchored in Galax and Martinsville.

Special care was taken to place Staunton and Waynesboro in the same district, as they form a community of interest. We attempted to place Roanoke, Salem and Blacksburg in the same district, to reflect what some have reported as a community of interest. We were unable to do so given equal population constraints.

Districts 8-17 (Southside and Richmond)

Districts 8, 9, 11, and 17 are all anchored by Southside and south-central cities: Lynchburg in the 8th, Danville and the US-58/US-360 corridors in the 9th, Charlottesville and the US-29 corridor for the 11th and Franklin/Emporia for the 17th.

Districts 10 and 12-16 are all anchored in the Richmond area. We worked to have one district based in the Henrico County suburbs, one in the Chesterfield County suburbs, and one in the exurbs of Goochland and Powhatan counties. Unfortunately, competing considerations forced a split of Hanover County.

Districts 13, 14 and 15 are minority opportunity districts. We forced ourselves to draw these districts within the constraints placed on other districts: Compactness, minimization of county splits and attention to communities of interest. In particular, we anchored these districts in distinct areas that contain minority populations with different needs: The 13th is based in Petersburg and Hopewell, the 14th is based in eastern Chesterfield County, and the 15th is based in Richmond and Henrico counties.

Districts 18-24 (Hampton Roads)

These were among the most difficult districts to draw in the commonwealth, as they require a careful balancing of competing considerations based upon geography, community, and race. District 20 contains the Eastern Shore, crosses over into Virginia Beach, and then takes in a small sliver of northern Norfolk. District 19 contains southern Virginia Beach and the main city of Chesapeake. District 22 includes western Virginia Beach, while 18 and 21 take in the majority of Portsmouth and Norfolk, respectively. We are able to avoid crossing the Monitor-Merrimack Bridge or the Hampton Roads Bridge-Tunnel. We were thus able to keep the Virginia Peninsula intact. District 23 includes the City of Hampton and southern Newport News, while district 24 includes the remainder of the Peninsula up to Williamsburg.

Districts 25 and 26 (Tidewater)

Commentators emphasized the importance of the Northern Neck and Middle Peninsula as communities of interest. These were combined into a single Senate district, along with James City County. West Point was added to the 26th to enable functional contiguity. The 25th includes most of the remaining Tidewater area.

Districts 27-32 (Outer Northern Virginia)

These districts follow naturally from the decisions made on how to draw Congressional Districts 7 and 10. We simply started in northern Prince George County, and drew counter-

clockwise, with some smoothing for population equality and respecting locality boundaries. District 31 could be made more compact by having District 32 adhere more religiously to the Loudoun/Fairfax border, but that would require more aggressive splitting of locales like Ashburn.

Districts 33-40 (Inner Northern Virginia)

Finally, we drew districts approximating Congressional Districts 8 and 11. We ultimately opted to anchor one district in each major census designated place and city. District 40 is anchored in Arlington/Falls Church (we acknowledge some debate in the COIs about whether to place Falls Church with Arlington or with Fairfax). District 39 is anchored in Alexandria. District 38 is anchored in Reston and McLean. District 37 is anchored in Oakton, Tyson's Corner and the City of Fairfax. District 36 is anchored in Centreville. District 35 is anchored in Annandale and Burke. District 34 is anchored in Franconia and Springfield. District 33 crosses into Prince William County, and is built around Lorton, Woodbridge, and the Potomac River banks.

Assessment of Senate Districts Under Statutory Criteria

Equal Representation: The ideal population size for a senate district in Virginia is 215,785. The largest positive deviation from the ideal population comes in district 32, which is overpopulated by 5,141 residents. The largest negative deviation from the ideal population comes in district 28, which is underpopulated by 5,213 residents. All absolute percentage deviations are under 2.5%, as required by Virginia law.

Evaluation of Equal Population Criteria, Draft Virginia Senate Districts 1-20

District	Population	Deviation	Pct. Deviation
1	219,464	3,679	1.70%
2	213,860	−1,925	−0.89%
3	215,770	−15	−0.01%
4	218,232	2,447	1.13%
5	219,146	3,361	1.56%
6	213,557	−2,228	−1.03%
7	217,620	1,835	0.85%
8	214,868	−917	−0.42%
9	214,702	−1,083	−0.50%
10	212,752	−3,033	−1.41%
11	215,978	193	0.09%
12	219,101	3,316	1.54%
13	213,623	−2,162	−1.00%
14	219,329	3,544	1.64%
15	220,199	4,414	2.05%
16	218,175	2,390	1.11%
17	216,724	939	0.44%
18	213,095	−2,690	−1.25%
19	212,136	−3,649	−1.69%
20	218,607	2,822	1.31%

Evaluation of Equal Population Criteria, Draft Virginia Senate Districts 21-40			
District	Population	Deviation	Pct. Deviation
21	214,208	−1,577	−0.73%
22	213,170	−2,615	−1.21%
23	215,570	−215	−0.10%
24	211,657	−4,128	−1.91%
25	217,082	1,297	0.60%
26	212,878	−2,907	−1.35%
27	213,276	−2,509	−1.16%
28	210,572	−5,213	−2.42%
29	216,720	935	0.43%
30	215,164	−621	−0.29%
31	220,345	4,560	2.11%
32	220,926	5,141	2.38%
33	212,814	−2,971	−1.38%
34	213,696	−2,089	−0.97%
35	214,667	−1,118	−0.52%
36	216,066	281	0.13%
37	220,175	4,390	2.03%
38	215,783	−2	0.00%
39	215,194	−591	−0.27%
40	214,492	−1,293	−0.60%

Equal Protection and Ability-to-Elect Districts: The following table provides racial breakdowns for the draft senate districts. We note at the outset that we do not have as many minority-majority districts as the existing plans. We believe that this is the incorrect inquiry under both Virginia and federal law. Rather, the emphasis is upon districts where minority groups would have the ability to elect their candidates of choice. In this respect, we believe that

we improve over existing law by creating an additional "ability to elect" district in the Richmond area.

The plan may draw criticism for not drawing minority-majority districts in the northern Virginia area. The Statutory Criteria do require that we draw districts where minority groups are able to elect their candidates of choice, either alone or in coalition with other groups. This follows the approach of a majority of federal circuits, which require such coalition districts. *See Campos v. City of Baytown*, 840 F.2d 1240 (5th Cir.), *reh'g denied*, 849 F.2d 943 (1988), *cert. denied*, 492 U.S. 905 (1989). *But see Nixon v. Kent County*, 76 F.3d 1381 (6th Cir. 1996) (en banc) (concluding that coalition districts are not required by the VRA).

Federal courts, however, require evidence that the minority groups placed in coalition districts are cohesive and frequently work together toward common ends. This definition seems implicit in the state requirement that the different minority groups form actual coalitions. While we could conceivably draw coalition districts, as discussed above, the minority groups in Fairfax County are dispersed across the county roughly evenly. We also have no record of groups working and voting together, particularly in primaries. We note that the state senators from coalition districts in Northern Virginia under the current maps are non-Hispanic Whites. While non-Hispanic Whites can, of course, be the minority candidate of choice, in the absence of any other record evidence suggesting that such coalitions are effective in Northern Virginia, we opted instead to honor the competing interests of compactness and nesting of districts.

We also note that, while we are generally ignorant of incumbent residences, one of our able research assistants noted that two minority state Senators are paired together in the Richmond area in the same district. After some discussion we concluded that the statutory guarantee is not to have particular incumbents elected, but rather the ability of minority groups to

elect a candidate of choice from a field of candidates. We did, however, want to bring this to the Court's attention.

Evaluation of Racial Criteria, Draft Virginia Senate Districts 1-20

District	Non-Hispanic White	Total Minority	Hispanic	Black	Asian	Native	API
1	89.13%	10.87%	3.64%	5.32%	1.21%	0.63%	0.02%
2	89.52%	10.48%	4.12%	4.36%	1.35%	0.55%	0.06%
3	89.90%	10.10%	1.75%	6.75%	0.95%	0.55%	0.08%
4	78.83%	21.17%	2.46%	15.56%	2.24%	0.56%	0.03%
5	91.07%	8.93%	1.55%	4.61%	1.96%	0.51%	0.09%
6	95.04%	4.96%	0.91%	3.08%	0.37%	0.55%	0.02%
7	85.62%	14.38%	1.80%	11.53%	0.44%	0.62%	0.01%
8	79.55%	20.45%	2.09%	16.49%	1.15%	0.74%	0.02%
9	63.65%	36.35%	1.43%	33.71%	0.49%	0.72%	0.04%
10	77.77%	22.23%	1.68%	18.98%	0.75%	0.76%	0.04%
11	78.93%	21.07%	2.52%	14.45%	3.29%	0.69%	0.04%
12	76.44%	23.56%	2.92%	16.13%	3.72%	0.75%	0.02%
13	42.61%	57.39%	3.42%	51.85%	1.03%	0.99%	0.07%
14	48.27%	51.73%	2.22%	45.97%	2.41%	0.89%	0.01%
15	47.76%	52.24%	5.40%	42.97%	2.77%	1.02%	0.07%
16	71.75%	28.25%	3.61%	16.06%	7.62%	0.52%	0.06%
17	53.40%	46.60%	2.45%	41.84%	1.24%	1.23%	0.02%
18	47.79%	52.21%	3.58%	44.79%	2.48%	1.14%	0.11%
19	72.22%	27.78%	5.27%	16.72%	4.61%	0.90%	0.12%
20	74.15%	25.85%	4.63%	16.45%	3.50%	0.81%	0.09%

Evaluation of Racial Criteria, Draft Virginia Senate Districts 21-40							
District	Non-Hispanic White	Total Minority	Hispanic	Black	Asian	Native	API
21	44.82%	55.18%	6.14%	44.33%	3.29%	1.09%	0.05%
22	54.17%	45.83%	7.39%	27.64%	9.27%	0.70%	0.07%
23	40.73%	59.27%	4.49%	50.95%	2.52%	0.88%	0.13%
24	64.23%	35.77%	6.23%	23.97%	4.12%	0.99%	0.17%
25	76.98%	23.02%	3.40%	16.73%	1.65%	1.03%	0.05%
26	77.53%	22.47%	2.88%	17.46%	1.22%	0.79%	0.02%
27	68.41%	31.59%	7.46%	19.35%	3.39%	0.88%	0.07%
28	82.71%	17.29%	3.82%	11.22%	1.21%	0.85%	0.08%
29	51.54%	48.46%	13.95%	26.03%	7.01%	0.79%	0.15%
30	57.99%	42.01%	15.14%	15.08%	10.66%	0.45%	0.04%
31	75.00%	25.00%	7.29%	7.29%	9.58%	0.53%	0.09%
32	54.64%	45.36%	10.22%	10.28%	23.69%	0.47%	0.10%
33	49.58%	50.42%	13.56%	23.79%	11.55%	0.68%	0.13%
34	55.94%	44.06%	12.47%	18.01%	12.30%	0.64%	0.11%
35	57.48%	42.52%	12.75%	8.68%	20.28%	0.62%	0.09%
36	61.84%	38.16%	7.53%	6.21%	23.35%	0.68%	0.09%
37	62.62%	37.38%	9.51%	7.50%	19.30%	0.68%	0.04%
38	69.10%	30.90%	7.26%	7.14%	15.79%	0.35%	0.03%
39	61.09%	38.91%	10.41%	20.12%	7.15%	0.68%	0.03%
40	72.71%	27.29%	9.19%	8.05%	9.16%	0.52%	0.09%

Contiguity: The districts are all contiguous under the census standard for contiguity (described above). To our knowledge, they are contiguous under functional contiguity as well.

Compactness: Below are the Reock and Polsby-Popper scores for the districts. These are two commonly used measures of spatial compactness. To simplify greatly, Reock scores measure

how "stretched" a district is, while Polsby-Popper scores measure how "dimpled" the district is. Under both metrics, higher scores are better.

Districts 2, 3, 6, and 7 score relatively poorly using Reock scores. This is to be expected, given the geographic constraints placed upon them. All of the districts perform well under the Polsby-Popper metric.

Evaluation of Compactness Criteria, Draft Virginia Senate Districts 1-20

District	Reock	Polsby-Popper
1	0.3745	0.4002
2	0.2564	0.2493
3	0.2515	0.2093
4	0.3527	0.2035
5	0.3402	0.2451
6	0.2509	0.2898
7	0.2332	0.2985
8	0.4159	0.3181
9	0.3268	0.3734
10	0.3581	0.2079
11	0.2742	0.2644
12	0.3853	0.3010
13	0.5010	0.2871
14	0.3205	0.2222
15	0.3088	0.1653
16	0.4649	0.2839
17	0.2757	0.2549
18	0.4424	0.4223
19	0.3812	0.4630
20	0.3244	0.3882

Evaluation of Compactness Criteria, Draft Virginia Senate Districts 21-40		
District	Reock	Polsby-Popper
21	0.5470	0.5411
22	0.5694	0.4124
23	0.3648	0.3497
24	0.3029	0.2435
25	0.3903	0.1461
26	0.5008	0.2372
27	0.5667	0.3387
28	0.4884	0.3234
29	0.3389	0.2190
30	0.4421	0.3111
31	0.3985	0.2480
32	0.4623	0.3658
33	0.3524	0.2829
34	0.4183	0.4092
35	0.4093	0.2617
36	0.5147	0.2501
37	0.3060	0.2548
38	0.3123	0.3527
39	0.4743	0.4465
40	0.2930	0.3470

However, since we are drawing a whole map for the state, the most important compactness comparison is for the state as whole. Dave's Redistricting App provides a composite compactness score for a whole map. The Special Masters' ("SMs") Senate map is more compact than the current Senate map, a value of 52 for the SMs map as compared to a

value of 9 for the current Senate map. In other words, we have effectively more than quintupled the degree to which the Senate map is a compact one.

Partisanship: Because state races occur in the off-years, which can have very different turnout patterns from presidential and midterm election years, we determined that it was important not to use elections from presidential or midterm elections to evaluate partisanship. Instead, we used data from Virginia Attorney General elections. A summary of the Democratic performance in the 2017 Attorney General election is provided below. The results are sorted by Democratic vote share. The average Democratic performance in this race was 53.3% to the Republican's 46.6%. As you can see below, the median districts, 31 and 17, gave the Democrat 54.3% of the vote and 53.2% of the vote, respectively. Thus, each party will have to win an election in "unfriendly" territory in order to control the state senate. Overall, this map is well-balanced, does not unduly favor any party, and does not require further adjustment.

2017 Attorney General Election Results, Draft Virginia Senate Districts 1-20

Average Dem Performance = 53.33%

District	Democratic	Republican
14	79.5%	20.4%
39	78.9%	21.0%
40	78.7%	21.2%
21	74.8%	25.1%
23	71.0%	28.9%
37	70.5%	29.4%
34	69.7%	30.2%
38	67.8%	32.1%
35	67.7%	32.2%
18	65.0%	34.9%
33	65.0%	34.9%
32	63.9%	36.0%
15	62.4%	37.5%
36	62.3%	37.6%
11	62.1%	37.8%
13	62.0%	37.9%
29	60.1%	39.7%
22	57.4%	42.5%
30	54.9%	45.0%
31	54.3%	45.7%

2017 Attorney General Election Results, Draft Virginia Senate Districts 21-40

Average Dem Performance = 53.33%

District	Democratic	Republican
17	53.2%	46.8%
16	52.3%	47.6%
24	51.6%	48.2%
4	47.8%	52.1%
27	47.6%	52.2%
20	46.1%	53.8%
12	43.1%	56.8%
19	42.1%	57.8%
26	41.1%	58.9%
9	39.6%	60.3%
25	37.2%	62.7%
28	37.0%	62.8%
1	36.4%	63.5%
5	36.3%	63.6%
3	35.9%	64.0%
10	35.9%	64.0%
2	33.2%	66.7%
8	31.8%	68.1%
7	30.6%	69.3%
6	23.3%	76.6%

VIRGINIA HOUSE OF DELEGATES

Because there are so many districts, we will not endeavor to describe each one. Because the senate districts are the bases for these districts, their basic underlying motivation should be familiar.

Statutory Criteria

Equal Representation: The ideal population size for a House of Delegates district in Virginia is 86,314. The largest positive deviation from the ideal population comes in district 75, which is overpopulated by 2,149 residents. The largest negative deviation from the ideal population comes in district 27, which is underpopulated by 2,101 residents. All absolute percentage deviations are under 2.5%, as required by Virginia law.

Evaluation of Equal Population Criteria, Draft Virginia House Districts 1-25

District	Population	Deviation	Pct. Deviation
1	84,957	−1,357	−1.57%
2	85,400	−914	−1.06%
3	86,887	573	0.66%
4	85,616	−698	−0.81%
5	86,826	512	0.59%
6	84,634	−1,680	−1.95%
7	85,669	−645	−0.75%
8	87,350	1,036	1.20%
9	86,572	258	0.30%
10	87,624	1,310	1.52%
11	87,486	1,172	1.36%
12	87,285	971	1.12%
13	86,448	134	0.16%
14	85,572	−742	−0.86%
15	88,051	1,737	2.01%
16	86,208	−106	−0.12%
17	86,477	163	0.19%
18	87,324	1,010	1.17%
19	85,437	−877	−1.02%
20	85,244	−1,070	−1.24%
21	86,571	257	0.30%
22	84,270	−2,044	−2.37%
23	84,720	−1,594	−1.85%
24	84,934	−1,380	−1.60%
25	87,209	895	1.04%

Evaluation of Equal Population Criteria, Draft Virginia House Districts 26-50

District	Population	Deviation	Pct. Deviation
26	87,291	977	1.13%
27	84,213	−2,101	−2.43%
28	87,454	1,140	1.32%
29	87,418	1,104	1.28%
30	85,420	−894	−1.04%
31	87,054	740	0.86%
32	85,347	−967	−1.12%
33	87,217	903	1.05%
34	86,651	337	0.39%
35	87,055	741	0.86%
36	86,397	83	0.10%
37	87,329	1,015	1.18%
38	87,965	1,651	1.91%
39	86,896	582	0.67%
40	86,918	604	0.70%
41	85,276	−1,038	−1.20%
42	86,234	−80	−0.09%
43	86,222	−92	−0.11%
44	87,779	1,465	1.70%
45	85,313	−1,001	−1.16%
46	84,739	−1,575	−1.82%
47	85,689	−625	−0.72%
48	84,443	−1,871	−2.17%
49	84,673	−1,641	−1.90%
50	84,359	−1,955	−2.26%

Evaluation of Equal Population Criteria, Draft Virginia House Districts 51-75

District	Population	Deviation	Pct. Deviation
51	85,784	−530	−0.61%
52	87,218	904	1.05%
53	86,080	−234	−0.27%
54	88,305	1,991	2.31%
55	86,747	433	0.50%
56	86,862	548	0.63%
57	86,076	−238	−0.28%
58	84,577	−1,737	−2.01%
59	85,634	−680	−0.79%
60	85,394	−920	−1.07%
61	84,921	−1,393	−1.61%
62	87,359	1,045	1.21%
63	84,966	−1,348	−1.56%
64	85,980	−334	−0.39%
65	87,139	825	0.96%
66	85,065	−1,249	−1.45%
67	85,966	−348	−0.40%
68	85,450	−864	−1.00%
69	87,386	1,072	1.24%
70	88,236	1,922	2.23%
71	84,328	−1,986	−2.30%
72	88,033	1,719	1.99%
73	87,751	1,437	1.66%
74	88,305	1,991	2.31%
75	88,463	2,149	2.49%

Evaluation of Equal Population Criteria, Draft Virginia House Districts 76-100

District	Population	Deviation	Pct. Deviation
76	85,270	−1,044	−1.21%
77	87,759	1,445	1.67%
78	87,774	1,460	1.69%
79	87,800	1,486	1.72%
80	85,693	−621	−0.72%
81	84,718	−1,596	−1.85%
82	86,012	−302	−0.35%
83	86,459	145	0.17%
84	87,624	1,310	1.52%
85	87,829	1,515	1.76%
86	85,949	−365	−0.42%
87	87,516	1,202	1.39%
88	86,371	57	0.07%
89	86,704	390	0.45%
90	87,890	1,576	1.83%
91	87,076	762	0.88%
92	86,158	−156	−0.18%
93	85,906	−408	−0.47%
94	84,653	−1,661	−1.92%
95	84,324	−1,990	−2.31%
96	85,578	−736	−0.85%
97	86,997	683	0.79%
98	86,690	376	0.44%
99	85,558	−756	−0.88%
100	84,937	−1,377	−1.60%

Equal Protection and Ability-to-Elect Districts: The following table provides racial breakdowns for the draft House districts. We note at the outset that we do not have as many minority-majority districts as the existing plans. We reiterate our conclusion from our Senate analysis that this is the incorrect inquiry under both Virginia and federal law. Rather, the emphasis is upon districts where minority groups would have the ability to elect their candidates of choice. In this respect, we believe that we improve over the current map. We reiterate that we do not believe we have sufficient evidence before us to intentionally draw coalition districts, although such districts may naturally occur in the course of drawing compact districts that minimize county splits.

Evaluation of Racial Criteria, Draft Virginia House Districts 1-25							
District	Non-Hispanic White	Total Minority	Hispanic	Black	Asian	Native	API
1	79.98%	20.02%	6.95%	4.66%	7.83%	0.31%	0.02%
2	71.88%	28.12%	9.24%	7.35%	10.38%	0.59%	0.19%
3	60.73%	39.27%	14.15%	15.02%	8.99%	0.73%	0.03%
4	46.87%	53.13%	11.98%	31.12%	9.03%	0.24%	0.03%
5	72.61%	27.39%	7.04%	14.12%	4.85%	1.05%	0.02%
6	76.46%	23.54%	3.50%	2.13%	17.48%	0.28%	0.00%
7	72.74%	27.26%	7.65%	7.49%	11.33%	0.22%	0.00%
8	55.70%	44.30%	9.77%	10.73%	22.72%	0.81%	0.09%
9	58.17%	41.83%	9.65%	6.05%	25.19%	0.51%	0.02%
10	62.24%	37.76%	6.79%	7.26%	22.49%	0.82%	0.18%
11	62.30%	37.70%	8.50%	9.66%	18.38%	0.76%	0.08%
12	65.41%	34.59%	8.45%	5.49%	19.75%	0.54%	0.00%
13	56.64%	43.36%	14.57%	8.07%	19.74%	0.62%	0.09%
14	50.74%	49.26%	14.38%	10.56%	23.69%	0.26%	0.14%
15	63.91%	36.09%	10.33%	6.82%	17.98%	0.98%	0.03%
16	63.30%	36.70%	11.75%	15.86%	8.09%	0.63%	0.06%
17	49.30%	50.70%	13.30%	23.28%	12.29%	0.76%	0.20%
18	60.03%	39.97%	9.97%	10.49%	18.59%	0.41%	0.07%
19	41.62%	58.38%	17.84%	28.88%	10.10%	0.58%	0.06%
20	52.33%	47.67%	21.50%	15.85%	9.19%	0.46%	0.03%
21	60.81%	39.19%	11.29%	15.43%	11.54%	0.31%	0.03%
22	69.31%	30.69%	9.35%	11.83%	8.25%	0.80%	0.04%
23	42.51%	57.49%	13.67%	34.76%	7.19%	0.77%	0.25%
24	45.24%	54.76%	16.37%	28.16%	8.72%	0.76%	0.19%
25	51.33%	48.67%	13.89%	24.54%	8.69%	0.90%	0.14%

Evaluation of Racial Criteria, Draft Virginia House Districts 26-50							
District	Non-Hispanic White	Total Minority	Hispanic	Black	Asian	Native	API
26	48.36%	51.64%	7.10%	11.31%	31.54%	0.62%	0.15%
27	56.70%	43.30%	13.45%	8.84%	20.07%	0.51%	0.15%
28	65.12%	34.88%	10.06%	8.62%	15.39%	0.34%	0.04%
29	69.52%	30.48%	8.44%	8.96%	12.27%	0.53%	0.10%
30	82.33%	17.67%	4.56%	6.01%	6.29%	0.52%	0.06%
31	89.33%	10.67%	3.28%	5.59%	1.09%	0.62%	0.02%
32	86.89%	13.11%	4.01%	6.89%	1.66%	0.62%	0.04%
33	93.91%	6.09%	2.95%	1.84%	0.51%	0.68%	0.04%
34	84.33%	15.67%	6.79%	5.53%	2.79%	0.38%	0.02%
35	91.76%	8.24%	2.45%	4.56%	0.44%	0.64%	0.08%
36	88.38%	11.62%	2.25%	7.83%	0.78%	0.58%	0.16%
37	91.84%	8.16%	1.45%	5.22%	0.90%	0.57%	0.02%
38	62.57%	37.43%	3.21%	30.87%	2.18%	0.65%	0.03%
39	89.75%	10.25%	1.38%	7.28%	1.10%	0.57%	0.00%
40	87.34%	12.66%	1.99%	7.63%	2.12%	0.51%	0.05%
41	88.23%	11.77%	2.38%	3.97%	4.63%	0.58%	0.02%
42	90.35%	9.65%	1.71%	6.11%	1.20%	0.28%	0.05%
43	95.49%	4.51%	0.86%	2.67%	0.32%	0.55%	0.04%
44	95.86%	4.14%	0.86%	2.34%	0.34%	0.58%	0.01%
45	93.51%	6.49%	0.91%	4.45%	0.46%	0.54%	0.03%
46	94.05%	5.95%	1.05%	3.90%	0.39%	0.54%	0.12%
47	91.92%	8.08%	1.79%	5.51%	0.30%	0.50%	0.00%
48	68.58%	31.42%	2.08%	27.86%	0.46%	0.96%	0.05%
49	57.93%	42.07%	1.63%	38.87%	0.50%	1.01%	0.03%
50	64.74%	35.26%	1.32%	32.74%	0.74%	0.47%	0.03%

Evaluation of Racial Criteria, Draft Virginia House Districts 51-75							
District	Non-Hispanic White	Total Minority	Hispanic	Black	Asian	Native	API
51	85.85%	14.15%	1.26%	11.66%	0.62%	0.78%	0.03%
52	69.33%	30.67%	3.10%	25.14%	1.64%	0.70%	0.01%
53	82.50%	17.50%	1.78%	13.95%	0.76%	0.98%	0.03%
54	72.39%	27.61%	3.48%	17.35%	5.95%	0.55%	0.01%
55	86.87%	13.13%	1.84%	8.78%	1.95%	0.55%	0.07%
56	73.07%	26.93%	1.43%	24.09%	0.60%	0.81%	0.04%
57	75.48%	24.52%	3.05%	10.09%	10.58%	0.54%	0.01%
58	79.57%	20.43%	3.29%	11.27%	5.35%	0.49%	0.03%
59	78.34%	21.66%	1.95%	15.91%	2.52%	0.88%	0.00%
60	86.34%	13.66%	1.56%	9.36%	1.61%	0.93%	0.03%
61	85.50%	14.50%	3.66%	8.03%	1.82%	0.90%	0.05%
62	79.62%	20.38%	3.67%	14.78%	0.88%	0.87%	0.09%
63	77.88%	22.12%	5.30%	13.63%	2.05%	0.64%	0.07%
64	65.65%	34.35%	9.47%	18.70%	4.59%	0.97%	0.11%
65	70.39%	29.61%	5.81%	20.27%	2.30%	0.94%	0.02%
66	68.67%	31.33%	4.89%	23.02%	2.12%	0.91%	0.13%
67	70.91%	29.09%	3.31%	24.22%	0.77%	0.70%	0.01%
68	78.15%	21.85%	2.71%	17.14%	0.70%	1.08%	0.04%
69	74.17%	25.83%	5.67%	15.93%	2.93%	0.72%	0.26%
70	53.70%	46.30%	6.79%	34.05%	3.83%	1.10%	0.13%
71	78.06%	21.94%	4.01%	13.93%	2.80%	1.20%	0.00%
72	77.78%	22.22%	1.77%	18.21%	1.84%	0.29%	0.07%
73	80.11%	19.89%	2.90%	11.45%	5.00%	0.58%	0.00%
74	68.26%	31.74%	3.38%	25.13%	2.11%	0.72%	0.06%
75	56.49%	43.51%	6.15%	32.88%	3.23%	0.90%	0.16%

Evaluation of Racial Criteria, Draft Virginia House Districts 26-50							
District	Non-Hispanic White	Total Minority	Hispanic	Black	Asian	Native	API
76	51.96%	48.04%	6.89%	37.31%	2.96%	0.84%	0.11%
77	44.52%	55.48%	3.47%	48.84%	1.83%	1.60%	0.07%
78	74.48%	25.52%	2.44%	18.50%	3.48%	0.60%	0.01%
79	26.12%	73.88%	1.90%	69.35%	1.53%	1.12%	0.01%
80	39.43%	60.57%	4.11%	52.10%	3.01%	0.82%	0.12%
81	42.72%	57.28%	2.81%	52.00%	0.77%	1.66%	0.00%
82	46.10%	53.90%	2.51%	49.74%	1.11%	0.47%	0.04%
83	53.00%	47.00%	1.59%	43.69%	0.59%	1.37%	0.01%
84	53.12%	46.88%	2.74%	41.55%	1.67%	1.22%	0.04%
85	43.06%	56.94%	4.37%	49.08%	2.45%	0.59%	0.07%
86	64.64%	35.36%	4.78%	25.04%	4.29%	0.82%	0.18%
87	32.35%	67.65%	4.38%	59.67%	2.21%	1.11%	0.10%
88	43.00%	57.00%	3.78%	50.10%	1.61%	1.14%	0.19%
89	61.84%	38.16%	3.71%	30.23%	3.43%	0.73%	0.02%
90	73.51%	26.49%	4.11%	17.20%	3.97%	0.73%	0.15%
91	43.20%	56.80%	3.82%	48.94%	2.78%	1.01%	0.05%
92	39.69%	60.31%	3.93%	52.78%	2.18%	1.41%	0.02%
93	38.54%	61.46%	5.46%	50.88%	3.62%	1.11%	0.04%
94	63.53%	36.47%	8.19%	22.77%	3.79%	1.06%	0.08%
95	52.21%	47.79%	7.44%	33.08%	5.92%	0.60%	0.03%
96	48.56%	51.44%	8.30%	28.67%	12.77%	0.88%	0.01%
97	63.29%	36.71%	6.73%	21.54%	6.80%	1.09%	0.12%
98	75.78%	24.22%	5.95%	11.73%	5.38%	0.87%	0.17%
99	80.43%	19.57%	3.94%	10.83%	3.68%	0.63%	0.16%
100	71.45%	28.55%	4.12%	20.61%	2.77%	0.73%	0.04%

Contiguity: The districts are all contiguous under the census standard for contiguity (described above). To our knowledge, they are contiguous under functional contiguity as well.

Compactness: Below are the Reock and Polsby-Popper scores for the districts. Only a handful of districts perform poorly under the Reock metric, while all perform well under the Polsby-Popper metric. Looking at the map as a whole using the metric in Dave's Redistricting App the Special Masters' ("SMs") House map is more compact than the current House map, a value of 50 for the SMs map as compared to a value of 34 for the current House map. In other words, compactness in the proposed map is nearly 1.5 times that of the current House map.

Evaluation of Compactness Criteria, Draft Virginia House Districts 1-25

District	Reock	Polsby-Popper
1	0.3532	0.3944
2	0.2987	0.3636
3	0.3258	0.4172
4	0.5920	0.4342
5	0.4773	0.4299
6	0.3002	0.3190
7	0.4644	0.4180
8	0.3985	0.2730
9	0.4258	0.2892
10	0.4282	0.3087
11	0.5047	0.2864
12	0.4651	0.4225
13	0.4055	0.3700
14	0.3088	0.3625
15	0.5496	0.2912
16	0.5991	0.3435
17	0.4008	0.3424
18	0.2401	0.1828
19	0.3333	0.3030
20	0.4053	0.2472
21	0.4546	0.3548
22	0.4097	0.2424
23	0.2937	0.2150
24	0.3646	0.3240
25	0.3215	0.2372

Evaluation of Compactness Criteria, Draft Virginia House Districts 26-50

District	Reock	Polsby-Popper
26	0.3565	0.2649
27	0.2201	0.2795
28	0.4628	0.3288
29	0.4388	0.3025
30	0.3872	0.2941
31	0.4249	0.3050
32	0.3951	0.2975
33	0.4441	0.2838
34	0.3476	0.2749
35	0.3534	0.2405
36	0.3706	0.2259
37	0.3585	0.2932
38	0.5652	0.2847
39	0.5604	0.3187
40	0.3254	0.1642
41	0.3242	0.1652
42	0.4278	0.1939
43	0.2108	0.2210
44	0.4157	0.5079
45	0.2414	0.2815
46	0.3541	0.3031
47	0.4170	0.2797
48	0.3287	0.2489
49	0.2936	0.2619
50	0.5403	0.3644

Evaluation of Compactness Criteria, Draft Virginia House Districts 51-75

District	Reock	Polsby-Popper
51	0.2930	0.2405
52	0.4074	0.3101
53	0.2978	0.2068
54	0.4827	0.3124
55	0.3641	0.2827
56	0.3319	0.2743
57	0.2877	0.2656
58	0.4107	0.3229
59	0.3156	0.2503
60	0.2959	0.1781
61	0.3927	0.3311
62	0.2850	0.2468
63	0.4321	0.3886
64	0.3499	0.3106
65	0.4605	0.2728
66	0.4118	0.2028
67	0.2321	0.1991
68	0.3129	0.2365
69	0.2061	0.1396
70	0.3304	0.2576
71	0.3202	0.1584
72	0.5226	0.2916
73	0.5351	0.3079
74	0.4351	0.3665
75	0.3916	0.1766

Evaluation of Compactness Criteria, Draft Virginia House Districts 76-100

District	Reock	Polsby-Popper
76	0.4152	0.3846
77	0.3409	0.2858
78	0.2761	0.2205
79	0.3078	0.2349
80	0.2617	0.2236
81	0.3001	0.2181
82	0.2051	0.2037
83	0.2805	0.2561
84	0.2388	0.1770
85	0.2800	0.3213
86	0.5226	0.5063
87	0.3463	0.3023
88	0.4524	0.4121
89	0.2984	0.2447
90	0.5333	0.4835
91	0.2538	0.1600
92	0.3579	0.2764
93	0.4740	0.2882
94	0.3017	0.3996
95	0.3990	0.3057
96	0.3406	0.4120
97	0.2774	0.2391
98	0.5686	0.5319
99	0.5905	0.5286
100	0.3046	0.4166

Partisanship: Because state races occur in the off-years, we determined that it was important not to use elections from presidential or midterm elections to evaluate partisanship. Instead, we used data from Virginia Attorney General elections. A summary of the Democratic performance in the 2017 Attorney General election is provided below. The results are sorted by Democratic vote share. The average Democratic performance in this race was 53.3% to the Republican's 46.6%. As you can see below, the median districts, 97 and 65, gave the Democrat 52.6% and 51.2%, respectively, in that race. This gives Republicans a slight advantage. However, it is difficult to eliminate this advantage given Virginia's political geography. Moreover, there are nine districts within five points of the statewide average on the Republican side, compared to only five on the Democratic side. In other words, although Republicans may find it slightly easier to win a majority, Democrats will have a tendency to enjoy larger majorities when they win. But overall, this map is well-balanced, does not unduly favor any party and did not need to be adjusted.

2017 Attorney General Election Results, Draft Virginia House Districts 1-25

Average Dem Performance = 53.33%

District	Democratic	Republican
79	91.6%	8.2%
4	81.2%	18.7%
3	81.1%	18.7%
2	79.6%	20.3%
54	79.3%	20.6%
92	78.6%	21.3%
87	77.8%	22.0%
1	77.5%	22.4%
80	76.8%	23.1%
93	76.7%	23.2%
5	76.0%	23.9%
13	73.9%	26.1%
77	72.6%	27.3%
78	72.6%	27.3%
17	72.0%	27.9%
91	71.7%	28.2%
12	71.4%	28.5%
7	71.0%	28.8%
23	69.7%	30.2%
14	69.4%	30.5%
85	69.0%	30.9%
8	68.9%	30.9%
16	68.6%	31.3%
19	68.3%	31.6%
88	68.0%	31.8%

2017 Attorney General Election Results, Draft Virginia House Districts 26-50

Average Dem Performance = 53.33%

District	Democratic	Republican
11	67.8%	32.1%
81	67.0%	32.9%
24	65.3%	34.5%
26	65.2%	34.8%
15	64.3%	35.5%
27	64.2%	35.7%
25	63.8%	36.1%
18	63.3%	36.7%
38	63.2%	36.8%
9	62.6%	37.3%
28	61.9%	38.0%
10	61.6%	38.4%
6	61.3%	38.6%
95	61.2%	38.7%
76	60.8%	39.2%
29	59.5%	40.5%
96	59.1%	40.8%
70	58.6%	41.2%
20	58.1%	41.8%
55	57.4%	42.5%
94	56.5%	43.4%
82	55.8%	44.1%
84	55.8%	44.2%
21	52.9%	47.0%
97	52.6%	47.3%

2017 Attorney General Election Results, Draft Virginia House Districts 51-75

Average Dem Performance = 53.33%

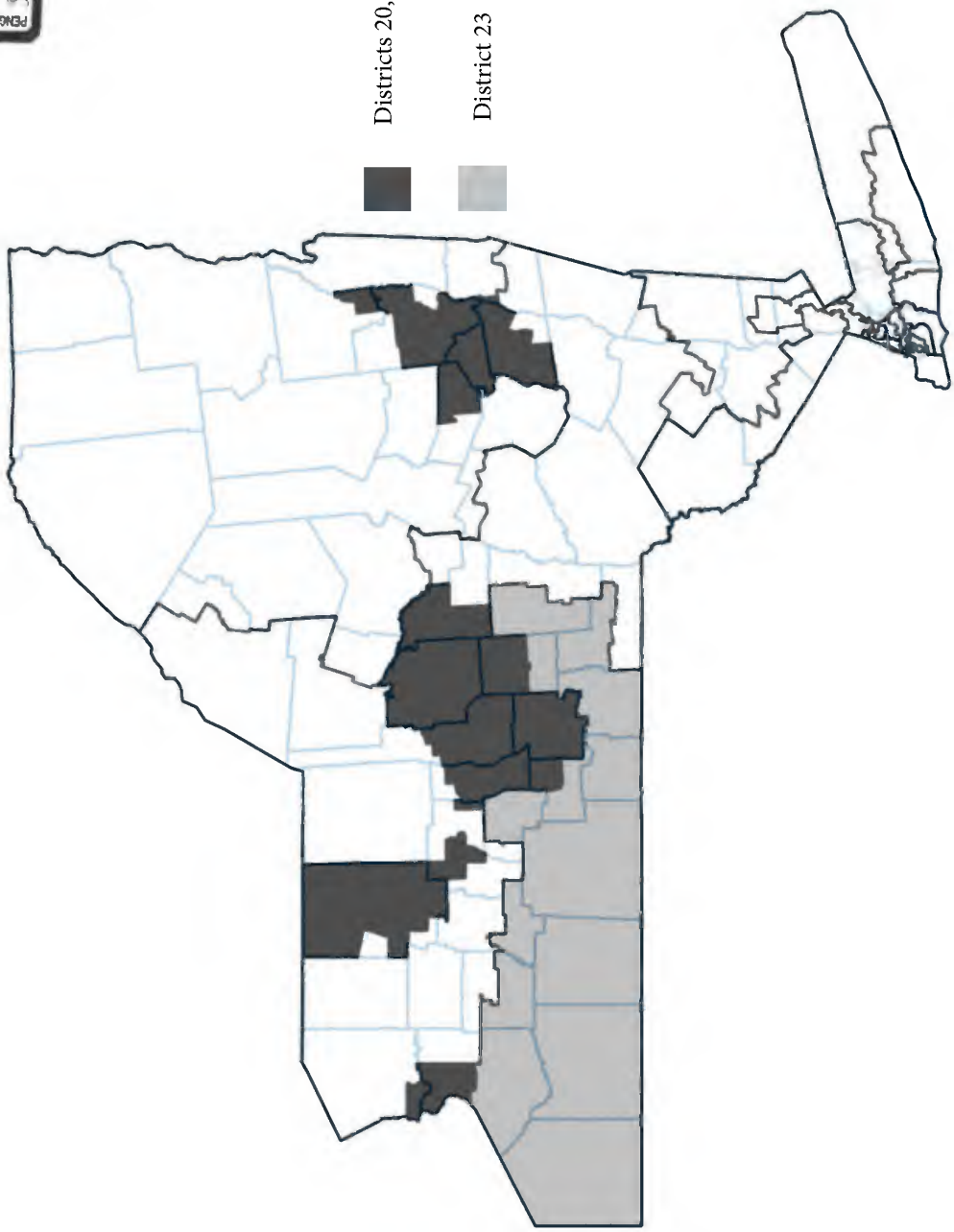
District	Democratic	Republican
65	51.2%	48.7%
89	51.1%	48.8%
41	51.1%	48.9%
58	49.6%	50.3%
86	48.8%	51.0%
71	48.6%	51.3%
83	48.3%	51.6%
22	48.2%	51.6%
66	47.8%	52.1%
30	47.7%	52.2%
75	47.4%	52.5%
57	47.3%	52.7%
34	46.1%	53.8%
100	45.8%	54.1%
64	45.6%	54.3%
69	45.4%	54.4%
49	44.6%	55.3%
52	44.2%	55.7%
99	44.2%	55.7%
40	42.5%	57.4%
73	42.4%	57.5%
74	41.6%	58.3%
50	41.2%	58.7%
59	41.2%	58.7%
98	41.1%	58.8%

2017 Attorney General Election Results, Draft Virginia House Districts 76-100

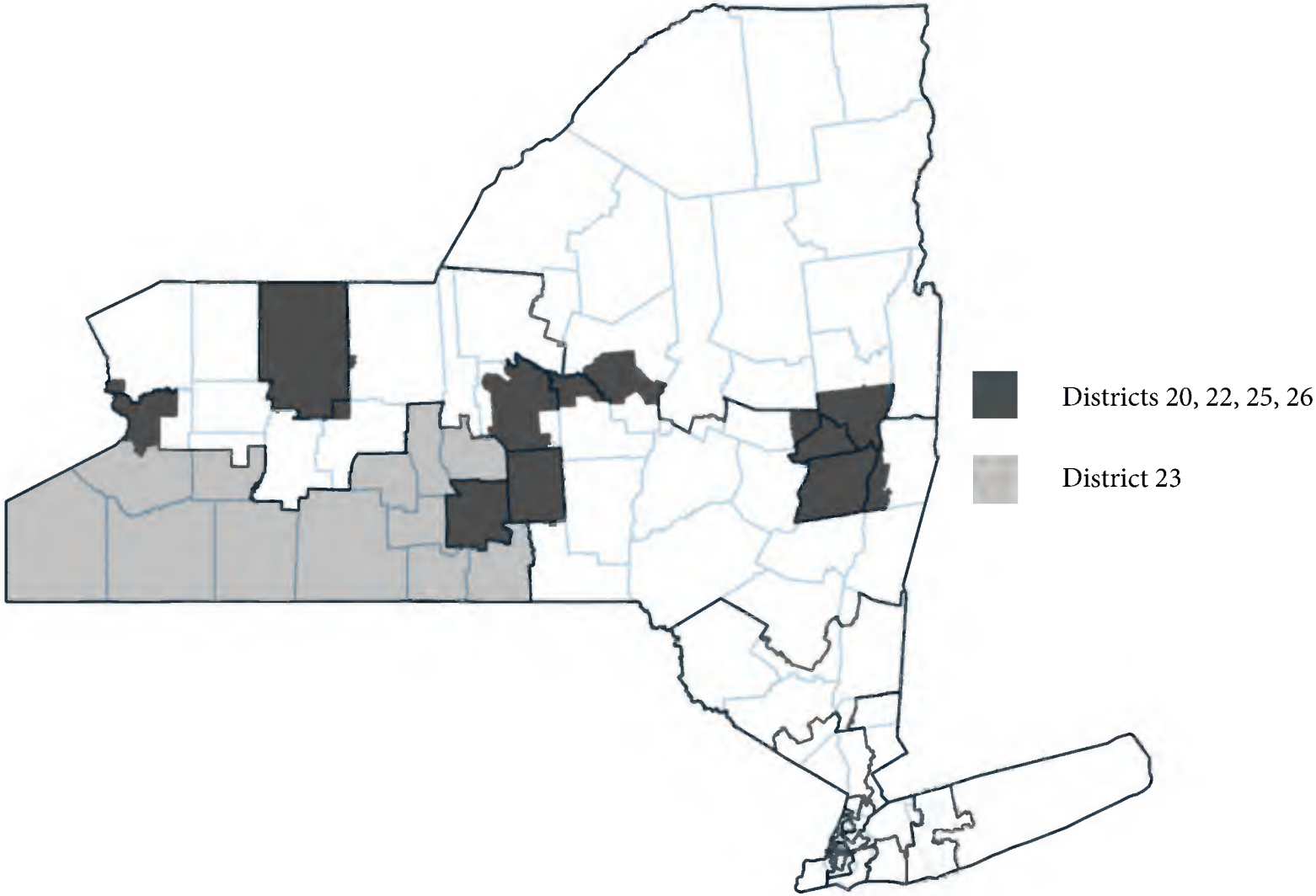
Average Dem Performance = 53.33%

District	Democratic	Republican
32	39.7%	60.2%
67	39.7%	60.2%
36	39.5%	60.4%
56	39.4%	60.5%
42	39.1%	60.8%
63	38.8%	61.1%
62	38.2%	61.7%
90	38.2%	61.7%
31	37.4%	62.5%
61	37.4%	62.5%
48	37.1%	62.8%
68	35.6%	64.3%
72	34.7%	65.2%
37	32.9%	67.0%
39	31.4%	68.5%
60	31.3%	68.5%
53	31.1%	68.8%
33	27.7%	72.2%
47	26.8%	73.1%
35	26.5%	73.4%
44	24.6%	75.3%
51	24.5%	75.4%
46	24.2%	75.7%
43	22.0%	77.9%
45	20.8%	79.1%

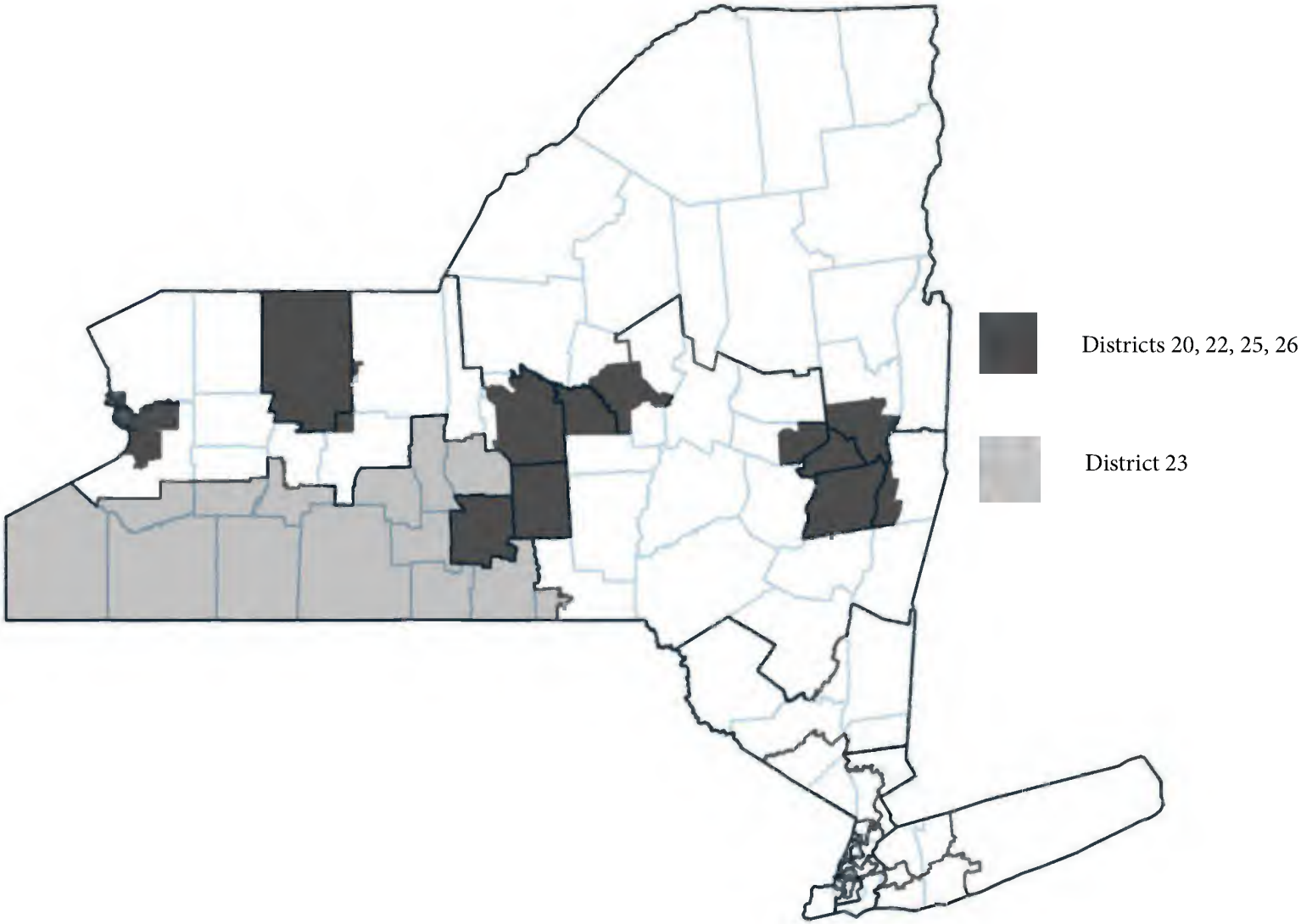
SENATE EXHIBIT S3:
COMPARISON OF 2022 ENACTED CONGRESSIONAL
UPSTATE VS. PLAN A + B UPSTATE MAPS [3263 - 3265]



Enacted 2022 Congressional Plan



2022 "Plan A" (Democratic Commissioners)

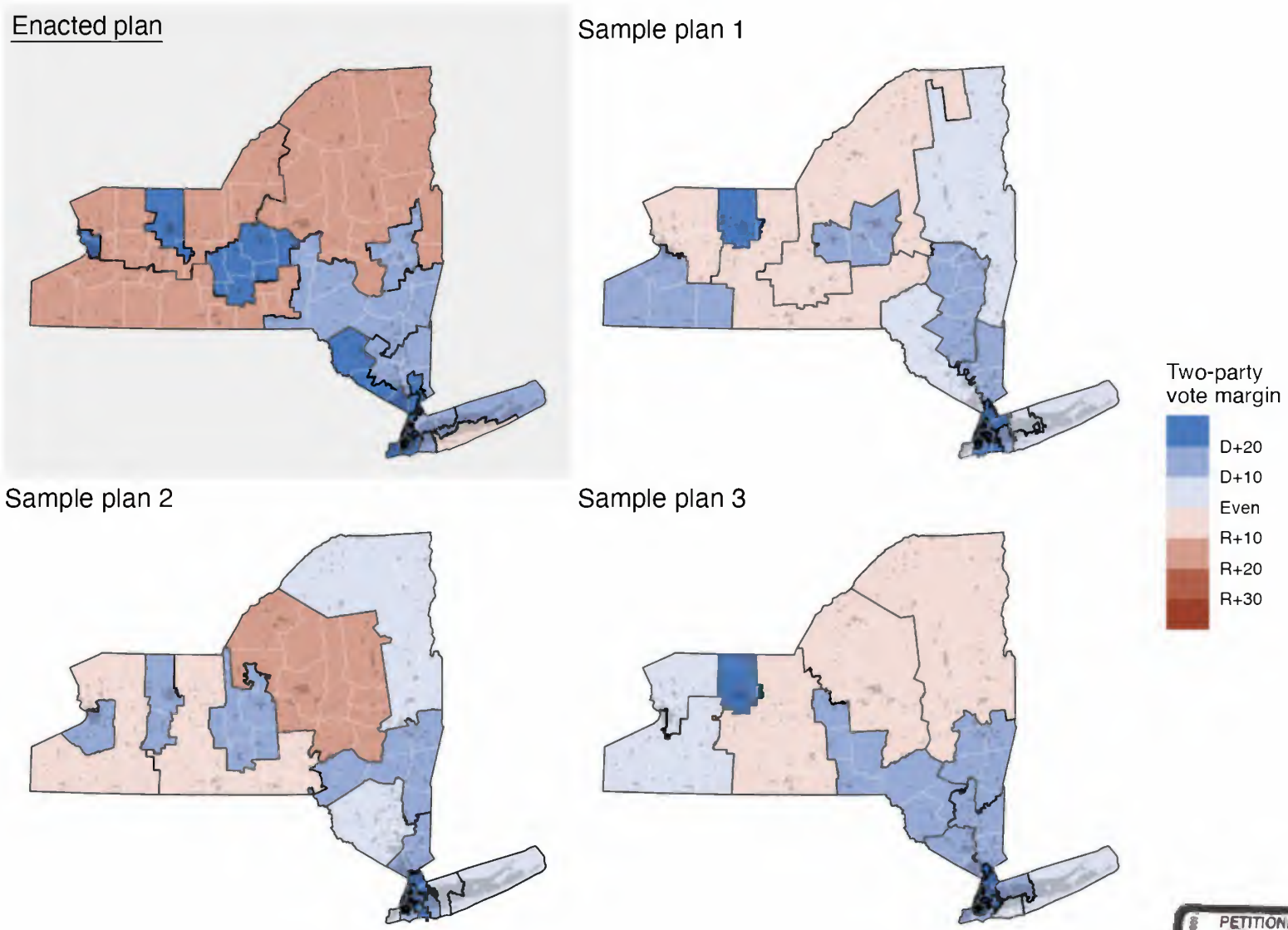


2022 "Plan B" (Republican Commissioners)

3266

SENATE EXHIBIT S4:
ALARM PROJECT UPSTATE MAPS

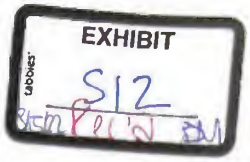
ALARM Project: Comparison of Enacted 2022 Congressional Plan to Simulated Sample Plans



available at: https://alarm-redist.github.io/fifty-states/NY_cd_2020/

SENATE EXHIBIT S12:
TESTIMONY OF DR. WAH LEE, SUBMITTED TO COMMISSION [3267 - 3269]

OCA | EMBRACING THE HOPES AND ASPIRATIONS OF ASIAN PACIFIC AMERICANS
New York Chapter



WRITTEN STATEMENT OF OCA-NY

Before the New York State Independent Redistricting Commision (IRC)

By Dr. Wah Lee

July 29, 2021

My name is Dr. Wah Lee. I am testifying on behalf of OCA-NY. I joined OCA-NY as a Board Member in 2010 and now am an Advisory Board Member. Founded in 1976, OCA-NY, formerly known as Organization for Chinese Americans, is a non-profit, non-partisan organization dedicated to protecting and advancing the rights of Asian Americans in New York City. OCA-NY is a member of the APA VOICE Redistricting Task Force.

I am 49 years old. I grew up in both Bensonhurst and Bath Beach where I graduated from Elementary School P.S. 247, and worked in my parents' dry cleaners. I completed one year of medical internship in Sunset Park's Lutheran Medical Center, now NYU Langone. I have a home in Bensonhurst and my medical practice is in Manhattan Chinatown. A few times a week, I am able to walk from Bensonhurst to visit my parents who still live in Bath Beach. I currently own residential property in both Bensonhurst and Bath Beach.

Position I: Regarding Senate Districts

The Asian community of Sunset Park should be kept in the same State Senate District with Bensonhurst, Homecrest, and Sheepshead Bay. According to the 2010 census, there were enough Asians to form an Asian majority district if the Asians living in Senate Districts 17, 20, and 22 were COMBINED. Instead, the 160,000 Asians were DIVIDED into these three districts. The Asian American communities in these districts have only grown since 2010. We request when the 2020 census numbers are released, at least one, if not two Asian majority Senate Districts be created to comply with the Voting Rights Act.

Wah Lee- OCA NY

OCA | EMBRACING THE HOPES AND ASPIRATIONS OF ASIAN PACIFIC AMERICANS
New York Chapter

POSITION II: Regarding Congressional Districts

CD11 contains all of Staten Island and a small part of Brooklyn which includes Bath Beach, and divides Bensonhurst. Bensonhurst and Bath Beach should NOT be with Staten Island. Rather, Bath Beach and the whole of Bensonhurst should be kept together.

86th Street is *the* major commercial strip in Southwestern Brooklyn. The northern side of 86th Street is in Bensonhurst, while the southern side is in Bath Beach. There is constant foot traffic going both ways. On both sides of 86th Street, there are Asian businesses including more than a dozen supermarkets, pharmacies, doctor's offices, restaurants, bakeries, bubble tea houses, salons, and 99 cent stores. Furthermore, the Asian department store franchise TESO recently opened a whopping 5,349 square feet store on 86th Street. 86th Street is also a major, essential transportation corridor via the D train for commuters from Bath Beach/Bensonhurst, connecting this Brooklyn region to Manhattan.

Staten Island does not share a similar concentration of Asians, nor the culture of Asian businesses as Bath Beach/Bensonhurst, nor do residents in Bath Beach/Bensonhurst travel on a regular basis to Staten Island and vice versa.

POSITION III: Keeping Manhattan Chinatown and Sunset Park Together

There is an Asian American, largely Chinese community of interest between Manhattan's Chinatown and Sunset Park, Brooklyn. Over the past 10 years, many Manhattan Chinatown residents left and migrated to Sunset Park. Current Sunset Park residents commute daily to Manhattan Chinatown via the N train. In my Manhattan Chinatown medical practice, I see

many Chinese patients who live in Sunset Park. In addition to my expertise, they come to me because my staff and I are bilingual in English and Chinese.

Thank you in advance for your full consideration of my testimony.

Respectfully Submitted,

Dr. Wah Lee
Diplomate, American Board of Physical Medicine & Rehabilitation
Diplomate, American Osteopathic Board of Neuromusculoskeletal Medicine & Osteopathic Manipulation
Diplomate, American Osteopathic Board of Physical Medicine & Rehabilitation

New York Supreme Court

Appellate Division—Fourth Department

TIM HARKENRIDER, GUY C. BROUGHT, LAWRENCE CANNING, PATRICIA CLARINO, GEORGE DOOHER, JR., STEPHEN EVANS, LINDA FANTON, JERRY FISHMAN, JAY FRANTZ, LAWRENCE GARVEY, ALAN NEPHEW, SUSAN ROWLEY, JOSEPHINE THOMAS, and MARIANNE VOLANTE,

Petitioners-Respondents,

-against-

GOVERNOR KATHY HOCHUL, LIEUTENANT GOVERNOR AND PRESIDENT OF THE SENATE BRIAN A. BENJAMIN, SENATE MAJORITY LEADER AND PRESIDENT PRO TEMPORE OF THE SENATE ANDREA STEWART-COUSINS, SPEAKER OF THE ASSEMBLY CARL HEASTIE, and THE NEW YORK STATE LEGISLATIVE TASK FORCE ON DEMOGRAPHIC RESEARCH AND REAPPORTIONMENT,

Respondents-Appellants,

and

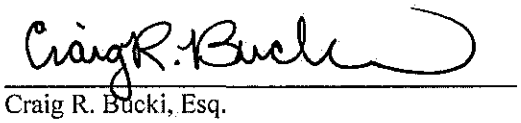
NEW YORK STATE BOARD OF ELECTIONS,

Respondent.

STIPULATION PURSUANT TO CPLR 5532

IT IS HEREBY STIPULATED AND AGREED by and among the undersigned attorneys for the respective parties hereto that the foregoing Record on Appeal is hereby deemed correct and complete, subject to the inclusion in a Supplemental Record of the transcript of proceedings in the Steuben County Supreme Court, Hon. Patrick F. McAllister, A.J.S.C., on March 31, 2022, and that settlement of the transcripts and certification of the record are hereby waived.

Dated: 4/13/2022



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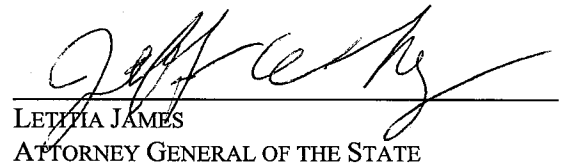

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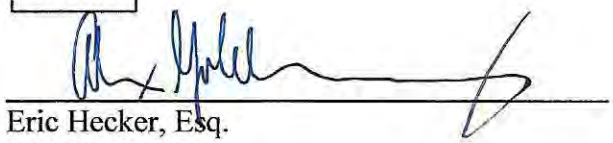

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