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TABLE OF CONTENTS

REDACTED PORTIONS OF THE FINAL TRANSCRIPT

VOLUME IV, DECEMBER 14, 2017

The Parties have stipulated to the redactions of
testimony: Pages 1,144, Line 14 to Page 1,154, Line 11

EXAMINATION

WITNESS:	DIRECT	CROSS	REDIRECT
NOLAN MCCARTY, PH.D.	1418	1499	1616
			VOIR DIRE
NOLAN MCCARTY, PH.D.			1409, 1415

REBUTTAL

	DIRECT	CROSS
JOWEI CHEN, PH.D.	1650	1702

E X H I B I T S

PETITIONERS' EXHIBITS:	MARKED	PAGE:
Number 163		1642
Number 164		1642
Number 165		1642
Number 166		1642
Number 167		1642

1	E X H I B I T S (Continued)		
2	PETITIONERS' EXHIBITS:	MARKED	PAGE:
3	Number 168		1643
4	Number 169		1643
5			
6	Number 170		1643
7			
8	Number 171		1643
9	Number 172		1643
10	Number 173		1644
11			
12	Number 174		1644
13	Number 175		1644
14			
15	Number 176		1644
16	Number 177		1644
17			
18	Number 178		1646
19	Number 179		1646
20			
21	Number 266		1578
22			
23	LEGISLATIVE RESPONDENTS' EXHIBITS:	MARKED	PAGE:
24	Number 16		1411
25			

1	LEGISLATIVE RESPONDENTS' EXHIBITS:	MARKED	PAGE:
2	Number 17		1497
3	Number 18		1497
4			
5	Number 19		1625
6			
7	STACK EXHIBITS:	MARKED	PAGE:
8	Number 11		1631
9			
10	Number 12	1613	1613
11			
12	EXECUTIVE BRANCH EXHIBITS:	MARKED	PAGE:
13	Number 2	1629	1629
14			
15	INTERVENORS' EXHIBITS:	MARKED	PAGE:
16	Number 2	1635	1635
17			
18	Number 16		1636
19			
20	Number 17		1636
21			
22			
23			
24			
25			

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

Harrisburg, Pennsylvania
December 15, 2017; 9:40 a.m.

THE CLERK: All rise. The
Commonwealth Court is now in session, the
Honorable Judge Kevin Brobson presiding.

THE COURT: Good morning. Please be
seated, everyone.

Before we resume testimony, I have a
housekeeping matter of my own that I'd like
to take up.

Mr. Tabas --

MR. TABAS: Yes, Your Honor.

THE COURT: -- I was reviewing the
stipulation of facts that the parties filed
in this case, and I had a question about
Paragraphs 194 and 195.

MR. TABAS: It may be upstairs with
my associate, Your Honor.

THE COURT: That's fine.

Let me tell you, 194 relates to --
194 relates to an Intervenor,
Kathleen Bowman, and 195 relates to an

1 Intervenor Brian Lieb.

2 MR. TABAS: Yes, Your Honor.

3 THE COURT: Neither of those
4 Intervenor are identified on the
5 application for leave to intervene.

6 MR. TABAS: The original one, they
7 were not, Your Honor. We filed a precipe to
8 join them very early in the case, like, a
9 few weeks after that was filed.

10 THE COURT: So you filed an amended
11 application to intervene?

12 MR. TABAS: Yes, and precipe to
13 amend -- to include them. And we attached
14 their verifications -- their signed
15 verifications were included.

16 THE COURT: Okay. We'll check the
17 docket on that. It was just something that
18 stood out for us --

19 MR. TABAS: I understand,
20 Your Honor.

21 THE COURT: -- but we'll check the
22 docket on that.

23 MR. TABAS: Thank you.

24 THE COURT: Okay. Any other
25 housekeeping matters to address this morning

1 before we begin testimony?

2 MR. LEWIS: Your Honor,
3 Patrick Lewis for the
4 Legislative Respondents.

5 We just wanted to inform the Court
6 that we have reached agreement with counsel
7 for Petitioners, counsel for Intervenors and
8 counsel for the State Respondents concerning
9 the scope of redaction of the Cho report,
10 Exhibit 11, and the Cho figure, Exhibit 12,
11 from Legislative Respondents.

12 We are verifying the copies to
13 insert into the binders. And I think we'll
14 have a representative from all parties
15 during the break this morning, and we'll
16 make the substitutions in the exhibit
17 binders.

18 THE COURT: Okay. On the break
19 this morning, I have I hard break at 10:30
20 that I need to leave for. And I could
21 probably fudge that a little bit toward
22 10:45, but it's -- it's a pretty hard break,
23 so I need to take that. And then I may not
24 get back until 11:00, so that gives you
25 about a half an hour for you all to -- to --

1 to -- to do your substitutions.

2 Will that work?

3 MR. LEWIS: Absolutely, it will.

4 THE COURT: Okay.

5 MR. LEWIS: On a related point,
6 we've also discussed with counsel the page
7 and line numbers from the trial transcript
8 that reference the figure, and that would
9 also need to be marked as stricken.

10 I need to review their proposal,
11 which I will do during that 10:30 to 11:00
12 time window. And, you know, it sounds,
13 based on discussions, like the way it will
14 work is there will be an amended transcript
15 filed with an index in the front to mark the
16 pages that will be, you know, not considered
17 by the Court from the transcript.

18 THE COURT: Okay. Thank you.

19 Any other housekeeping matters?

20 Legislative Respondents, please call
21 your next witness.

22 MR. TUCKER: Legislative Respondents
23 call Dr. Nolan McCarty.

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- - -

NOLAN MCCARTY, PH.D.,
after having been first duly sworn, was
examined and testified as follows:

- - -

- - -

VOIR DIRE

- - -

BY MR. TUCKER:

Q. Good morning, Dr. McCarty.

A. Good morning.

Q. Can you please describe your
educational background?

A. Yes. I have a Bachelor's degree in
economics from the University of Chicago, and I have
an MS and Ph.D. in political economics from Carnegie
Mellon University in Pittsburgh.

Q. And where are you currently employed?

A. Princeton University.

Q. And do you hold any positions at
Princeton University?

A. I'm the Susan Dod Brown Professor of
Politics and Public Affairs, and I'm the chair of the
politics department.

Q. And how long have you been in that

1 role?

2 A. I've been at Princeton for 17 years,
3 and I've been the chair of the politics department
4 for seven.

5 Q. Are you a tenured professor at the
6 University of Princeton?

7 A. Yes, I'm a full, chaired professor.

8 Q. And how long have you been a full,
9 chaired professor there?

10 A. Since 2005.

11 Q. What classes do you teach, Dr. McCarty?

12 A. As a department chair, I have a reduced
13 teaching load; but during this time, I've taught
14 Introduction to American Politics, and I've taught
15 Ph.D.-level courses in legislative politics.

16 Q. Dr. McCarty, I want to refer to you --
17 refer you to Legislative Respondents' Exhibit 16.
18 And if you need a hard copy, there's a white binder
19 behind you there that's got --

20 THE COURT: Further to the left,
21 Dr. McCarty. Keep going. There you go.

22 BY MR. TUCKER:

23 Q. And that's Exhibit 16.

24 Can you identify what
25 Legislative Respondents' Exhibit 16 is, Dr. McCarty?

1 A. It appears to be my curriculum vitae,
2 my CV.

3 Q. Can you look through it and confirm
4 that it is a true and accurate copy of your current
5 curriculum vitae?

6 A. Yes. It's from -- as of November 22nd.

7 MR. TUCKER: Your Honor, at this
8 time, we move to admit
9 Legislative Respondents' Exhibit 16.

10 THE COURT: Any objection?

11 MR. GERSCH: No objection,
12 Your Honor.

13 THE COURT: Without objection,
14 Legislative Respondents' Exhibit 16 is
15 admitted into the record.

16 - - -

17 (Whereupon, Legislative Respondents'
18 Exhibit Number 16 was admitted into
19 evidence.)

20 - - -

21 BY MR. TUCKER:

22 Q. Dr. McCarty, have you done any research
23 or studies related to redistricting?

24 A. Yes. I've done some analysis,
25 published analysis, articles and books looking at the

1 relationship between districting and political
2 polarization in legislatures.

3 Q. And have you also written any
4 literature or peer-reviewed articles that relate to
5 redistricting?

6 A. Yes. I have a peer-reviewed work on
7 the -- the relationship between redistricting and
8 political polarization.

9 Q. And are those articles reflected in
10 your CV?

11 A. Yes, they are.

12 Q. Have you been involved with any
13 academic journals?

14 A. Yes. I was the founding coeditor of
15 the Quarterly Journal of Political Science, which is
16 a journal that specializes in quantitative and
17 analytical political science.

18 Q. Have you been involved in any expert
19 work related to redistricting?

20 A. Yes, I have. I provided reports and
21 testimony in two redistricting cases in Florida: one
22 involving the Congressional districting plan, and one
23 involving a state Senate districting plan.

24 Q. And can you just generally describe the
25 scope of what the testimony was that you provided in

1 those two cases in Florida?

2 A. In both of those cases, I was a
3 rebuttal witness responding to witnesses that had
4 used simulations to estimate the partisan bias of
5 those districting plans.

6 Q. Now, have you also studied or
7 researched polarization in Congress?

8 A. Yes, I have. In fact, the bulk of my
9 research for about 25 years has been the study of
10 political polarization in Congress and the state
11 legislatures.

12 Q. And does that research in those
13 studies, Dr. McCarty, include research into voting
14 patterns and voting behavior?

15 A. Yes, they do.

16 Q. Have you written any peer-reviewed
17 articles in the areas of polarization, voting
18 patterns and voting behavior?

19 A. Yes, I have, several.

20 Q. And are those articles likewise
21 reflected in your CV?

22 A. They are, yes.

23 Q. Dr. McCarty, finally, have you also
24 done research and studies into election analysis?

25 A. Yes, I have. Many of my articles and

1 several of my books use election data to evaluate
2 various hypotheses about voter and legislative
3 behavior.

4 Q. You have extensive experience in
5 evaluating election data?

6 A. Yes. I've used the quantitative --
7 I've used quantitative measures of election outcomes
8 in almost all of my work over the course of my
9 career.

10 MR. TUCKER: Your Honor, at this
11 time, we move to qualify Dr. McCarty as an
12 expert in the areas of redistricting,
13 quantitative election and political
14 analysis, representation and legislative
15 behavior, and voting behavior.

16 THE COURT: Any objections?

17 MR. GERSCH: No objection.

18 Brief voir dire, Your Honor?

19 THE COURT: Well, if you have no
20 objection, why would you voir dire?

21 MR. GERSCH: I'm sorry, no objection
22 yet.

23 THE COURT: Well, you either have
24 an objection -- you either have an
25 objection, you don't know if you have an

1 objection, you want to voir dire. It's one
2 of those two.

3 MR. GERSCH: Correct; I'd like
4 to voir dire.

5 THE COURT: Okay --

6 MR. GERSCH: Thank you, Your Honor.

7 THE COURT: -- you may.

8 - - -

9 VOIR DIRE

10 - - -

11 BY MR. GERSCH:

12 Q. Good morning, Dr. McCarty. My name is
13 David Gersch, and I represent the Petitioners in this
14 action.

15 You and I have never met?

16 A. That's correct.

17 Q. We've never spoken before?

18 A. No, never.

19 Q. All right. Just a few questions for
20 you.

21 Do you do any work -- any published
22 work simulating maps to determine whether or not a
23 particular Congressional map or any map is a
24 gerrymander?

25 A. I have used some simulations, but it

1 did not deal with the questions of whether or not
2 they were partisanship gerrymanders. There's some
3 simulations in my work on the relationship between
4 political polarization and redistricting, but they're
5 not primarily focused on measuring partisan bias.

6 Q. Okay. So you're not one of those folks
7 who -- who tries to come up with a system for or a
8 yardstick for determining when there's sufficient
9 partisan bias to call something a gerrymander and
10 when there isn't?

11 A. No, no, I'm not.

12 Q. All right. And -- and you're also not
13 someone who creates metrics, like the efficiency gap
14 or things like that, which some scholars will say
15 will help them determine a -- whether there is a
16 partisanship gerrymander?

17 A. I've not been involved in any
18 measurements related to districting plans. I've been
19 involved in lots of measurement involving legislative
20 behavior.

21 Q. And I understand that that -- that's a
22 principal focus of -- of your work.

23 Have you published anything in which
24 you -- regardless of the methodology, you address the
25 question of whether a particular state's plan or a

1 particular -- or even a single district in a state
2 was any kind of gerrymander?

3 A. No.

4 MR. GERSCH: Thank you, Dr. McCarty.

5 THE COURT: He's been offered as an
6 expert in redistricting, quantitative
7 election and political analysis,
8 representation and legislative behavior, and
9 voting behavior.

10 Any objection to his qualifications
11 in those areas?

12 MR. GERSCH: Your Honor, can I ask
13 one more question? I realize I should have
14 asked one more.

15 THE COURT: Sure.

16 BY MR. GERSCH:

17 Q. Dr. McCarty, correct me if I'm wrong.

18 You're not planning to offer an opinion
19 on whether or not Pennsylvania's map is a
20 gerrymandered map, are you?

21 A. No. I'm going to evaluate the evidence
22 that was presented by experts on that issue.

23 MR. GERSCH: All right. With that
24 clarification, no objection, Your Honor.

25 THE COURT: Okay. He will be

1 accepted in those areas as an expert without
2 objection.

3 - - -

4 DIRECT EXAMINATION

5 - - -

6 BY MR. TUCKER:

7 Q. Dr. McCarty, are you familiar with the
8 2011 Congressional redistricting plan in
9 Pennsylvania?

10 A. Roughly familiar, familiar enough to
11 kind of evaluate the statistical arguments which were
12 made about its performance.

13 Q. And did you author a report in this
14 case?

15 A. Yes, I did.

16 Q. I'd like to refer you to
17 Legislative Respondents' Exhibit 17.

18 A. Okay.

19 Q. Have you had a chance to look at
20 Exhibit 17?

21 A. Yes.

22 Q. And is this the report that you have
23 offered in this case?

24 A. I believe so.

25 Q. Can you take your time and look through

1 it and confirm if it is the full report that you've
2 authored in this case?

3 A. Yes, it appears to be so.

4 MR. TUCKER: Your Honor, consistent,
5 I think, with how we've been handling the
6 other expert witnesses, we'll move to admit
7 his report at the end of his testimony.

8 THE COURT: Good plan.

9 BY MR. TUCKER:

10 Q. Dr. McCarty, are there various measures
11 that can be used to measure partisan bias?

12 A. Yes, there have been various measures
13 proposed over the years to measure the performance of
14 districting plans, which some people interpret as
15 measures of partisan bias.

16 Q. And can you describe what some of those
17 methodologies are?

18 A. So one of the oldest is to look at the
19 swing ratio, which is essentially a relationship
20 between seats and votes, looking at that relationship
21 as it departs from 50 percentage -- 50 percent of the
22 votes.

23 There's -- more recently, there's the
24 measure called "efficiency gap," which looks at the
25 allocation of wasted votes across seats controlled by

1 different parties.

2 And then there are measures which are
3 basically just simply tallying up the number of
4 districts in which a -- one party or the other has
5 obtained a majority in some previous election or
6 through voter registration or through some other
7 metric like that.

8 Q. Did you attempt to identify the
9 estimated number of seats each party was expected to
10 win under the 2011 Plan in Pennsylvania?

11 A. That was -- that was part of my report,
12 yes.

13 Q. And how did you do that?

14 A. So what I did in that case was I
15 computed a measure of partisanship of each of those
16 Congressional districts in the plan; I used
17 historical data from Congressional elections
18 throughout the United States to assess the
19 relationship between district partisanship and the
20 Congressional election outcomes; and then I used the
21 probabilities that each party would win each of the
22 Congressional seats in Pennsylvania to estimate the
23 expected number of seats that each party would
24 obtain.

25 Q. So, as I understand it, Dr. McCarty,

1 you started by first attempting to -- to estimate --
2 or determine the -- the partisanship of each
3 Congressional district under the 2011 Plan?

4 A. Yes, to come up with some measure of
5 the kind of underlying partisanship of each district.

6 Q. And how did you calculate whether a
7 district was Republican-leaning or
8 Democratic-leaning?

9 A. So I used presidential voting data and
10 computed a measure that's sort of commonly used in
11 the literature called the "Partisan Voting Index."
12 So I computed that for each of Pennsylvania's 18
13 Congressional districts.

14 Q. And, specifically, what data did you
15 use to compute the Partisan Voting Index for each
16 Congressional district?

17 A. So the Partisan Voting Index is a
18 measure that's based on presidential vote returns in
19 each Congressional district. So it involves taking
20 the presidential voting returns in a Congressional
21 district for the previous two elections and then
22 subtracting the national performance of each of the
23 parties from that measure and then taking the average
24 over those two elections.

25 Q. And where did you obtain this data?

1 A. I obtained this data from a firm called
2 Polydata. I bought the data sometime in 2015 for an
3 unrelated academic project.

4 Q. And is this method of calculating a
5 Partisan Voting Index -- or I think it's referred to
6 commonly as PVI; is that correct?

7 A. That's correct, yes.

8 Q. Is this method commonly accepted in the
9 political science community?

10 A. It's common -- so using presidential
11 votes as a measure of partisanship in Congressional
12 districts, which is essentially what the PVI does, is
13 commonly accepted. Using presidential vote returns
14 is often used in regressions on election outcomes
15 under the heading of kind of the normal vote of the
16 district.

17 The PVI is slightly different only in
18 that I'm using two presidential elections to compute
19 this average for more precision. But within the kind
20 of practitioner community, the PVI is -- plays a much
21 more prominent role in discussions.

22 So purely as a presentational thing, I
23 decided it would be good to use the PVI, but it's
24 very consistent with academic research, which uses
25 the presidential voting returns to predict

1 Congressional election outcomes.

2 Q. So in your opinion, is using past
3 presidential elections better than using, say,
4 statewide elections?

5 A. There's some advantages for using
6 presidential election returns. Presidential
7 elections tend to be very high profile, partisanship
8 affairs; whereas some statewide election might be
9 more idiosyncratic, driven by, you know, strong --
10 strong versus weak candidates. Presidential
11 elections are always highly contested. Some
12 statewide elections are not quite as closely
13 contested. So I had -- I think there's some
14 advantages in using presidential votes.

15 The main reason why I use presidential
16 votes is I needed to do some comparisons with --
17 Pennsylvania with the rest of the country, and I
18 obviously don't have Pennsylvania statewide votes in
19 any state other than Pennsylvania.

20 Q. And why did you use 2004 and 2008
21 presidential elections as opposed to, say, 2012 or
22 maybe even 2016?

23 A. Well, what I wanted to assess for the
24 enacted districting plan was what the partisanship of
25 those districts would have looked like at the time

1 the plan was adopted. And, of course, the 2012
2 election had not occurred at that time.

3 Q. Dr. McCarty, is your analysis of the
4 Partisan Voting Index reflected in Figure 1 of your
5 report?

6 A. Yes, yes, it is.

7 Q. And can you describe what Figure 1
8 shows?

9 A. Sure. So let me back up just one
10 second.

11 Usually, when there are references to
12 Partisan Voting Index, they come -- they're described
13 as something as R plus 2, which means Republican
14 presidential candidates ran 2 percentage points
15 better in that district than they did nationally; or
16 they might refer to them as D plus 3, which means
17 that the Democratic presidential candidates did
18 better in that district by 3 percentage points better
19 than nationally.

20 What Figure 1 reflects is kind of a
21 rescaling of those indices such that the R plus
22 numbers are given positive values, so an R plus 3 is
23 a 3; and the D-leaning districts are given negative
24 values, so a D plus 3 would be a minus 3 on this
25 scale.

1 So with that rescaling, this Figure 1
2 does represent my estimates of the Partisan Voting
3 Index for the enacted plan at the point it was
4 enacted.

5 Q. So just by way of example, if, in a
6 presidential election, the Republican candidate for
7 president gets 51 percent of the vote, and a -- in a
8 particular Congressional district, that district
9 voted for that president and gave him 53 percent of
10 the vote, that would be an R plus 2 district?

11 A. I'm sorry. Could you -- so I get it
12 right, can you restate the example?

13 Q. Sure. I'm trying to give an example so
14 it's easy to understand.

15 If a presidential candidate nationally
16 got 51 percent of the vote -- the Republican
17 candidate for president got 51 percent of the vote
18 and a -- that candidate got 53 percent of the vote in
19 a particular Congressional district in Pennsylvania,
20 that district would be identified as an R plus 2
21 district, correct?

22 A. Yes, it would, except I'm averaging two
23 elections. So subject to that caveat, that is the
24 correct interpretation.

25 Q. Thank you.

1 How many districts under the 2011 Plan,
2 using the data that you used, did you determine had a
3 positive Republican PVI?

4 A. I'll have to count.

5 (Whereupon, the witness reviews the
6 material provided.)

7 THE WITNESS: Eleven.

8 BY MR. TUCKER:

9 Q. And how many did you determine had a
10 negative Republican PVI, or would be a district that
11 would be then Democratic-leaning?

12 A. Five.

13 Q. And were there any that were a wash, or
14 zero?

15 A. Yes, one that was approximately zero.

16 Q. Does this analysis, Dr. McCarty, tell
17 us how many districts Republicans or Democrats are
18 likely to win under the enacted plan?

19 A. No, it does not.

20 Q. And what are some of the factors that
21 go into whether or not a particular Congressional
22 candidate running in a district will prevail?

23 A. Well, partisanship is one of them, so,
24 of course, there is going to be some -- some
25 relationship between the PVI and the outcome of the

1 Congressional election. But there are many other
2 factors: national waves, spending on an election, the
3 quality of candidates on both sides.

4 So things -- you know, factors having
5 to do with the actual politics of elections obviously
6 help determine these outcomes, in addition to the
7 underlying partisanship of districts.

8 Q. And are there other outside influences
9 that can impact a Congressional race?

10 A. Sure. Spending by outside actors, the
11 popularity of the president or unpopularity of the
12 president, just kind of political winds.

13 Q. And does simply identifying whether a
14 district has a positive or negative PVI tell us
15 whether a district is competitive?

16 A. Not telling whether it's just positive
17 or negative. I would say that we would think of
18 competitive districts as being ones that have PVIs
19 that are small in absolute terms.

20 But, you know, a district that's, say,
21 R plus 1 is not much more likely to be won by a
22 Republican than -- than, you know, an R minus -- I
23 mean a D plus 1 or a minus 1. So there are other
24 things other than just the kind of underlying
25 partisanship that determine election outcomes.

1 Q. So did you calculate the percentage
2 that a party, either the Democrats or Republicans,
3 were likely to win a district based upon the PVIs
4 that you calculated?

5 A. Yes. So what I did, because of the
6 recognition that this figure itself doesn't really
7 tell you how many seats Republicans are expected to
8 win, because they should win some but not all of the
9 close or competitive elections, I needed a measure of
10 what the relationship between underlying partisanship
11 or the PVI is in Congressional election outcomes.

12 So I acquired data on Congressional
13 election outcomes from 2004 to 2014, and I related
14 those outcomes nationally to measures of the
15 partisanship Partisan Voting Index for each of those
16 districts over those six elections. And that was to
17 help me determine, you know, what the likelihood that
18 a district with a particular value of the PVI would
19 vote for a Democratic candidate.

20 THE COURT: Counsel, can I
21 interrupt for a second?

22 MR. TUCKER: Sure.

23 THE COURT: I know we have a
24 transcript running, but I'm trying to write
25 down these numbers.

1 Can we go back to that last chart?

2 Professor, I want to understand --
3 how many districts on this map did you say
4 have -- or this chart have a negative PVI,
5 essentially favorable to Democrats?

6 THE WITNESS: I think I may have
7 said five, but it -- it appears to be six.
8 The resolution is not very -- not very
9 clear.

10 THE COURT: Okay. My numbers
11 weren't adding up, and I just --

12 THE WITNESS: You're absolutely --
13 you're absolutely right. The very small
14 negative -- there's a very small negative
15 one which I think I miscounted. So it
16 should be six negative numbers.

17 BY MR. TUCKER:

18 Q. I thought you said six. So if I didn't
19 catch that, that's my fault, too.

20 A. I'm sorry.

21 MR. TUCKER: Okay, Your Honor?

22 THE COURT: Yes, please.

23 BY MR. TUCKER:

24 Q. So to -- to clarify, Dr. McCarty, if a
25 district has a PVI of R plus 3, does that mean that

1 the Republicans are going to win that district every
2 time?

3 A. No, it doesn't. Historically, that's
4 not been the case in Congressional elections
5 nationwide.

6 Q. And so what -- what you did next, then,
7 was attempt to identify how many times in such
8 districts that the Republicans might win versus the
9 Democrats might win?

10 A. That's correct, yes.

11 Q. And can you describe how you went about
12 doing that analysis?

13 A. Sure.

14 As I said, I collected -- or acquired
15 data from Gary Jacobson, kind of a leading scholar of
16 Congressional elections, who has a widely used
17 database of Congressional election outcomes.

18 And so I matched my estimates of
19 district PVI to all the districts in his database
20 from 2004 to 2014, and just simply for each value of
21 the PVI, I computed the proportion of times that the
22 Democratic candidate won that election.

23 Q. So you looked at all Congressional
24 elections across the entire country from 2004 to
25 2014?

1 A. That is correct, yes.

2 Q. Why did you look to Congressional
3 elections outside of Pennsylvania for trying to
4 assess only the Congressional elections in
5 Pennsylvania?

6 A. Well, there are relatively few
7 Congressional elections that have taken place in
8 Pennsylvania. And in order to get estimates for a
9 broad range of PVI values, I just simply needed more
10 data to get more precision on what those proportions
11 should be.

12 Q. Do differences in states' political
13 ideologies play a factor in that?

14 A. They could, conceivably. I don't know
15 in which direction that would fall, but I think the
16 districts in Pennsylvania, over the course of the
17 period of time that I'm looking at, did not depart
18 quite a lot from the national pattern. The
19 Democratic Party have won several seats, especially
20 in 2004 and 2006, that had Republican-leaning PVIs,
21 quite consistent with what I found nationally.

22 So while I don't rule out that there
23 can be variation from state to state, there didn't
24 really seem to be anything particular about
25 Pennsylvania that seemed anomalous compared to the

1 national record.

2 Q. And why did you now use data through
3 2014 when, previously, calculating the PVIs for
4 Congressional districts in Pennsylvania, you only
5 used 2004 and 2008 data?

6 A. Well, what I wanted to -- the kind of
7 consistent methodology I used was to have the most --
8 use the most recent PVI for whichever event or
9 decision that I was analyzing. So in analyzing the
10 partisanship of the enacted plan, I wanted to have
11 the PVI that was in place and most recent at the time
12 that plan was enacted.

13 But when I'm looking at Congressional
14 district elections over the course of this
15 six-election time frame, I wanted to, for each of
16 those elections, use the most recent PVI that would
17 have been in place as those elections were happening.

18 So when I'm looking at 2014
19 Congressional elections, I am using a PVI based on
20 the 2012 and 2008 elections. It's totally consistent
21 with the premise that I just wanted to, in each case,
22 use the most recent PVI at the time something was
23 happening.

24 Q. So you used data from the two most
25 recent president elections for that particular

1 Congressional election?

2 A. That is correct, yes.

3 Q. Now, are your findings for this
4 analysis reflected in Figure 2 of your report?

5 A. Figure 2 reflects part of the findings.
6 Then there's an extension of those findings in the
7 appendix.

8 Q. And can you describe what Figure 2
9 shows?

10 A. Sure. So Figure 2 is a plot where the
11 X axis ranges from a PVI of minus 10 to a PVI of 10.
12 And then the Y axis represents the proportion of
13 elections at each level of PVI that a Democratic
14 candidate won.

15 Within the plot, each of the circles,
16 the size reflects the number of elections that
17 occurred nationally for which I'm able to compute
18 these proportions.

19 Q. So as I understand what you're saying,
20 the X axis reflects the PVI, the PVI for the
21 district, correct?

22 A. That is correct, yes.

23 Q. And the Y axis represents the
24 percentage of times that PVI occurred out of all of
25 the --

1 A. No, no. The Y axis represents the
2 proportion of times that a Democratic candidate won
3 an election for a given PVI.

4 Q. I'm sorry. That's -- that's what I
5 meant.

6 So the -- the Y axis reflects the
7 percentage of times that the Democrat is going to win
8 that district with that given PVI?

9 A. Yes. Actually, to be -- to be
10 perfectly correct, the proportion of time, since I
11 have it scaled from zero to 1 instead of zero to 100.

12 Q. And the larger the circles, the dots in
13 this figure, that's the more times that those
14 elections occurred?

15 A. That is correct, yes.

16 Q. Now, I see in your Key you have
17 something written there called "lowest."

18 What do you mean by that?

19 A. Yes. So the lowest is just simply a
20 prediction line that uses kind of the local
21 information, the observations around a particular
22 point, to estimate the best prediction. I think the
23 easiest way to think about it is that it's a
24 smooth-moving average of the data as you move from a
25 PVI of minus 10 to 10.

1 Q. So, generally, the higher the PVI in
2 favor of Republicans, the less likely Democrats are
3 going to win that district?

4 A. Yes, that is -- that is true. But the
5 point that I think the figure brings out is that that
6 relationship changes fairly gradually, that it's not
7 just simply a jump where PVIs of plus 1 are extremely
8 Republican and PVIs of minus 1 are extremely
9 Democratic.

10 As one can see from the figure, the
11 relationship is much smoother than that, and there's
12 not a big jump in Democratic success as you move from
13 the positive numbers to the negative numbers.

14 Q. Does Figure 2 represent the full
15 spectrum of results from this analysis?

16 A. No. There's many much less competitive
17 districts, ones that are below minus 10 and plus 10.
18 So I did not put them in the figure so the figure
19 would be scaled appropriately. But I did include in
20 the appendix the full set of results for all
21 Congressional districts over this period.

22 Q. And, Dr. McCarty, I've now put up on
23 the screen -- and I'll refer you back to your
24 report -- is this the appendix you were just
25 describing?

1 A. I'm sorry. That's still Figure 2.

2 Q. There we go.

3 Dr. McCarty, is this the appendix in
4 your report?

5 A. Yes, that's the first page of the
6 appendix. Because there are many, many districts, it
7 goes on for several pages.

8 Q. And what does the first column that's
9 titled Republican PVI -- what does that represent?

10 A. That represents my estimate of the PVI
11 where, again, I've scaled it such that the Republican
12 numbers are positive and the Democratic-leaning
13 numbers are negative.

14 Q. And what does the second column mean,
15 which says Number of Elections?

16 A. It's the number of times that a
17 Congressional election was held in the seat with a
18 particular value of the PVI over this six-election
19 time period.

20 Q. So over this time period, there were
21 two elections where you calculated the Republican PVI
22 to be 32?

23 A. That's correct, yes.

24 Q. And then what is the third column that
25 says, Proportion of Democratic victories?

1 A. That's the proportion of times that the
2 Democratic candidate won in a district with a
3 particular PVI.

4 Q. So I want to refer you to the bottom of
5 the first page of this chart, where we see, in the
6 first column there, the Number 6.

7 So that represents a PVI of R plus 6?

8 A. Yes, that's correct.

9 Q. And how many times did you find in your
10 analysis those types of districts in the 2004 to 2014
11 Congressional elections?

12 A. In my data set, there were 129 such
13 instances.

14 Q. And what percentage of those elections
15 did the Democrats win?

16 A. 23.3 percent.

17 Q. Now I want to refer you to the first
18 column with the positive number of 1.

19 And what -- that represents, again,
20 the -- or a Republican PVI of plus 1?

21 A. Yes.

22 Q. And how many instances did you find
23 districts with a PVI of R plus 1?

24 A. It appears to be 63 times.

25 Q. And how often did the Democratic

1 candidate win those districts?

2 A. 39.7 percent of the time.

3 Q. Dr. McCarty, how did you now use this
4 analysis to calculate the number of Congressional
5 districts that each party was expected to win under
6 the 2011 Plan?

7 A. Well, sure, now that I have an estimate
8 of the probability that the Democrat or Republican
9 would win for a particular PVI, I'm then able to use
10 the data represented in Figure 1 with giving the PVIs
11 for each of the districts, and then for each of those
12 districts, relating that to the probability that a
13 Democratic candidate would win. And then I'm able,
14 from that information, to compute the expected number
15 of Republican and Democratic seats.

16 Q. So if I understand you correctly, you
17 took the -- the PVIs that you had calculated from
18 Figure 1 for each of the 18 Congressional districts
19 in Pennsylvania, correct?

20 A. That's correct, yes.

21 Q. And you -- and you -- for whatever the
22 corresponding PVI you calculated is, you then went to
23 your chart in appendix -- in the appendix of your
24 report and identified the percentage of times that
25 you calculated that the Democratic candidate would

1 still win that district?

2 A. That's correct. Yes.

3 Q. And, now, did you do this analysis for
4 both the 2011 Plan and the prior 2002 Congressional
5 Plan?

6 A. Yes, I did.

7 Q. And how did you -- did you use the same
8 analysis for calculating the Congressional districts
9 under the prior plan?

10 A. Yes, I did. And in that case, however,
11 I did use the 2004, 2008 PVI because I wanted to know
12 the partisanship of the 2002 Plan at the time in
13 which the 2011 Plan was being adopted so that I could
14 compare the changes between the two plans.

15 Q. So you used the same data set for
16 calculating the PVIs under the 2002 Plan and the
17 2011 Plan?

18 A. That's correct.

19 Q. And I notice, Dr. McCarty, in Table 1,
20 this says the 2004 Congressional Districting Map. I
21 just want to clarify.

22 That was a typographical error?

23 A. Yes. That was a mistake, yes.

24 Q. That should be 2002?

25 A. Yes, that's correct.

1 Q. Can you walk us through what Table 1
2 shows?

3 A. Sure. So starting with the -- the left
4 three columns, which reflect the 2002 Congressional
5 Districting Plan, the first column is CD, or
6 Congressional District. The second column is what I
7 calculate to be the PVI for that district, using
8 2004, 2008 election returns. And then the third
9 column, the prob(DEM) column, is just simply the
10 probability that based on historical nationwide
11 patterns, I would expect a Democrat to win such a
12 district.

13 Q. And what do the next three columns,
14 then, represent?

15 A. The second three columns contain the
16 same information but for the 2011 Congressional
17 Districting Plan.

18 Q. So by way of example, for the Fourth
19 Congressional District, you calculated a PVI of
20 R plus 6 under the prior plan and that the Democrats
21 had a -- about a 23 percent chance of winning that
22 district?

23 A. Yes, so -- so, yes, I computed there's
24 a PVI -- District 4 had a PVI of plus 6.
25 Historically, Democrats have won 23.3 percent of

1 those districts, and so I assigned a probability that
2 that district would go Democratic .233.

3 Q. And then how did you use these numbers,
4 Dr. McCarty, to estimate the expected number of seats
5 that the Democrats would likely win under both the
6 2002 Plan and the 2011 Plan?

7 A. Well, given that each of these rows
8 represent -- provides information, the probability
9 that a Democrat would win the seat, it's easy to
10 compute the expected number of seats for Democrats
11 simply by summing up the rows of probabilities for
12 each of the two plans.

13 Q. And what did your summations show?

14 A. So my summations showed that the
15 expected number of Democratic seats under the
16 2002 Plan was 9.55, so, you know, be expected to win
17 somewhere between nine and 10 seats. And then for
18 the 2011 Congressional Plan, which had one fewer
19 seats, 18 instead of 19, I expected that the
20 Democrats would win slightly more than eight seats.

21 Q. So the Democrats were expected to win
22 under the prior plan, under your analysis, about
23 nine-and-a-half seats?

24 A. That's correct.

25 Q. And under the enacted plan, they're

1 expected to win a little over eight seats on average?

2 A. That's correct, yes, that's what I
3 counted.

4 Q. Now, how does the loss of a
5 Congressional seat that Pennsylvania experienced
6 after the 2010 apportionment -- how does that impact
7 that analysis?

8 A. Well, since under the 2002 Plan,
9 Democrats were winning about half the seats, I think
10 it's fair to assess the loss of a seat is reflecting
11 half a seat lost for the Democrats and half a seat
12 lost for the Republicans.

13 So at least .5 of the difference
14 between 9.5 and 8.1 can be, I think, directly
15 attributable to the loss of a seat.

16 Q. So after attributing the loss of a
17 seat, about how many additional seats do you
18 anticipate or do you -- do you estimate the
19 Republicans would have been expected to win under the
20 2011 Plan?

21 A. It appears that if one had applied the
22 product -- the expected Democratic share from the
23 2002 Plan, which is just .503, to the 18 seats that
24 were available in 2011, that the Democrats should've
25 won something like 8.9 instead of 8.1.

1 So there's about a .8 -- you know,
2 three-quarters of a seat in expectation difference --
3 between the two plans in terms of their partisanship.

4 Q. Now, analyzing the 18 Congressional
5 districts under the 2011 Plan, based upon your PVI
6 analysis, how many of these districts would you
7 consider competitive?

8 A. So there's no hard-and-fast rule for
9 defining what is competitive. I think a good rule of
10 thumb, for me, is to look at districts for which one
11 or both parties have more than a 20 percent chance of
12 winning.

13 Q. And how many of those districts do you
14 see reflected in Table 1?

15 A. Well, let me count.

16 I'm counting 10.

17 Q. So you see 10 of the 18 districts, in
18 your opinion, Dr. McCarty, based on your analysis,
19 are competitive districts under the 2011 Plan?

20 A. Ten of the districts have the property
21 [sic] that each party has at least a 20 percent
22 chance of winning.

23 Q. And how many of the districts that are
24 not competitive are favorable to the Democrats?

25 A. Let me -- let me count.

1 I count five.

2 Q. And how many of the noncompetitive
3 districts are favorable to the Republicans?

4 A. I -- I count three.

5 Q. Now, I want to ask you a couple of
6 specific questions about some of these districts. We
7 see very, very high -- or I should say very, very low
8 PVI numbers in Districts 1 and 2.

9 Are you aware of anything that might be
10 impacting those districts and why they would have
11 such a highly leaning Democratic PVI?

12 A. Both of those districts are centered
13 around --

14 MR. GERSCH: Objection: This is
15 outside the scope of the report.

16 MR. TUCKER: I'm asking about
17 numbers that he calculated in the table and
18 if he has explanations and -- for some of
19 those numbers.

20 THE COURT: Why don't you lay a
21 better foundation? Because my understanding
22 from his testimony, so far, is the way he
23 arrived at the PVI was crunching numbers, so
24 if he considered some other factor other
25 than number crunching, you can try to lay

1 that foundation and see if the objection
2 goes away.

3 For now, I'm going to allow counsel
4 to rephrase and will overrule the objection
5 at this point in time. But you need to
6 establish he did more than number crunching.

7 BY MR. TUCKER:

8 Q. Dr. McCarty, do you have an
9 understanding of the political geography of
10 Pennsylvania?

11 A. I have some basic understanding. I
12 live in the Philadelphia media market, and I attended
13 Carnegie Mellon for my Ph.D.

14 Q. And did you do any investigation or
15 analysis as to whether or not the -- the reasons for
16 some of these particular PVIs?

17 A. I did -- I -- I did look at -- I did
18 look at maps that have been provided in different
19 cases, so I know the rough locations of various
20 districts and I know things about the kind of
21 demographic composition of several of the districts.

22 Q. So do you have an understanding of
23 the -- of the location of where Districts 1 and
24 Districts 2 are under the 2011 Plan?

25 A. Yes, I believe Districts 1 [sic] and

1 District 2 are in the city of Philadelphia or
2 centered around the city of Philadelphia.

3 Q. And based upon that and in your
4 expertise, do you have any opinions as to why that
5 might be resulting in some of the numbers that we're
6 seeing reflected in District 1 and District 2 in
7 Table 1?

8 MR. GERSCH: Your Honor, I'm going
9 to object that it's outside the scope of the
10 report. I think the answer to this question
11 probably will be not prejudicial, but . . .

12 THE COURT: I could very easily
13 take judicial notice of the fact that
14 Congressional District 1 and Congressional
15 District 2 are in the southeast part of the
16 state and encompass part of the city of
17 Philadelphia.

18 MR. GERSCH: Correct, Your Honor.
19 And -- and I guess I'm laying down a marker
20 for the future.

21 THE COURT: In fact, I'll ask
22 counsel for Legislative Respondents one
23 specific question: Is there anything in the
24 professor's expert report that links the PVI
25 to political demographics?

1 MR. TUCKER: I don't believe so,
2 Your Honor.

3 THE COURT: So the objection is
4 sustained.

5 MR. GERSCH: Thank you, Your Honor.

6 BY MR. TUCKER:

7 Q. So, Dr. McCarty, according to the
8 analysis that's reflected in Table 1, you predict
9 that Democrats should win about eight seats under the
10 2011 Plan, correct?

11 A. That's correct, that's the prediction.

12 Q. But as we know -- and as a stipulated
13 fact in the case -- the Democrats have only held five
14 seats in each of the last three Congressional
15 elections.

16 Is this something that we can blame the
17 2011 Plan for?

18 A. Not the partisan composition of the
19 plan. I would argue that the partisan effects of the
20 plan should be captured in this expectation and other
21 factors presumably can contribute to deviations from
22 that expectation.

23 Q. And what other factors are you
24 referring to?

25 A. Again, there's any number of things

1 that go into determining Congressional election
2 outcomes: candidate quality, incumbency, spending,
3 national tides, trends within the electorate. So at
4 the time which this was enacted, I think the evidence
5 that I can extract from national-level patterns is
6 that the Democratic Party should have won eight seats
7 in the 2012 election.

8 Q. And just doing very simple math, what
9 does that mean on how many seats that the Republicans
10 should have won under the 2011 Plan?

11 A. They should have won 10, slightly less
12 than 10. Again, it depends how you want to deal with
13 these fractions.

14 Q. Dr. McCarty, do you think it's
15 appropriate to assess partisan bias on a
16 winner-take-all analysis?

17 A. Could you rephrase the question?

18 Q. Sure. I mean, do you think it's
19 acceptable to analyze, you know, partisan bias by
20 purely looking at whether or not, you know, the
21 Republicans got 50 percent plus 1 of the vote or the
22 Democrats got 50 percent plus 1 of the vote?

23 A. No, I don't think so, because I think
24 that the relationship between district partisanship,
25 prior voting and how they're going to perform in

1 future Congressional elections is fairly uncertain,
2 so a district in which a Republican candidate have
3 historically got slightly more -- slightly larger
4 percentage of the vote, those districts are also ones
5 in which Democrats have a very, very good chance of
6 winning on occasion, and that needs to be taken into
7 account.

8 Q. Aside from calculating the estimate --
9 estimated number of seats that the Democrats and the
10 Republicans would -- would -- might win under the
11 2011 Plan, did you also look at the range of possible
12 outcomes?

13 A. Yes, I did.

14 So, again, Table 1 represents just an
15 expectation of Bayesian probabilities. Perhaps a
16 better way of looking at the question is, like,
17 assuming that these are the probabilities, what would
18 be the range of outcomes that we should -- that we
19 should see given this collection of probabilities.

20 So I did a simulation analysis to try
21 to capture the range of possible outcomes under the
22 2011 Districting Plan and, I should say, to be clear,
23 the expected range of outcomes for the 2012
24 Congressional election, because obviously
25 partisanship has changed in Pennsylvania since then,

1 so this is really a prediction about the first
2 post-enactment election.

3 Q. And how did you go about doing those
4 calculations?

5 A. So for each of the -- I conducted a
6 simulation, where I essentially simulated a thousand
7 different elections. In each of these election
8 simulations, I used random numbers and probabilities
9 to make predictions about which candidate won each
10 district in each simulation. So one way to think
11 about it is I -- for each simulation is flipping a
12 weighted coin 18 times and the weights for those
13 coins are based on the probabilities from the
14 previous table.

15 So then for each of these thousand
16 elections, I compute the number of times that it came
17 up heads for the Republicans, given my weighted-coin
18 metaphor, and then Figure 3 presents the distribution
19 of those outcomes across the thousand simulations.

20 Q. Did you write any code to run these
21 simulations?

22 A. Yes, I did.

23 Q. And did you produce that code along
24 with your expert report in this case?

25 A. Yes, I did.

1 Q. So as -- your analogy is that -- do I
2 understand this right, that essentially you had 18
3 coins, one coin reflecting each Congressional
4 district, and you essentially flipped those weighted
5 coins based upon the numbers you had already
6 calculated a thousand different times?

7 A. That is correct.

8 Q. And then does Figure 3 represent the
9 results of that simulation?

10 A. Yes, it does. It shows for each
11 outcome I observed, which ranged from five Republican
12 seats to 14 Republican seats, the percentage of times
13 of the thousand simulations in which that outcome
14 occurred.

15 Q. And what was the most common result?

16 A. Ten, which is consistent with my
17 estimate that Republicans should win about 10 seats.

18 Q. Now, Dr. McCarty, I do see that there
19 is -- there is a bar by the Number 13 down there,
20 which is the number of seats we know the Republicans
21 have held.

22 How many times in your simulations did
23 the Republicans win 13 seats?

24 A. I don't have the exact number, but just
25 looking at the figure, it looks like around 3 percent

1 of the time.

2 Q. And what does that tell us?

3 A. Well, so it tells us two things: It
4 tells us, one, that it is possible under the -- under
5 the plan for the Republicans to win 13 seats.
6 That's -- that's a useful thing to know. But it also
7 tells us that it's not that common under the plan, so
8 it doesn't seem as if the plan was designed to create
9 13 Republican seats.

10 Q. I want to clarify that point, because I
11 even had to admit, when I first saw your report, this
12 confused me a little bit.

13 Can you elaborate a little bit on what
14 you mean by it's not that -- it's not that common or
15 expected for the Republicans to win 13 seats under
16 the -- under the plan?

17 A. Well, it's -- it's a possible outcome.
18 I mean, it -- it happens in the data, so it's a
19 possible outcome, but it's not a very common outcome.

20 Hypothetically, if a plan was designed
21 to create 13 Republican seats, we would expect to see
22 13 seats be a much more common outcome or if not the
23 modal outcome. And that's not what we see here.

24 Q. The more -- what are the more common
25 outcomes that we do see here?

1 A. The most common outcome, as I
2 mentioned, was 10, but nine and 11 are also very
3 common outcomes, as are 12 and eight.

4 Q. So based upon your analysis of the
5 2011 Plan using PVI and historical voting data,
6 should we have expected to see the Republicans win 13
7 Congressional seats?

8 A. Based on my analysis, that would not be
9 the expectation, but it's also possible, given the
10 configuration of the districts.

11 MR. TUCKER: Your Honor, how are we
12 doing on time for your break?

13 THE COURT: If this is a good break
14 for you, it's a good break for me.

15 MR. TUCKER: I think it is a good
16 break, so I think we can take a break now.

17 THE COURT: Okay. We will be in
18 recess.

19 If you could all be back in the
20 courtroom by 11:00. I'm not sure that I'm
21 going to be here at 11:00, but I'll try to
22 be here as close to 11:00 as possible.

23 Thank you.

24 THE CLERK: The Court is now in
25 recess.

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(Whereupon, a recess was taken from
10:36 a.m. to 11:01 a.m.)

- - -

THE CLERK: All rise. The
Commonwealth Court is back in session.

THE COURT: Please be seated,
everyone.

Before we continue with
Dr. McCarty's testimony, Mr. Tabas, I did
some investigating -- Mr. Tabas isn't here.
We can't really begin, can we?

Let's go off the record.

- - -

(Whereupon, a discussion was held off
the record.)

- - -

THE COURT: Mr. Tabas.

MR. TABAS: Sorry, Your Honor. I
was getting the information. I was having
copies brought over as well.

THE COURT: We are getting what
information?

MR. TABAS: To respond to your
housekeeping matter.

1 THE COURT: I was going to talk to
2 you about that.

3 MR. TABAS: Yes, Your Honor.

4 THE COURT: Those two individuals,
5 Ms. Bowman and Mr. Lieb, are not on the
6 docket as parties. The reason why they're
7 not on the docket as parties is because you
8 did not submit an amended application to
9 intervene identifying them as potential
10 intervenors.

11 All we have is precipes to append
12 their affidavits to the application to
13 intervene, but there's nothing in the actual
14 body of the application to intervene that
15 identifies them as -- as an intervenor.

16 So as -- as papers are processed in
17 our court, they were just filed as precipes
18 to be appended to your application to
19 intervene, but there was no substantive
20 request for an order granting them
21 intervenor status.

22 MR. TABAS: That, I have determined
23 to be correct. We had asked what was the
24 appropriate thing to file. That's why we
25 had to paper file our precipes, because the

1 clerk's office said there was no category to
2 do it electronically.

3 And we filed the precipes, which
4 said that we were incorporating by reference
5 Paragraphs 1 through 73 of the application
6 to intervene, and then we set forth the
7 specific standing references from Ms. Bowman
8 and Mr. Lieb in there. But you're right,
9 Your Honor, there was no actual order -- we
10 didn't ask for a separate order --

11 THE COURT: You didn't specifically
12 ask for relief to allow these two people to
13 intervene.

14 MR. TABAS: That is correct,
15 Your Honor, because we hadn't had -- we
16 weren't intervened at that point. The Court
17 had not --

18 THE COURT: I understand. And I'm
19 not holding it against you. I just want to
20 make the record clear why they're not
21 indicated as intervenors on the docket.

22 MR. TABAS: I appreciate that.

23 THE COURT: But it appears,
24 considering that everybody has sort of
25 stipulated that they're intervenors in the

1 stipulation of facts, the Court will now, on
2 the record, treat the precipes to append, of
3 which there are two, as amendments to your
4 application and request that they be allowed
5 to intervene, and it will be granted.

6 MR. TABAS: Thank you very much,
7 Your Honor.

8 THE COURT: You're welcome.
9 Please continue with your direct
10 examination of Dr. McCarty.

11 MR. TUCKER: Thank you, Your Honor.

12 BY MR. TUCKER:

13 Q. Dr. McCarty, just to kind of set the
14 stage where we were before we broke. You had,
15 through a number of steps, conducted an analysis to
16 identify the expected number of seats that both the
17 Democrats and Republicans would likely win under the
18 2011 Plan, correct?

19 A. That is correct. Yes.

20 Q. And you also then took a look at the
21 range of outcomes that would be expected under the
22 2011 Plan?

23 A. Yes, I conducted simulations to get at
24 the range of possibilities, given the plan as written
25 in 2011.

1 Q. Now, have you reviewed any of the
2 Petitioners' expert reports in this case?

3 A. Yes, I have.

4 Q. Did you review a report by
5 Dr. Jowei Chen?

6 A. Yes, I did.

7 Q. And are you, then, aware of the
8 opinions that he's offered in this case?

9 A. Yes, I am.

10 Q. And are you aware that Dr. Chen, in his
11 expert reports, attempts to measure partisan bias in
12 the 2011 Plan?

13 A. Yes.

14 Q. And what is your understanding of how
15 Dr. Chen attempts to compute the partisan bias under
16 the 2011 Plan?

17 A. So his analysis is based, roughly
18 speaking, on two steps. The first is to simulate a
19 number of Congressional districting maps under a
20 partisan-neutral procedure. He does two sets of
21 those maps, one that incorporates information about
22 incumbency, residencies, and one that does not. And
23 then he compares -- then for each simulation, for
24 each district in the simulation, he assigns them as
25 either being Republican or Democratic based on voting

1 outcomes in the 2008 and 2010 Pennsylvania statewide
2 election returns.

3 So he's able for each of his
4 simulations to compute this hypothetical number of
5 Republican seats in each simulation, and then he
6 compares the distribution of those outcomes to that
7 outcome from the enacted plan.

8 Q. Do you have any opinions on the sample
9 sizes that he uses?

10 A. Simply that --

11 MR. GERSCH: Objection, Your Honor.
12 I think this relates to, if it's the matter
13 that -- it's either not in the report, or if
14 it is in the report, it's the matter in the
15 report that deals with Dr. Pegden. That's
16 the only reference to this in his report.

17 THE COURT: Hold on. Is your --
18 which one is it? Is your objection that
19 it's not in the report, or do you know -- is
20 it in the report, or isn't it in the report?

21 MR. GERSCH: The issue about
22 whether -- whether there's a big-enough
23 sample is contained in the report in
24 reference to Dr. Pegden.

25 THE COURT: Okay.

1 MR. GERSCH: I don't know what
2 answer is going to come out of his mouth.

3 THE COURT: Then, you have every
4 right to object before the answer comes out.

5 MR. GERSCH: Right. So either he's
6 going to give an answer that's not in the
7 report or is going to traverse the
8 territory, if I can use that expression,
9 that -- the territory of the report that
10 relates to Dr. Pegden.

11 MR. TUCKER: Your Honor, if I may
12 respond, I don't agree with the
13 characterization of the report. I think
14 Dr. McCarty has drawn his own conclusions
15 about the sample size in the report, and
16 this is a very, very brief point in the
17 report.

18 THE COURT: About Dr. Chen's sample
19 size.

20 MR. TUCKER: Exactly, not about
21 Dr. Pegden. He's not criticizing
22 Dr. Pegden --

23 THE COURT: On what page of the
24 report does he do that?

25 MR. TUCKER: Yes, Your Honor. It's

1 on Page 2 of the report.

2 So he may refer to --

3 THE COURT: Hold on for a second.

4 MR. TUCKER: Go ahead.

5 THE COURT: Objection overruled.

6 BY MR. TUCKER:

7 Q. So, Dr. McCarty, do you have any
8 opinions about the sample size that Dr. Chen uses in
9 his simulations?

10 MR. GERSCH: Objection: lack of
11 foundation.

12 THE COURT: Objection overruled.

13 BY MR. TUCKER:

14 Q. Let me ask the question again so it's
15 clear for the record.

16 Dr. McCarty, do you have any opinions
17 about the sample size that Dr. Chen uses in his
18 simulations?

19 A. They seem relatively small overall.
20 And then in cases in which he uses a subset of those
21 simulations to meet criteria other than contiguity
22 and compactness, those samples are even smaller.

23 Q. Is that your main criticism of -- of
24 Dr. Chen's report?

25 A. No, no. My main criticism is how he

1 computes the partisanship of each of the districts
2 and what he infers from that.

3 Q. And what is your concern about how he
4 computes the partisanship of the districts in his
5 simulated plans?

6 A. Well, as I mentioned a moment ago, he
7 considers a district Republican if Republican
8 candidates received a plurality of votes cast in the
9 2010, 2008 Pennsylvania state elections.

10 My concerns were the same ones that I
11 raised earlier of taking a historical voting data and
12 from that trying to draw too strong inferences about
13 how a Congressional district will perform in actual
14 Congressional district elections.

15 Q. So under Dr. Chen's simulations, if a
16 Republican wins the district with even 48 percent of
17 the vote, that's considered a Republican district?

18 A. Let me clarify. I believe that he uses
19 something called the "two-party vote." So he's
20 ignoring third-party votes, so he's only looking at
21 Democratic and Republican votes. So it's simply a
22 district in which Republican candidates got more
23 votes than Democratic candidates, he would consider
24 that to be a Republican district.

25 Q. Would under a two-party system mean the

1 party that would win would have to be 50 percent plus
2 1?

3 A. Yes.

4 Q. Okay. Does Dr. Chen at all use
5 Partisan Vote Index or any other measure to assess
6 whether or not a Republican or a Democrat would
7 likely win that district?

8 A. He does not, but, of course, the 2008
9 presidential vote in Pennsylvania would be a
10 component of his measure, and it's also in the
11 Partisan Voting Index, so there's a considerable
12 amount of overlap in the two indices.

13 Q. And what -- in your opinion, what is
14 the problem with calculating estimated number of
15 seats using that methodology?

16 A. Well, analogous to my discussion of the
17 PVI, if Republicans get a very small majority of the
18 district, that does not mean that the Republicans are
19 very, very likely to win a Congressional seat in that
20 district. It means that that district could be quite
21 competitive and won by Republicans and Democrats
22 in -- equally likely terms.

23 Q. Did you attempt to apply PVI -- or PVIs
24 to Dr. Chen's simulations?

25 A. Ideally, I -- I would have, but his

1 data release did not include sufficient information
2 for me on a timely basis to compute PVI values for
3 every district in his thousand simulations.

4 Q. So did you employ some other method to
5 try to estimate or -- or determine what would be the
6 PVIs in each of the districts in each of Dr. Chen's
7 1,000 simulations?

8 A. Yes, I did.

9 There's a -- a set of districts for
10 which there's an overlap for which I have a accurate
11 PVI measure and for which I had his measure of
12 partisan voting. That would be the districts under
13 the 2002 Congressional Districting Plan, 19 of them.
14 So I used a regression analysis which related his
15 values of partisan voting to predicted values of the
16 Partisan Voting Index, and then I used those
17 regression coefficients, those relationships, to
18 impute the Partisan Vote Index for each of the
19 districts across all of his simulations.

20 Q. So you didn't actually calculate the
21 PVI for each district in each of the 1,000
22 simulations?

23 A. No, I did not.

24 Q. Doing just basic math, how many
25 calculations would you have had to have done to do

1 that?

2 A. Well, there's -- there's a thousand
3 simulations; then there's, you know, 18 -- then
4 there's 18 districts; and then that involves,
5 basically, each of these simulations as a map. So
6 compute using the map and the geocoding to go from
7 those thousand simulations to each of these measures.

8 Q. And why, again, didn't you undertake
9 that analysis?

10 A. We were on a very tight deadline. I
11 believe it was Thursday-before-Monday deadline before
12 it was possible to recognize this problem.

13 Q. And so instead -- I understand your
14 testimony -- you employed a regression analysis,
15 correct?

16 A. That's correct, yes.

17 Q. And are regression analyses commonly
18 used in your field?

19 A. It's ubiquitous, yes.

20 Q. Did you do anything -- or perform any
21 analysis to check how good the regression analysis
22 was to predicting the PVI for Dr. Chen's submitted
23 plans?

24 A. Well, a standard measure of the
25 goodness of fit from a regression is known as the

1 R-squared, which is a statistic that goes from zero
2 to 1. So zero is like a zero correlation,
3 essentially; a 1 is almost a perfect correlation
4 relationship.

5 The R-squared for my regression was
6 .998.

7 Q. And is that a very good correlation?

8 A. Yeah, it's -- it's almost 1.

9 Q. What does that correlation tell you?

10 A. It basically tells us, in kind of
11 layman's terms, that the information in both measures
12 is essentially the same. The one measure is just
13 kind of a linear adjustment or linear transformation
14 of the other.

15 Q. And did you describe this regression
16 analysis in your report?

17 A. Yes, I did. The coefficients and the
18 R-squared are described in a footnote.

19 Q. Did you provide the underlying code or
20 analysis for the regression analysis with your
21 report?

22 A. Yes, I did.

23 Q. So after performing this regression
24 analysis, Dr. McCarty, for each of Dr. Chen's two
25 sets of simulations, one where incumbents were

1 protected and the one that -- where they were not,
2 were you able to predict the number of seats that
3 Republicans were expected to win under Dr. Chen's
4 simulations?

5 A. Sure. Let me -- one thing I guess I
6 would just like to point out, I would not
7 characterize his second simulation as one in which
8 incumbents were protected. It is just simply one
9 that avoided multi-incumbent elections.

10 MR. GERSCH: Objection, Your Honor:
11 beyond the scope.

12 THE COURT: Beyond the scope of
13 what?

14 MR. GERSCH: I'm sorry. Beyond the
15 scope of the report. There's nothing in the
16 report about incumbent protection.

17 THE COURT: Response?

18 MR. TUCKER: I think he's just
19 commenting on what he observed in Dr. Chen's
20 simulations, which does go to what's in his
21 report.

22 THE COURT: Does he analyze -- does
23 he analyze in his report the distinctions
24 between Set 1 and Set 2 of Dr. Chen's expert
25 report?

1 MR. TUCKER: I believe he does, Your
2 Honor.

3 THE COURT: All right. Give me a
4 page.

5 MR. GERSCH: Your Honor, I'll
6 stipulate that he may talk about both --
7 both simulations.

8 My objection is, this business about
9 what's proper incumbency protection or what
10 isn't, that's what's not in the report.

11 THE COURT: Mr. Gersch, that might
12 be cutting too fine of a line in terms of
13 what needs to be in a report or not in a
14 report. I think it's within his expertise
15 and is relevant to the scope of his report.
16 So I'm going to overrule your objection.

17 I think his only point was he
18 disagrees with how incumbency protection was
19 defined in Dr. Chen's report.

20 MR. TUCKER: And I don't have any
21 further questions on that subject matter, so
22 we're moving on anyway.

23 THE COURT: I also think there was
24 another expert that testified about what she
25 felt incumbency protection was compared to

1 what Dr. Chen said, so there are no
2 surprises here.

3 BY MR. TUCKER:

4 Q. So, Dr. McCarty, for each of the two
5 sets of simulations that Dr. Chen performed, were you
6 able to then compute the expected number of
7 Republican seats that would have been won?

8 A. Yes, I was.

9 Q. And how did you go about doing that?

10 A. Essentially, identically to my previous
11 analysis, where I used the PVI to simulate election
12 outcomes. So here, instead of doing a thousand
13 simulations of one districting plan, I did 500
14 simulations -- 500 simulated elections of each of the
15 two sets of 500 simulated plans and then computed
16 based on the expected -- then I computed, based on
17 the results of this kind of weighted coin flipping
18 that I described before, the number of Republican
19 seats that were won across each of the 500
20 simulations for each of the two sets.

21 Q. So did you look at 500 of his
22 simulations?

23 A. I looked at a thousand total
24 simulations, 500 of which from him -- what he
25 describes as Simulation Set 1, which ignores the

1 residencies of incumbents, and then Simulation Set 2,
2 where he avoids competing incumbents.

3 Q. And are the results of your analysis in
4 imputing the PVIs to Dr. Chen's simulations reflected
5 in Figure 4?

6 A. Yes, Figure 4 describes the outcomes of
7 my 500 simulations of his 500 plans from his
8 Simulation Set 1.

9 Q. And what does the X axis show?

10 A. The X axis is the outcome for each
11 of the possible outcomes across the simulations that
12 range from four Republican seats to 16 Republican
13 seats.

14 Q. And what does the Y axis show?

15 A. The Y axis is the percentage of times
16 that that particular outcome was observed across the
17 500 simulated elections and 50 -- over 500 simulated
18 plans.

19 Q. And what's -- I think you just
20 actually testified to this, but to be clear, what is
21 the range of outcomes that you saw after applying
22 your analysis to Dr. Chen's simulations?

23 A. There were some cases which were as low
24 as four Republican seats and some for which it was as
25 high as 16 Republican seats.

1 Q. What was the most common outcome?

2 A. The most common outcome was 11
3 Republican seats.

4 Q. And how many times or what percentage
5 of times did we see there being 13 Republican seats
6 under Dr. Chen's plans?

7 A. Just about 10 percent.

8 Q. Would you consider that to be an
9 outlier?

10 A. No, I wouldn't. That's a reasonably
11 common outcome.

12 Q. So what implications does imputing the
13 PVI into Dr. Chen's simulations have -- what impact
14 does it have on his conclusions in this case?

15 A. Well -- well, overall, the simulations
16 suggest that the plans that he generated are not all
17 that different than the enacted plan. We saw from
18 Figure 3, again, that the expected number of
19 Republican seats was around 10, with some variation
20 on both sides, with 13 -- an occurrence with some
21 frequency.

22 We see something very similar with
23 Figure 4, except here we see that the expected number
24 of Republican seats is probably closer to 11, and
25 there's much more variation around that 11, and that

1 13 Republican seats is a much more common outcome in
2 his simulations than it would have been under the
3 enacted plan.

4 Q. So after analyzing both the 2011 Plan
5 and Dr. Chen's simulations using a PVI, which one
6 seems to be more favorable to Republicans?

7 A. Based on the comparisons of Figure 4
8 and Figure 3, it appears that his simulated plans
9 were more favorable to the Republicans than the
10 enacted plan.

11 Q. So to summarize, Dr. McCarty, under
12 your analysis, how many seats would you have expected
13 the Republicans to win under the 2011 Plan?

14 A. I expected them to win around 10.

15 Q. And under Dr. Chen's simulations, after
16 imputing PVI, how many seats would his simulations
17 expect the Republicans to win?

18 A. Eleven.

19 Q. Now, Dr. McCarty, during Dr. Chen's
20 testimony in this case, he was critical about your
21 use of a regression analysis and testified that it
22 overstates the Republican PVI in his plans.

23 And I'm going to refer you to -- and I
24 can't remember if this was actually marked and
25 admitted as an exhibit.

1 MR. TUCKER: Do we have the exhibit
2 number?

3 MR. JACOBSON: 162, Petitioners'.

4 BY MR. TUCKER:

5 Q. I'm going to refer you, Dr. McCarty, to
6 Petitioners' Exhibit 162.

7 THE COURT: 162 was admitted
8 without objection.

9 BY MR. TUCKER:

10 Q. And, Dr. McCarty, do you have a
11 response to Dr. Chen's opinion about your use of a
12 regression model and its potentially overstating the
13 PVI?

14 A. So this exhibit represents one of the
15 simulation -- simulated plans that underlies
16 Dr. Chen's report. So my first reaction is I have no
17 way of knowing whether these particular findings are
18 representative of the entirety of his -- of the
19 thousand simulations.

20 Q. So this is just one of the thousand
21 that you calculated PVIs for?

22 A. That is -- that is my understanding --
23 or imputed PVIs for.

24 Q. And do you have any reason to believe,
25 based upon the analysis you did, that this would be a

1 trend or something that you would see in many more or
2 all of the simulations?

3 A. I have no reason to believe that it's a
4 common outcome.

5 As I indicated earlier, the correlation
6 between PVI and Dr. Chen's measure under the 2002
7 Congressional districting plan was exceptionally
8 high. So, yes, there may be some outliers in one
9 direction or another. I would expect that there
10 would not be very many given the high R-squared and
11 that they would be canceling each other out across
12 the totality of the simulations.

13 Q. And, again, to clarify, did you
14 calculate any values to determine the accuracy of
15 your regression model?

16 A. Again, I used the -- the conventional
17 measure of fit, which is the R-squared. It was very
18 high by conventional -- by conventional standards.

19 So my expectation would be that, on
20 average, the imputations would get it right, that
21 there are one of perhaps a thousand simulations for
22 which there's some deviation -- does not undermine my
23 confidences that, you know, overall, these errors
24 will balance each other out.

25 MR. TUCKER: Is this 163?

1 THE COURT: There is no 163.

2 MR. JACOBSON: This is earlier.

3 THE COURT: At least I don't have a
4 163.

5 MR. JACOBSON: It's 34.

6 BY MR. TUCKER:

7 Q. Dr. McCarty, I want to refer you to
8 Petitioners' Exhibit 34.

9 And Dr. Chen, during his testimony
10 earlier in this case, was also critical of your use
11 of 2004 and 2008 presidential election data to
12 calculate the PVIs for the Congressional districts,
13 as opposed to using 2008 and 2012. And according to
14 his calculations in this exhibit, that that, again,
15 overstated the -- or I think, actually, in this case,
16 understated the Republican PVI that should have
17 applied to those districts.

18 Do you have a response to that
19 criticism?

20 A. Yes, I do.

21 First of all, it did not make sense to
22 me to compute -- to use the PVIs based on 2008, 2012
23 for a plan that was enacted in 2011.

24 So whatever the outcome of the 2012
25 election would have been unknown; the shifts in

1 partisanship that might have taken place from the
2 time in which the plan was enacted until the 2012
3 election were also unknown.

4 And so I'm not sure that, logically, it
5 would have made sense at all to use voting data from
6 the future to compute the partisanship of the plan
7 that was enacted in 2011.

8 Second, I'd like to point out that the
9 data columns which he draws from my data set are
10 presented in such a way that it suggests that I
11 specifically computed the PVIs for the Congressional
12 districting plan -- the 2011 Congressional
13 districting plan in Pennsylvania using 2008 and 2012.

14 Those -- that spreadsheet is actually a
15 snippet of a broader spreadsheet that includes the
16 PVIs for every district in the entire country over
17 the entire time period between 2004 and 2014.

18 As I described earlier, that
19 calculation was necessary for computing the
20 relationship between PVI and Democratic performance
21 for elections that occurred over the entire time
22 period. So the only -- so that data is presented --
23 or was used in the analysis. It was used in -- where
24 Pennsylvania was only a part of the overall national
25 sample in computing the relationship between PVI and

1 Democratic performance.

2 Q. Dr. McCarty, I want to switch gears a
3 little bit now and talk about polarization.

4 In the context of politics, how do you
5 define "polarization"?

6 A. So, typically, polarization is thought
7 of or measured as the level of disagreement between
8 members of opposing political parties. I've focused
9 on it primarily in legislatures where we're talking
10 about the differences between Republican and
11 Democratic legislators on policy matters.

12 Q. Are you aware of any evidence that
13 polarization -- sorry. Let me strike that.

14 Are you aware of any evidence that
15 gerrymandering causes polarization?

16 A. No. I think there's a rough consensus
17 in the political science literature that gerrymander
18 does not have a causal effect on the levels of
19 polarization in our legislatures.

20 Q. Have you reviewed a report prepared by
21 Dr. Christopher Warshaw in this case?

22 A. Yes, I have.

23 Q. And do you recall his opinions
24 regarding gerrymandering and polarization?

25 A. Yes, I do.

1 Q. And what do you recall about those
2 opinions?

3 A. So Professor Warshaw concedes the
4 academic consensus that there's not a causal effect
5 of gerrymandering on polarization, but he asserts
6 that gerrymandering exacerbates the negative effects
7 of polarization.

8 Q. Do you have any opinions upon his
9 opinions?

10 A. Yes. So his -- his argument is
11 essentially that in a polarized environment, the
12 voters of the losing party are less well-represented
13 than the voters of the -- of the winning party.
14 Therefore, that part of the argument is just kind of
15 a natural consequence of elections in the fact that
16 Republican legislators and Democratic legislators
17 represent constituencies differently.

18 His -- the stronger claim that he makes
19 is that Democratic -- for example, Democratic voters
20 in Republican districts are worse-represented because
21 of gerrymandering than they would otherwise be, and I
22 did not find that part of the argument as compelling.

23 Q. Did you do any analysis to support your
24 conclusions?

25 A. Yes. I tried to follow, in many ways,

1 Professor Warshaw's report as closely as possible.
2 He uses a measure known as DW-NOMINATE to measure the
3 conservativeness of members of the House of
4 Representatives and argues that there's a big
5 difference -- there's a gap between Republican
6 legislators and Democratic legislators.

7 But what I wanted to show is that in
8 the districts like those in Pennsylvania, which are
9 reasonably competitive, the differences between
10 Democratic and Republican legislators gets much
11 smaller. So I produced Figure 5, which plots this
12 measure of conservatism for each member of the House
13 up against the Partisan Voting Index for their
14 district for each of the parties to demonstrate that
15 as districts become more competitive, the differences
16 between the two parties becomes much smaller.

17 And I think that represents a
18 representational benefit to voters in such districts.

19 Q. So there's a lot of information in
20 Figure 5, so let's kind of break this down so we can
21 all understand it.

22 A. Sure.

23 Q. So what is represented on the X axis?

24 A. So the X axis is the Partisan Voting
25 Index of the district, as I've described many times

1 before.

2 Q. And what is the Y axis?

3 A. The Y axis is this measure of the
4 conservatism of the voting record of each member of
5 the House of Representatives. It's known in the
6 literature as the DW-NOMINATE score.

7 Q. And why, again, did you use the
8 DW-NOMINATE score?

9 A. Well, two reasons: one is that I helped
10 develop it in the late '90s; and the second reason is
11 I was following Professor Warshaw, who used it in his
12 report.

13 Q. And what do all of the various dots,
14 either the blue dots or the red dots, on the figure
15 represent?

16 A. Okay. So in adapting current
17 conventions, red dots represent Republican
18 legislators, and blue dots represent Democrat
19 legislators. Each dot represents a combination of
20 the PVI of their district and their positioning on
21 this conservatism scale.

22 Q. And what do each of the three lines
23 that we see on Figure 5 represent?

24 A. So each of the three lines are the
25 lowest lines, the type of prediction, moving average

1 lines that I described before, kind of shows you the
2 relationship between the PVI and the DW-NOMINATE
3 score locally.

4 So the top red line represents the
5 predicted -- predicted DW-NOMINATE score for
6 Republican members as a function of their district's
7 partisanship, and the blue line does the same for
8 members of the Democratic Party.

9 Q. So what conclusions did you draw from
10 Figure 5?

11 A. Well, the first conclusion is that --
12 as you can see that -- in the districts that are
13 roughly competitive, as I just roughly described
14 before, 6 to minus 6, the gap between Democratic and
15 Republican legislators is considerably small -- is
16 considerably smaller, which suggests that Democratic
17 voters in slightly Republican districts are
18 benefiting perhaps in two ways: one is that the
19 Republican members in such districts are more
20 moderate than they are in other districts. And the
21 second is a point that I've tried to underscore
22 several times, which is that districts in this middle
23 range, this competitive range, are often won by
24 members of both parties.

25 So you can see that in, say, the

1 districts between minus 5 and plus 5, the clouds
2 overlap very considerably, suggesting that voters in
3 such districts benefit from sometimes having a
4 Republican representative and sometimes having a
5 Democratic representative.

6 So what the purple lowest line shows is
7 the predicted value of the DW-NOMINATE score for
8 districts as a function of their PVI. And because of
9 the partisan competition in this middle range, the
10 best prediction of the DW-NOMINATE score for these
11 competitive districts is right in the middle of the
12 spectrum, which is another benefit --
13 representational benefit for voters in such
14 districts.

15 Q. Does this figure tell us that both
16 Democrats and Republicans who represent competitive
17 districts tend to be more moderate?

18 A. That's what this convergence of the red
19 line and the blue line in those -- in that region
20 shows.

21 Q. The final topic, Dr. McCarty, I want to
22 ask you a little bit of questions about the
23 efficiency gap and Dr. Warshaw's opinions on the
24 efficiency gap.

25 Can you start by explaining what your

1 understanding of the efficiency gap is?

2 A. The efficiency gap is a measure that's
3 gotten a lot of recent currency, that's predicated on
4 the notion of the wasted votes. Wasted vote for the
5 winning party is just the number of votes exceeding
6 the 50 plus 1 threshold needed for election. The
7 wasted votes for the losing party is the total number
8 of votes cast for that party.

9 So efficiency gap is a relative measure
10 of wasted votes. It computes the wasted number of
11 Republican votes, which includes the additional votes
12 they received in winning districts plus all of their
13 votes in losing districts, compares that to the
14 wasted Democratic votes, which includes their excess
15 votes in winning districts and their votes in losing
16 districts, and compares those two numbers and then
17 normalizes by the total number of votes cast.

18 Q. In your opinion, is the efficiency gap
19 a good measure of whether a particular redistricting
20 plan was a partisan gerrymander?

21 A. No, I don't believe so, because there
22 are many conflating factors that can make an
23 efficiency gap larger or smaller in the presence or
24 in the absence of partisan gerrymandering.

25 Q. What are some of those factors?

1 A. Well, the geographic concentration of
2 voters is a big one. If voters in one particular
3 party tend to be concentrated, neutral districting
4 plans, which are compact and contiguous, might force
5 them into the same district. That would produce
6 excess votes for that party, and that geographic
7 basis would lead to an efficiency gap disadvantage
8 for such a party.

9 Q. Did you review Dr. Warshaw's analysis
10 of the efficiency gap in Pennsylvania?

11 A. Yes, I did.

12 Q. And in your opinion, did he take in
13 some of these alternative factors?

14 A. No. I do not believe he controlled
15 for, explicitly, a variety of other factors which
16 might lead efficiency gaps to be larger or smaller in
17 particular circumstances.

18 Q. And Dr. Warshaw also opined in this
19 case that he believes the efficiency gaps are
20 durable.

21 Do you agree?

22 A. No, I don't agree. And I think it's
23 belied by the evidence that he, himself, presents in
24 his report.

25 Q. Dr. McCarty, I'm going to refer you to

1 Petitioners' Exhibit 40.

2 And do you recognize this as
3 Dr. Warshaw's figure showing the efficiency gaps in
4 Pennsylvania?

5 A. Yes, that -- that is.

6 Q. And is there anything about this figure
7 that leads you to your conclusion that you don't
8 believe efficiency gaps are durable?

9 A. Well, I think the history of the
10 previous districting plan, the one that was in place
11 between 2002 -- the 2002 and 2010 elections, shows a
12 distinct lack of durability. You can see for the
13 first couple of elections under the plan, there was a
14 pro-Republican efficiency gap, which essentially
15 disappeared in 2004. It became a pro-Democratic
16 efficiency gap and then returned to kind of modest
17 pro-Republican efficiency gap all within the same
18 decade.

19 So it's hard for me to conclude that
20 the efficiency gap measure tells us a whole lot about
21 how a districting plan is expected to perform over
22 the course of a decade.

23 Q. Now, Professor Warshaw -- strike that.

24 Are you aware of the period of time
25 over which Professor Warsaw examined to reach his

1 conclusion that the efficiency gap was durable?

2 A. Yes. He compared the efficiency gaps
3 for a couple of elections after the latest round of
4 reapportionment.

5 Q. Do you recall specifically the number
6 of elections he looked at?

7 A. I believe he looked at the 2012
8 efficiency gaps and the 2014 efficiency gaps for each
9 of the states.

10 Q. Are you aware if whether he looked at
11 also the 2016?

12 A. I'm not recalling off the top of my
13 head. I -- he may well have.

14 Q. Assuming he looked at either two or
15 three election cycles, in your opinion, is that a
16 sufficiently long period of time to -- to --

17 A. To clarify, I know that it was two,
18 because the analysis was simply applied to the
19 efficiency gap in the first election versus the
20 efficiency gap in the second election.

21 So I'm just not recalling exactly which
22 two he's compared.

23 Q. Would -- would two or three election
24 cycles be sufficient to determine the durability of
25 an efficiency gap?

1 A. Well, certainly not two. As we saw in
2 the history of the previous districting plan. If you
3 look at the first two, it looks durable; and then you
4 go to three, and it swings wildly.

5 So, again, there are lots of things
6 that drive the efficiency gap that can seem stable
7 for a short amount of time but lead to large changes
8 over a longer period of time.

9 Q. Do you think even three election cycles
10 would be enough?

11 A. Well, I mean, I would -- you know, I
12 would like to see -- if I'm going to -- I'm assessing
13 a claim that the efficiency gap is durable and it's
14 related to partisan districting at the time of
15 enactment, I would expect it to be durable across the
16 entire set of five elections under that plan.

17 Q. Dr. McCarty, did you calculate yourself
18 any efficiency gaps for Pennsylvania?

19 A. No, I did not.

20 Q. And why did you not?

21 A. I had no reason to doubt the
22 calculations that underlied the efficiency gap. I
23 just didn't believe that they were very informative
24 at the matter at hand.

25 Q. Are there situations which there can be

1 an intentional gerrymander but a lower, even zero,
2 efficiency gap?

3 A. Yes, there can be.

4 Q. And what -- what -- do you have an
5 example of that situation?

6 A. There could be a situation which parts
7 of gerrymandering is used to offset the effects of
8 geographic concentration. So the parts of
9 gerrymander can work to actually reduce the
10 efficiency gap by reducing the wasted votes of the
11 party whose voters are concentrated into urban areas.

12 Q. And there are also situations where you
13 have very competitive districts but can result in a
14 very high efficiency gap?

15 A. That is correct. One of the features
16 of the efficiency gap is that it appears to award the
17 party that's very successful at winning close
18 elections.

19 So if you have a very competitive
20 system, say, both parties have sort of roughly equal
21 chances of winning in any particular election, if one
22 party gets fortunate and wins several of those very
23 close seats, it will shift the efficiency gap in
24 their favor quite dramatically.

25 So, for example, if you have three

1 districts, each of which the Republicans won by
2 51 percent of the vote, those districts will have
3 a -- an efficiency gap of almost 50 points
4 pro-Republican. But in the next election, if the
5 Democrats recover and won all three of those very
6 close elections, the efficiency gap would switch in a
7 pro-Democratic direction by 50 points even though the
8 only thing that changed was the performance of the
9 parties in districts that were very competitive.

10 Q. So to sum up your testimony on the
11 efficiency gap, Dr. McCarty, in your opinion, is it a
12 useful tool in determining whether a plan advantages
13 one political party or another?

14 A. No. It is simply a measure of the
15 rough proportions of wasted votes. But there are a
16 lot of components to wasted votes that are not
17 related to partisan districting.

18 Q. One final question.

19 So based upon the analysis that you've
20 done for this case, in your opinion, have you seen
21 any evidence to demonstrate that the 2011 Plan gives
22 the Republicans a partisan advantage from
23 redistricting?

24 A. No, I have not found any of the
25 evidence presented in this case as compelling on that

1 matter.

2 MR. TUCKER: Your Honor, at this
3 time, we would like to move
4 Legislative Respondents' Exhibits 17 and 18
5 into evidence, and that is Dr. McCarty's
6 report and the PowerPoint presentation with
7 the figures and tables from Dr. McCarty's
8 report.

9 THE COURT: Legislative Respondents
10 move Legislative Respondents' Exhibits 17
11 and 18.

12 Any objection?

13 MR. GERSCH: Ms. Theodore is going
14 to address this.

15 MS. THEODORE: Yes, Your Honor. We
16 object to -- we object to moving the report
17 without redactions relating to the
18 discussion of Dr. Pegden's testimony.

19 THE COURT: Response?

20 MR. TUCKER: He didn't discuss
21 Dr. Pegden's testimony once in his testimony
22 today.

23 THE COURT: So you don't have an
24 objection to redacting it from the report?

25 MR. TUCKER: I do have an objection.

1 I don't see the need to redact it from the
2 report.

3 He has no criticisms of Dr. Pegden.
4 He's merely referencing something that's in
5 Dr. Pegden's report itself.

6 He's not criticizing Dr. Pegden.
7 He's not offering any response to
8 Dr. Pegden's conclusions. It's merely a
9 reference to something Dr. Pegden says in
10 his report.

11 So I -- I don't see the need for it
12 to be redacted and to go through the effort
13 of having to redact that and then put it --
14 exchange the exhibit binders out and do all
15 that when this is something that is already
16 in Dr. Pegden's report.

17 And he hasn't provided any further
18 testimony on it today that would have
19 required any rebuttal testimony by
20 Dr. Pegden yesterday.

21 MS. THEODORE: May I respond?

22 THE COURT: Of course.

23 MS. THEODORE: Thank you,

24 Your Honor.

25 So yesterday,

1 Legislative Respondents, as I'm sure recall,
2 bet their case on the representation that
3 Dr. McCarty was not, quote, in any way going
4 to touch Dr. Pegden's testimony. And the
5 references in this report, while it's true
6 that they're not critical of Dr. Pegden,
7 what they do is Dr. McCarty looks at a
8 sentence in Dr. Pegden's report and he
9 opines that that sentence undermines
10 Dr. Chen's approach. And I can tell you
11 that if Dr. Pegden were here for rebuttal,
12 he would tell you very vigorously that
13 nothing in his report undermines Dr. Chen in
14 any way.

15 And so we believe that that should
16 be stricken from the report. The report --
17 he's moving it into evidence, and it would
18 violate their representation to have that
19 in.

20 And I will note that we raised this
21 issue with counsel for
22 Legislative Respondents yesterday evening
23 and asked them to agree to create a redacted
24 version yesterday evening, and they
25 declined.

1 MR. TUCKER: Your Honor, can I
2 respond briefly on that?

3 THE COURT: Please.

4 MR. TUCKER: Two points --

5 THE COURT: Let me point out
6 something, too, on the record.

7 I don't typically like to hear about
8 private conversations between counsel in an
9 effort to reach agreement. I'll hear
10 whether you have an agreement or whether you
11 don't have an agreement, but I don't want to
12 hear what the discussions are. I just --
13 that's not what I like to do here.

14 MS. THEODORE: I apologize.

15 THE COURT: Okay. So they
16 apparently sought an agreement; you
17 disagreed.

18 Okay. I'm not sure that matters to
19 me.

20 MR. TUCKER: Your Honor, this
21 sentence in Dr. McCarty's report has been in
22 there since he authored the report on
23 December 4th --

24 THE COURT: But isn't it, in fact,
25 an opinion? Isn't it an opinion from a --

1 the objection is it is an opinion about what
2 Dr. Pegden is saying.

3 MR. TUCKER: He has an opinion about
4 Dr. Chen's analysis that he refers, in order
5 to support that opinion, to something in
6 Dr. Pegden's report.

7 If Dr. Pegden had an issue with
8 that, he had every opportunity twice to
9 address that during testimony to this Court.

10 THE COURT: I disagree with you.

11 We're going to strike that --
12 what -- what portion of the -- of the report
13 is that?

14 MS. THEODORE: So there's a -- it's
15 a discussion on Page 2 and on Page 20.

16 And I would propose that we could
17 discuss the precise redactions with
18 Legislative Respondents' counsel on a break
19 to --

20 THE COURT: Well, let's -- okay.
21 Let's take one exhibit at a time.

22 MS. THEODORE: Sure.

23 THE COURT: Which one are we
24 looking at right now? We're looking at
25 Exhibit 17.

1 Which page?

2 MR. TUCKER: Page 2, Your Honor.

3 I believe it's -- what the
4 Petitioners have an objection with is the
5 sentence that starts with, I will not
6 comment directly.

7 I don't know that we -- I think we
8 would only want to strike the portion that
9 refers to Dr. Pegden's testimony. I think
10 Dr. McCarty has an independent opinion in
11 this case about the sample size that
12 Dr. Chen used that -- he uses part of
13 Dr. Pegden's opinion to support that, but
14 his -- his opinion is still independent of
15 what Dr. Pegden's report says.

16 THE COURT: So in granting
17 Petitioners' motion, we will strike from the
18 expert report Page 2, starting on Line 7,
19 the sentence starts, in the previous line, I
20 will not comment directly on the methodology
21 behind Dr. -- Professor Chen's simulations.
22 And we will put a period there.

23 We will redact -- other than -- we
24 will redact the remaining of that line, the
25 following line, the following line after

1 that, the following line after that and the
2 following line after that, including the
3 footnote. And that will be the redaction on
4 that page.

5 MS. THEODORE: Your Honor, may I
6 just note that the next sentence, starting
7 with Given the size of these sets, relies on
8 Dr. Pegden's report as well?

9 THE COURT: I'm going to overrule
10 your objection on that. I think we had that
11 objection earlier and allowed him to testify
12 on that.

13 So the redaction I note on Page 2
14 will be made.

15 MS. THEODORE: Thank you.

16 Your Honor, there's one more
17 reference on Page 20. And we would just ask
18 for a redaction of the sentence -- it's the
19 first sentence in the final paragraph, and
20 it starts, With respect to Professor Chen's
21 report.

22 THE COURT: Okay. Let me read it.

23 MS. THEODORE: Sure.

24 THE COURT: We will strike that
25 sentence as well. The sentence is on

1 Page 20, the second paragraph, first
2 sentence will be stricken from that report.

3 MS. THEODORE: Thank you,
4 Your Honor.

5 THE COURT: With those redactions
6 ordered by the Court, there's a motion to
7 admit Petitioners' Exhibit 17.

8 Any objection?

9 MS. THEODORE: No.

10 THE COURT: It will be admitted
11 without objection subject to the redactions
12 noted by the Court on the record.

13 - - -

14 (Whereupon, Legislative Respondents'
15 Exhibit Number 17 was admitted into
16 evidence.)

17 - - -

18 THE COURT: I'm sorry. Did I say
19 Petitioners? I meant
20 Legislative Respondents.

21 Any objection to
22 Legislative Respondents' Exhibit 18?

23 MS. THEODORE: No, Your Honor.

24 THE COURT: Exhibit --
25 Legislative Respondents' Exhibit 18 will be

1 admitted without objection.

2 - - -

3 (Whereupon, Legislative Respondents'
4 Exhibit Number 18 was admitted into
5 evidence.)

6 - - -

7 MR. TUCKER: We tender the witness,
8 Your Honor.

9 THE COURT: We're going to do that
10 after lunch. We will take a break now, and
11 we will reconvene at 1:00.

12 THE CLERK: The Court is now in
13 recess.

14 (Whereupon, at 11:53 a.m., a
15 luncheon recess was taken.)

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1 A F T E R N O O N

S E S S I O N

2 (1:09 p.m.)

3 - - -

4 NOLAN MCCARTY, PH.D.,

5 was called for continued examination and, after having

6 been previously duly sworn, was examined and

7 testified further as follows:

8 - - -

9 THE CLERK: All rise. The
10 Commonwealth Court is now back in session.

11 THE COURT: Please be seated,
12 everyone.

13 Petitioners, you may begin your
14 cross-examination of Dr. McCarty.

15 MR. GERSCH: Thank you, Your Honor.

16 - - -

17 CROSS-EXAMINATION

18 - - -

19 BY MR. GERSCH:

20 Q. Good afternoon, Dr. McCarty.

21 A. Good afternoon.

22 Q. I take from your testimony this morning
23 that you would say that to evaluate a Congressional
24 map and simulated maps, that is, maps of
25 Congressional districts and simulated maps of

1 Congressional districts, you need a good predictor of
2 how the districts are going to vote?

3 A. Yes.

4 Q. All right. And if you have a poor
5 predictor, then the analysis of the actual plan or
6 the simulated plan -- your analysis will be no good?

7 A. Yes.

8 Q. All right. And now, Dr. Chen, in his
9 principal metric, used the elections in Pennsylvania,
10 all statewide elections in 2008 and 2010.

11 That's your understanding, right?

12 A. Yes.

13 Q. And you're not saying that's not wrong?
14 You're not saying that -- you're not saying that he
15 didn't do that?

16 A. No; he did do that.

17 Q. All right. And then he used all
18 statewide elections for 2012, 2014 and 2016 as a
19 robustness test?

20 A. Yes.

21 Q. All right. And you say that the
22 primary problem with his approach to measuring
23 partisan bias is that whether a district casts a
24 majority of its ballots for Republicans in statewide
25 elections is a very imperfect indicator of how the

1 district will vote in actual Congressional elections;
2 is that right?

3 A. Yes.

4 Q. I'm quoting from your report.

5 You recognize the language?

6 A. Yeah, I recognize the language.

7 Q. And you said on direct, if I got this
8 right, that using presidential votes as a measure of
9 partisanship in Congressional districts, which is
10 essentially what the PVI does, is commonly accepted;
11 is that right?

12 A. Yes. There are many, many studies that
13 use presidential votes as a predictor of
14 Congressional votes and Congressional voting
15 outcomes.

16 Q. Dr. McCarty, during the voir dire, you
17 said -- or it was during your qualifications, you
18 said that you testified at two cases in Florida; is
19 that right?

20 A. I testified in one case. I filed
21 reports in two cases.

22 Q. You filed reports in both.

23 And in one of those cases, the Romo
24 versus Detzner case, isn't it true that what you
25 wrote in your report was that the use of presidential

1 vote outcomes to predict Congressional elections is
2 problematic. First, presidential election vote is
3 only a crude measure of partisanship and may not
4 predict Congressional voting patterns. Second,
5 presidential -- a presidential candidate may easily
6 over- or underperform partisan expectations, and
7 given these concerns, the best way to evaluate
8 Professor Chen and Rodden's conclusions would be to
9 use precinct-level vote returns from other Florida
10 statewide elections.

11 Wasn't that your report?

12 A. That was in one of the reports.

13 Q. So in that case, what you told the
14 Court was presidential elections are problematic; the
15 best thing to use are statewide election?

16 Yes?

17 A. I -- I believe I -- in both cases --
18 both this case and that case, I ultimately concluded
19 that using either set of votes alone without some
20 effort to link it to actual Congressional outcomes
21 was a problem.

22 Q. Okay. But what you told the Court
23 was -- in -- in a section -- you're not saying what I
24 read was out of context, are you?

25 A. It's preliminary to how I -- how I

1 subsequently suggested the right way to do it is
2 done.

3 Q. You would say use them all?

4 A. Yeah, to use -- to use them all, but,
5 importantly, to use them as predictors of actual
6 Congressional vote outcomes and to take into
7 consideration the uncertainty of that relationship
8 between those votes in other elections and how
9 Congressional districts are going to perform.

10 Q. You didn't use an uncertainty factor in
11 the Florida cases.

12 A. In -- in the response to their
13 response, I do -- I do do that.

14 Q. In at least one of -- in at least a
15 couple of your reports, you do not; is that right?

16 A. I do that in response to their response
17 to my criticisms. And so where I ended up coming
18 down on that case was that the right way to do
19 that -- the right way to analyze the simulations was
20 to take underlying votes, predict Congressional
21 voting outcomes, use those probabilities to evaluate
22 the variation across simulations.

23 The -- the final report that I wrote in
24 response to theirs has almost exactly the same
25 methodology as my response to Professor Chen today.

1 Q. Well, Dr. McCarty, if I understand your
2 testimony correctly, what you said is use all
3 votes -- excuse me -- meaning the statewide votes,
4 which would include the presidential votes, right?

5 A. That's correct.

6 Q. And that's what Dr. Chen did, correct?

7 A. But did he not do the step of looking
8 to see how those -- how those statewide votes mapped
9 into potential Congressional outcomes. That's my
10 criticism.

11 Q. I'm not sure I understand it, but
12 let's -- let's stay with the first proposition.

13 Dr. Chen used all the statewide votes
14 for the years he looked at, correct?

15 A. That is correct, yes.

16 Q. What you chose to use was just
17 presidential votes?

18 A. I chose to use something that I could
19 leverage national-level outcomes to make predictions.
20 If I had the opportunity to incorporate statewide
21 votes into that analysis, I could have, but it would
22 not have been consistent with the methodology of
23 using underlying votes to predict Congressional
24 outcomes.

25 Q. You -- you used presidential votes out

1 of convenience because you wanted to compare to other
2 states?

3 A. I needed -- no. I needed some measure
4 of historical relationships between district
5 partisanship and Congressional voting outcomes, and I
6 needed a sample to cut across states that have
7 sufficient statistical power to do those
8 calculations.

9 Q. We may be talking past each other, and
10 that will be my fault. I meant to be asking about
11 your testimony in this case, about what you did in
12 Pennsylvania.

13 So let's make sure we're on the same
14 page. Maybe we are, maybe we aren't. Let's find
15 out.

16 What I understood you to say on direct
17 was in this case, not in Florida, in this case, the
18 reason you wanted to use the presidential votes was
19 because, one, you said it was better than the
20 statewide votes; and, two, you said presidential
21 votes were a matter of convenience because that would
22 enable you to make the comparison to other states.

23 A. Yes. What I want to suggest is, in
24 this case, what I said was that given the choice
25 between presidential votes and other votes, I think

1 presidential votes have more explanatory -- have more
2 explanatory power.

3 If there were a way to be able to do
4 the type of analysis I did, which links partisanship
5 to Congressional voting outcomes using state-level
6 votes, I would have done that. But since state-level
7 elections are different in every state, I would not
8 have had the ability to estimate the probabilities
9 that I used in my analysis.

10 Q. Okay. But, bottom line, when you told
11 the Court in Florida that the best way to evaluate
12 the Professor Chen and Rodden's conclusions would be
13 to use precinct-level vote returns from other Florida
14 statewide elections, you stand by that testimony
15 today?

16 A. I suggested that -- I believe the
17 context of that testimony was to suggest that one
18 wanted to know that it was robust across the choice
19 of elections so that one would want to know if it
20 held -- if their simulations came out for
21 presidential votes, did they also come for other
22 statewide votes, and that that robustness should be
23 checked.

24 I never suggested, in that case,
25 substituting statewide elections for presidential

1 elections. It was just an argument about, when
2 available for an analysis, that more elections should
3 be used when they can be.

4 Q. I just want to make sure I understand
5 your testimony.

6 You're saying it would be good to use
7 them both?

8 A. When -- when possible, for a particular
9 methodology.

10 Q. All right. But in this case, you used
11 only the presidential vote, and one thing that you
12 know is that using the presidential vote the way you
13 did is more favorable to the Legislative Respondents?

14 A. I don't know that. I don't know that.

15 Ultimately, if -- I mean, the
16 correlation between Professor Chen's measures and
17 mine, as I reported, is over .99, so in terms of
18 their ability to predict Congressional elections,
19 they should predict them just equally as well, and so
20 I don't think that there would be any difference
21 between my conclusions using presidential vote and
22 using statewide votes, if there was some magical way
23 to have a statewide voting measure, that I could link
24 to Congressional voting outcomes throughout the
25 country.

1 Q. Dr. McCarty, when you say there's this
2 .99 correlation, the results that you come to and
3 that Dr. Chen to -- they don't correlate .99?

4 A. Well, he doesn't take into account what
5 the relationship between his measure and the
6 performance of Congressional districts are.

7 Q. My question is, The results that you
8 and -- and Dr. Chen come to, they don't correlate?

9 A. The results don't correlate, but the
10 inputs correlate.

11 Q. All right. Let's take a look at how
12 your approach does. Let's put up Table 1 from your
13 report, Page --

14 MR. GERSCH: That's on Page 9.

15 BY MR. GERSCH:

16 Q. All right. You calculated the PVI for
17 every district in Pennsylvania; is that right?

18 A. Yes. Well, every district in the
19 entire United States.

20 Q. Yes. That, too.

21 A. Yes.

22 Q. Yes. I didn't mean to suggest
23 otherwise. I wasn't up to that part yet.

24 A. Yep.

25 Q. In Table 1, so -- so -- so just

1 focusing on the right-hand side, 2011.

2 A. Okay.

3 Q. All right. So -- so that first column,
4 that's the Congressional Districts. The second
5 column is the PVI. And here, let me just note, I
6 think sometimes we run into charts in which the PVI
7 is calculated where the Democrats are a positive and
8 sometimes they're a negative. I don't know if you've
9 seen that.

10 There's no significance --

11 A. Partly within my report, yeah, I can do
12 it either direction.

13 Q. Yeah. And -- and I don't know if other
14 people get confused, but I sometimes get confused,
15 but there's a tally in the top row -- the top row is
16 District 1, and that's always Democratic, right?

17 A. Yes.

18 Q. And so -- so if -- if anyone is
19 confused, you can just look at that top row on any
20 chart and that's always -- what -- if it's a positive
21 number, then the Democrats are positive; if it's a
22 negative number, the Democrats are always negative?

23 A. Yes.

24 Q. All right. Let's take a look -- and
25 then the last thing, as I understand your testimony,

1 is the far right-hand column, that's the probability
2 that for any given PVI, that the election will come
3 out for the Democrats, right?

4 A. Yes, based on the historical patterns.

5 Q. And that's what you computed using the
6 2004 to 2014 House elections that's recorded in your
7 appendix?

8 A. Yes, that's correct.

9 Q. Okay. All right.

10 Let's just take a look at what I think
11 is the closest race, which is -- in your table, which
12 is the Seventh -- Seventh Congressional District.
13 You have a -- a PVI of zero.

14 That means it's a toss-up district,
15 from a PVI standpoint, right?

16 A. Yes, that's correct.

17 Q. And this information that you took from
18 across the country, the historical measures from
19 every district, that, you say, Democrats should win
20 that -- we'll round it to 52 percent of the time,
21 right?

22 A. Sure. Yes.

23 Q. Okay. But in real life, in the first
24 election under the plan, the Republican candidate
25 wins that election, even though you have it as a

1 Democratic-leaning election, right?

2 A. I don't have it as a Democratic-leaning
3 election. I have it as a toss-up.

4 Q. You consider PVI to be the lean?

5 A. Yeah, if you're considering the
6 probability, yes, it's Democratic-leaning in terms of
7 probability.

8 Q. Okay. It's a slight lean, right?

9 A. It's a slight lean.

10 Q. But you understand the Republican
11 candidate won by almost 20 percent of the vote in
12 that election, right?

13 A. I don't know the raw-vote differential,
14 but I agree that I know the Republican won that
15 district.

16 Q. And then he won in 2014 with also about
17 20 percent of the vote, right?

18 A. I -- I don't know that for a fact, but
19 I'll --

20 Q. You'll take my representation?

21 A. -- I'll take your representation.

22 Q. Do you know that he also won the
23 Seventh -- the Seventh was also won by the
24 Republican, again, in 2016 also with about 20 percent
25 of the vote -- I'm sorry -- by a 20 percent margin?

1 A. I'll stipulate to the margin.

2 Q. Okay. All right. So this is what
3 in one of those Florida cases you refer to as a
4 "prediction error," right?

5 A. In the particular -- in this particular
6 case, yes.

7 Q. All right. And by "prediction error,"
8 what we mean is whatever the measure is in question
9 predicts, say, a Democratic win and the Republicans
10 win in real life, or the measure predicted a
11 Republican win, and then in real life, the Democrats
12 win.

13 That's what we mean by a "prediction
14 error"?

15 A. Yeah, it was more likely that the
16 Democrats would win; the Republicans won, so just
17 based purely on the probabilities, that would be a
18 prediction error.

19 Q. All right. And we've been talking just
20 about the Seventh for the moment, but that's not the
21 only place where there are prediction errors in your
22 PVI measure, right?

23 A. Yes, that's going to be true, yes.

24 MR. GERSCH: Let's go to Figure 3.

25 And if we can enlarge -- that's it.

1 BY MR. GERSCH:

2 Q. All right. This is your bar chart
3 showing the results of a thousand simulated
4 elections, and I think I got this right, but what
5 makes the -- the -- the chart go is that far
6 right-hand column in the table we just looked at
7 which has the probabilities.

8 A. That's correct, yes.

9 Q. You multiply them -- the probabilities
10 by a thousand percent, and that's what you get, is
11 this chart?

12 A. No.

13 Q. All right. Explain how you got that.

14 A. Okay. So, you know --

15 Q. I think I left a step out.

16 A. Yeah. It might help if you go back to
17 the chart.

18 Q. Sure. Let's go back.

19 Sorry about that.

20 A. So the analogy I used previously was,
21 for each of the elections, I was flipping 18 weighted
22 coins where the weights were given by these
23 probabilities. So in the first simulation, it's as
24 if the computer flips a coin for the first CD, but
25 it's not really a coin flip because we know the

1 Democrats are going to win with Probability 1. The
2 same is true with Probability 2.

3 In the Third District, it essentially
4 flips a coin that comes up Democratic 21 percent of
5 the time. So in some of the -- you know, in
6 approximately 21 percent of the simulations, that
7 would be a Democratic district; approximately 79,
8 that would be a Republican district.

9 I do that for each of the districts in
10 each of the simulations. So because the randomness
11 is going to vary from one simulated election to
12 another, they're going to have different total
13 numbers of seats that came up heads for the
14 Democrats, tails for the Republicans.

15 Q. Okay. Thank you for the clarification.

16 But I take it that because of the law
17 of large numbers, if you run a thousand simulations,
18 you'll get numbers that reflect very close to what
19 those probabilities are?

20 A. You will get -- the law of large
21 numbers says you will get that on average, but that
22 doesn't -- law of large numbers isn't going to rule
23 out the variation --

24 Q. Sure.

25 A. -- and the -- the source of -- I mean,

1 the point of Figure 3 is the variation across those
2 simulations.

3 Q. All right.

4 MR. GERSCH: Let's go back to
5 Figure 3.

6 BY MR. GERSCH:

7 Q. All right. And here, again, what I
8 want to do is talk about -- and talk to you about the
9 difference between what your approach predicts and
10 what happens in the real world.

11 So in the real world, the Republicans
12 won 13 seats in 2012, right?

13 A. Yes, that's the number of seats they
14 won.

15 Q. And your prediction is about 3 percent,
16 that should happen about 3 percent of the time?

17 A. That looks about right, yeah.

18 Q. All right. And then the Republicans
19 won the same 13 seats in 2014, right?

20 A. Yes, that's correct.

21 Q. And then they won the same 13 seats in
22 2016?

23 A. Yes.

24 Q. Okay. So by my rough calculation, your
25 measure is off about 97 percent of the time; is that

1 fair?

2 A. No, I would not use all three -- I
3 would not use all three elections for that, because
4 their districts are changing over this period of
5 time. And -- so -- so, yes, I've got, like, a
6 3 percent likely outcome from the first election
7 to -- I would want to do the simulation over using
8 the more updated data to evaluate 2014, 2016.

9 Q. If you could do it, what -- what you
10 would do is say, All right. For going into 2014, I
11 don't want this model to look the same way; I better
12 take -- take into account the more recent election?

13 A. Yeah, I'd update the PVI to make the
14 prediction about 2014. And that may well be more
15 favorable to the -- that election, the PVIs were more
16 favorable to the Republicans than the ones that
17 occurred before 2012.

18 Q. Okay. So that's a good clarification.
19 This is not what you would use to look
20 at the 2014 election?

21 A. No.

22 Q. And it's not what you would use to look
23 at the 2016 election?

24 A. No.

25 Q. All right. And -- so let's just --

1 let's just talk about the 2012 election, to be fair
2 to your methodology.

3 It's fair for 2012 to say that the
4 simulations get it wrong 97 percent of the time?

5 A. That outcome is not produced by the
6 simulations 97 percent of the time. It doesn't mean
7 the simulations are wrong. It just means that the
8 outcome of the 2012 election was an outlier relative
9 to the fundamentals of the districting plan, which
10 would have predicted something closer to 10
11 Republican seats.

12 Q. Okay. But what you want to do in the
13 end, when you're coming up with a predictor, is --
14 what you want to do is to get a predictor that's
15 going to get it right; isn't that fair?

16 A. This simulation is designed to kind of
17 show how much variation there can be across outcomes,
18 given the underlying districting plan, and it shows
19 that 13 is a possible outcome of those simulations.

20 My goal is not -- I'm not into
21 forecasting Congressional elections as the goal. I'm
22 here just as Dr. Chen was, which was to say, What are
23 the partisan fundamentals of the district? Are they
24 consistent with the outcomes that we observe? And I
25 argue that this figure shows that.

1 Q. Can I ask you to move the mic just a
2 little bit closer?

3 A. Closer to me. I apologize. I just had
4 oral surgery.

5 Q. No, I think it's my age and my ears.

6 A. We're both infirm. It's okay.

7 Q. So just to test the last answer. I --
8 I -- I want to make sure I understood this.

9 You would rather have an election --
10 a -- a measure -- a predictive measure that gets you
11 the right answer, wouldn't you?

12 A. I believe that I have a prediction
13 based on thousands of elections in which it does a
14 reasonably good job of predicting.

15 The fact that Pennsylvania is an
16 outlier with respect to that in this one election, I
17 think, is -- is informative to what the underlying
18 claim is, which is that 13 is -- is an outlier,
19 outcome, with respect to what one would expect. I'm
20 showing that it's not the typical outcome, that the
21 plan was not designed to create 13, but it's
22 consistent with the observation of 13 Congressional
23 seats held by the Republicans.

24 Q. You don't mean that the plan wasn't
25 designed to create 13 seats, right? You're not

1 offering an opinion on that, are you?

2 A. I'm not offering an opinion on that,
3 but this simulation is consistent with a plan that
4 looked like an expectation that should deliver about
5 10 seats, an expectation with variation ranging
6 between, you know, seven and 13.

7 Q. And -- and just so we're clear, when
8 you say "expectation," this is Dr. McCarty's
9 expectation based on his chosen methodology, right?

10 A. This is -- this is the expectation
11 based on the methodology which I documented in the
12 report.

13 Q. But it's your methodology and your
14 opinion, right?

15 A. It's a methodology that I deployed. I
16 don't think -- it's a methodology that's consistent
17 with other methodologies in the field, and I think
18 the conclusions that I draw follow from the
19 methodology.

20 Q. I don't want to talk past each other.
21 You could have chosen a different
22 methodology. You could have used the presidential
23 election in all -- and all other statewide elections,
24 right?

25 A. I could not have employed that

1 methodology in order to make predictions about the
2 probabilities of districts electing Democrats or
3 Republicans.

4 Q. You just would have had to generate the
5 probability a different way; isn't that right?

6 A. It would be large amounts of
7 uncertainty about those probabilities because it
8 would be based on 18 Congressional elections rather
9 than the over 2,500 elections that I used for
10 calibration nationally.

11 Q. I'll come back to that point.

12 But, certainly, putting aside the
13 probability part of your calculation for the moment,
14 just to calculate the lean of the districts, you
15 didn't have to use just the presidential elections;
16 you could have used the presidential and the state --
17 and all statewide elections?

18 A. That is true about the lean, but I
19 don't think the lean tells us very much about how we
20 should expect a districting plan to perform.
21 Democrats win in Republican-leaning districts.
22 Republicans win in Democrat-leaning districts.

23 What we would like to know is some
24 assessment about the overall expectation once those
25 uncertainties are resolved.

1 Q. All right. And two other points here
2 before we move on. One is, I think I hear you to be
3 saying that this shouldn't be what you look at to
4 forecast beyond -- I'm sorry -- "this" meaning
5 Figure 3 -- shouldn't be what you look at to forecast
6 beyond the 2012 election.

7 A. Yeah, it's going to be a much better
8 forecast in 2012 than it would be a later election
9 because of the changes in the voting behavior in the
10 state.

11 Q. Let's talk about Dr. Chen's predictor.
12 He used, as we talked about, statewide elections for
13 2008 to 2010 for his principle measure, right?

14 A. Yes.

15 Q. And that -- that indicator predicts 13
16 Republican seats?

17 A. Yes, there was a Republican lean in 13
18 of those basing his measure in 13 seats.

19 Q. And -- and so his measure got every
20 seat right; and yours -- if I understand what the
21 simulation does, you're getting it right 3 percent of
22 the time?

23 A. I think that's an apples-to-oranges
24 comparison.

25

1 THE COURT: Well, why don't you
2 answer the question first and then give your
3 explanation?

4 The question was -- the question, I
5 think, was, Dr. Chen's model predicted three
6 of the elections -- Congressional district
7 results in three of the Congressional
8 elections after the map was drawn, and yours
9 only got that prediction right 97 percent
10 [sic] of the time.

11 That was the question.

12 THE WITNESS: Yeah, I don't -- I
13 think that's a mischaracterization of my
14 result. I think the right comparison would
15 be that his -- he predicted -- his measure
16 of lean indicates which of the 13 -- the 13
17 seats that the Republicans -- the
18 Republicans won. My measure predicted that
19 they would win 10. So it's a difference of,
20 like, three seats, rather than 97 percent
21 versus perfect.

22 So that's how I would characterize
23 the comparison.

24 BY MR. GERSCH:

25 Q. Three seats is a lot, isn't it?

1 A. Yeah, three seats is a significant
2 number of seats.

3 Q. And, also, I understand what you're
4 saying about how -- how you want to compare it. But
5 just to look at sort of all of the data, the way your
6 simulated elections play out, you would say there's a
7 greater chance -- there would have been a greater
8 chance for the Republicans to win only seven seats in
9 2012 than there was for them to win three seats --
10 I'm sorry -- 13 seats?

11 Do you need the chart again?

12 MR. GERSCH: Let's put the chart up.

13 THE WITNESS: Yes, that is -- that
14 is -- I can see the chart.

15 That is correct, yes.

16 BY MR. GERSCH:

17 Q. So -- so the way it looks, to me, is
18 there's almost a double -- there's also twice the
19 probability, under your method, that the Republicans
20 would have ended up with seven seats rather than 13?

21 A. That looks right, yeah.

22 Q. Dr. McCarty, isn't it true that the key
23 to drawing inferences from simulated districting
24 models is to use a good method?

25 A. The key to drawing inferences -- good

1 inferences is always to use a good method.

2 Q. And the measure you choose should do a
3 good job of predicting the actual legislative
4 outcomes -- legislative election outcomes?

5 A. Sure, ideally.

6 Q. And, therefore, for any measures, the
7 one that succeeds in correctly forecasting subsequent
8 Pennsylvania election outcomes should be the
9 preferred one?

10 A. I don't -- I don't necessarily agree.
11 I don't necessarily agree with that. My argument
12 would be that at the time the maps were drawn, 10 was
13 a more likely outcome, just purely on the basis of
14 partisanship, than 13. The 13 was a fortuitous set
15 of circumstances. That it turned out to be 13, I
16 would argue, is not related to the partisanship of
17 the districts and the map, but perhaps other factors
18 which are not models here.

19 Q. Dr. McCarty, you told the Florida Court
20 that Therefore, for any measures, the one that
21 succeeds in correctly forecasting subsequent State
22 Senate outcomes -- it was State Senate race, should
23 be preferred.

24 Isn't that right?

25 A. That -- that refers to calibrating the

1 probabilities of a -- of a district turning --
2 turning Democratic for the -- for the simulations.

3 I would argue, what you want to know
4 for this comparison is, like, which method was raw
5 partisan -- whether raw partisan lean or estimated
6 probabilities does a better job of predicting
7 Congressional elections in general. And I would
8 argue that the methodology I use is better at
9 predicting Congressional elections in general and,
10 therefore, is justifiably applied to this particular
11 case.

12 Q. So if I understand you correctly,
13 you're saying, even though your method gets it wrong
14 in this case, we should prefer it because you say in
15 other cases that you've not shown us, it will do
16 better?

17 A. No, I'm not saying that about other
18 cases. I'm saying that my method of calibrating the
19 relationship between partisanship and outcome is
20 based on the observation of over 2,500 Congressional
21 election outcomes.

22 The 2012 election was an outcome based
23 on a sample of eight -- the performance of 18
24 districts. So I have more confidence in kind of, as
25 a general relationship, one that I derive from over

1 25 other observations, rather than one that's based
2 on essentially a sample of 18.

3 Q. Dr. McCarty, there's nowhere in your
4 report where you try your system out on any other
5 election other than the Pennsylvania elections; isn't
6 that right?

7 A. I -- I actually -- in the first set of
8 columns in Table 2, I apply it to the previous
9 Congressional districting plan and show that it's a
10 fairly neutral plan, and over the course of that
11 decade, it fit reasonably well.

12 I also report in the report that one of
13 the reasons why the Republicans picked up 13 seats is
14 they picked up almost all of the very, very close
15 seats in terms of partisan skew, but previously in
16 Pennsylvania, Democrats had been very successful at
17 winning those seats. So I take that as evidence that
18 the ex-ante probabilities of which my analysis is
19 based are reasonable ones because they've been shown
20 to hold throughout the country and they're consistent
21 with historical patterns in Pennsylvania under the
22 previous plan.

23 Q. Doctor, my question was a little
24 different.

25 My question was, There's not one place

1 in your report where you show us that your measure
2 does a good job of predicting any election outside of
3 Pennsylvania; isn't that right?

4 A. I guess I'm not sure what you mean by
5 predicting -- by predicting elections. I analyzed
6 2,500 elections, and I show -- I show the estimates,
7 I show the data, and so I show the relationship
8 between PVI and voting.

9 And I show that, in many cases, it's
10 going to lead to erroneous errors because it's not a
11 binary, one party has more voters than the other,
12 it's a very much more contiguous relationship. So I
13 think that establishes that it's quite possible that
14 performance in Congressional -- in Pennsylvania could
15 have been quite different if it didn't -- adhere
16 either to the historical patterns nationally or even
17 the patterns in the state of Pennsylvania under the
18 previous plan, where the Democratic partisan
19 routinely won districts that were R plus 2, R plus 3,
20 R plus 6, et cetera.

21 Q. Dr. McCarty, let's not get hung up on
22 terminology.

23 I asked you if there was a place in the
24 report where you say you've shown that your election
25 [verbatim] predicted the right results from election

1 outside of Pennsylvania.

2 I'm not sure I followed everything you
3 said, but if you think that's in that appendix, show
4 me -- show me an election outside of Pennsylvania
5 that you used your methodology on and where it
6 predicted the right result.

7 You can look anywhere in your report.

8 You have your report there?

9 A. Yes, I do.

10 Q. Can you point to any page number?

11 A. Since we don't want to talk past in
12 terminology, so could you explain exactly what you
13 mean by predicting another --

14 THE COURT: Dr. McCarty, let me
15 interrupt and make this pretty easy.

16 THE WITNESS: Okay.

17 THE COURT: So you applied your
18 methodology to the 2011 Plan for
19 Pennsylvania, correct?

20 THE WITNESS: That's correct.

21 THE COURT: Is there any part of
22 your report where you applied your
23 methodology to another state?

24 THE WITNESS: Not to another state.

25 THE COURT: To another state's

1 Congressional races?

2 THE WITNESS: Not in the same way
3 that I did to the 2011 Congressional Plan.

4 MR. GERSCH: Thank you, Your Honor.

5 THE COURT: You're welcome.

6 BY MR. GERSCH:

7 Q. I have a note that one of us got the
8 percentages backwards at some point and, so, that
9 there's apparently a statement on the record that
10 your approach got it right 97 percent of the time.
11 That's not correct.

12 A. Oh. If -- if I --

13 Q. I'm not saying it was you. One of us,
14 is what I'm told.

15 A. No, no. Under either definition of
16 "getting it right," that's not a correct statement.

17 THE COURT: I guess that depends on
18 which side of the view you are on this case.

19 BY MR. GERSCH:

20 Q. All right. Let's move on.

21 All right. Let's talk some about your
22 work with respect to Dr. Chen's simulated plans.

23 And what I read in your report is you
24 said that all of Professor Chen's simulations in
25 Set 1 are more favorable to Republicans than the 2011

1 enacted plan; is that right?

2 Page 7.

3 A. Page 7.

4 Could you repeat what I --

5 Q. Sure.

6 On Page 7, you say, All -- and "all" is
7 ALL in caps -- of Professor Chen's simulations in
8 Set 1 are more favorable to Republicans than the 2011
9 enacted plan.

10 A. I don't see that on Page 7 of my
11 report, which doesn't deal with --

12 Q. Let me take a look. Maybe I gave you
13 the wrong number.

14 It appears I did. I'm sorry.

15 Page 12, carryover paragraph, the
16 next-to-last line.

17 A. Yes.

18 Q. Yes, that's what it says.

19 Okay. And -- and so what -- if I can
20 reduce it here, so when you apply your approach, what
21 you say is that Dr. Chen's simulated maps are better
22 for the Republicans -- this is your opinion, right --
23 better for the Republicans than the enacted map; is
24 that right?

25 A. That's what my methodology implied,

1 yes.

2 Q. Okay. And -- well, let's -- and is
3 that the opinion you're offering today, that the --
4 Dr. Chen's simulated maps --

5 A. I --

6 Q. Excuse me. Let me just get the
7 question out; you can give whatever answer you want.

8 -- that Dr. Chen's simulated maps are
9 better for the Republicans than the enacted maps?

10 A. That's what these data -- that's what
11 these data showed.

12 Q. I know that's what the data shows.
13 I'm asking if you're standing behind
14 it.

15 A. Yeah, I'm standing behind the
16 methodology in these results.

17 Q. Okay. Do you understand that
18 Dr. Chen's work was done with no partisan inputs?

19 A. That's my understanding, yes.

20 Q. Okay. And you understand that when the
21 enacted plan was made, the Republicans controlled the
22 State House, the State Senate and the Governor's
23 Office?

24 A. Yes.

25 Q. And you've seen the very bizarre shapes

1 of the maps in the enacted plans, yes?

2 A. I've seen -- I've seen the enacted
3 plans' maps.

4 Q. Have you seen the map of the Seventh?

5 A. Yes, I've seen the map of the Seventh.

6 Q. Okay. How about the map of the 12th?

7 A. I'm not sure what -- I'm not good at
8 remembering numbers.

9 MR. GERSCH: If we can put up the
10 map of the 12th.

11 BY MR. GERSCH:

12 Q. While we're still on the subject of the
13 Seventh, that's a pretty strange-looking map, isn't
14 it?

15 If you need me to put that up, I'll do
16 that too.

17 A. I mean, I -- you know, I don't have a
18 metric for what's strange and what's not strange.

19 Q. It's not compact.

20 Do you have it in mind?

21 If you don't have it in mind, I'll put
22 it up.

23 A. I know which one you're talking about.

24 Q. I figured you do.

25 It's not a compact map, right?

1 A. It does stretch out through a wide part
2 of the state, yeah.

3 Q. And it's a barely contiguous map,
4 right?

5 A. It has some narrow points, yes.

6 Q. There's a point where it's only as wide
7 as Creed's Seafood & Steaks Restaurant, correct?

8 A. That, I don't know.

9 Q. Okay. And there's another place where
10 it's only as wide as a hospital; isn't that right?

11 A. That, I don't know.

12 Q. Okay. But you would accept my
13 representation?

14 A. I guess, yes.

15 Q. And you understand that when the map
16 was passed, the legislature never produced any
17 explanation of how they came up with these shapes?

18 A. I have no information on that.

19 Q. Have you looked?

20 A. No.

21 Q. You were an expert in the Federal case?

22 A. In Pennsylvania?

23 Q. Yes.

24 A. Yes.

25 Q. The Agre case that was just tried last

1 week.

2 A. Yes. Yes, I was, yes.

3 Q. And have you seen the data --
4 the data that the Speaker produced in that case?

5 MR. TUCKER: Objection, Your Honor.

6 THE COURT: The basis?

7 MR. TUCKER: That data is not being
8 admitted in this case. It was not admitted
9 in the Agre case.

10 MR. GERSCH: I haven't offered it in
11 evidence.

12 THE COURT: Was it used in the Agre
13 case?

14 MR. TUCKER: Not with this witness,
15 Your Honor.

16 THE COURT: Objection sustained.

17 MR. GERSCH: Well, Your Honor, can I
18 at least inquire whether he knows about it?

19 THE COURT: No.

20 MR. GERSCH: Fair enough.

21 BY MR. GERSCH:

22 Q. In any case --

23 MR. GERSCH: Let's put up --

24 THE COURT: Let me correct that.

25 You can inquire of the witness

1 whether he has seen any information --
2 several experts have been asked about
3 whether they know how or have information
4 specifically from the legislature about
5 what -- what they used to draw the maps.

6 So if you want to ask that question,
7 whether -- whether he was given any
8 information to show how the maps are drawn,
9 were drawn, then --

10 MR. GERSCH: Certainly, Your Honor.
11 And let me make this inquiry so that I don't
12 get it wrong.

13 What I'm interested in finding
14 out -- my experience, usually the experts
15 want to know all the information that the
16 legislators might have considered -- or any
17 decision-maker for any kind of case, they
18 want know the inputs that -- that the
19 legislator -- that the people considered
20 making the decisions and --

21 THE COURT: Well, you can ask him
22 that question.

23 BY MR. GERSCH:

24 Q. Dr. McCarty, first of all, did you ask
25 to see whatever information was produced in discovery

1 regarding what the people who made the map looked at?

2 A. No.

3 Q. Is there a reason you didn't ask to see
4 that?

5 A. No. I was a rebuttal witness to
6 reports, and I really focused on addressing the
7 issues that were addressed directly in those reports.
8 And I didn't see it necessary to inquire further,
9 given the time constraints involved in both of those
10 cases.

11 Q. And I take it that's because what
12 you're saying is you were there for the limited
13 purpose of critiquing their methodology?

14 A. Yes.

15 Q. The same as you are here today?

16 A. Yes.

17 Q. Okay. But when we -- when we get down
18 to the issue of whether or not your opinion is right
19 that Dr. Chen's simulated maps are better for the
20 Republicans than the actual map, and you see that
21 your data -- that's what your data supports, isn't it
22 appropriate, as a scholar, to ask some questions
23 like, Is this consistent with these maps that were
24 made? Is this consistent with the fact that the one
25 party controlled both the entire legislature and the

1 Governor's Office?

2 Aren't those questions you want to ask
3 about whether your measure might have some bias to
4 it, might not be capturing reality?

5 A. No. I mean, there's two aspects to
6 what I'm reporting here. One is, again, as you asked
7 me early on whether I was opining about whether or
8 not I was providing evidence for or against the
9 proposition, I said no, and I'm just simply
10 critiquing the evidence that had been provided.
11 There's another alternative hypothesis, which is that
12 Professor Chen's simulations do a relatively poor job
13 of capturing the complexities of districting in
14 Pennsylvania and it's the pathology of his
15 simulations, rather than something about the ways in
16 which I measured the propensity of districts to elect
17 Republicans versus Democrats.

18 So given the time constraints and given
19 that I felt it was equally likely that the problems
20 lie in the simulations, rather than my reanalysis of
21 the simulations, I didn't really see the purpose in
22 inquiring further.

23 Q. All right. But -- the basis for your
24 analysis that Dr. Chen's getting it wrong with
25 respect to the way the enacted plan favors the

1 Republicans -- the basis for your analysis is this
2 methodology you've chosen to use with just the 2004
3 and the 2008 preelections?

4 A. It's applying a different measure of
5 partisanship and how that relates to Congressional
6 performance to his methodology of drawing -- drawing
7 districts. So the output, you know -- he has an
8 input. I have an input. The output is different.
9 On a very tight schedule, it's very difficult to
10 unpack the differences between -- with who --
11 relative blame in those predictions.

12 Q. Sure. And I can assure you,
13 Dr. McCarty, in terms of the tight schedule, all of
14 the lawyers, and probably the Court as well, we get
15 that part --

16 A. Yes.

17 Q. -- we're all under a tight schedule.
18 But my question is a little different.

19 The point that I'm trying to get at is,
20 the basis on which you say that Dr. Chen is getting
21 it wrong is not that Dr. Chen fails to predict the
22 real world; the basis is that you're saying that
23 Dr. Chen's results don't line up with your construct,
24 correct?

25 A. What -- what I'm saying is that you

1 apply a different measure of partisan performance to
2 the districts, mine instead of his, the results that
3 he gets are very, very different than what he
4 reports, in such a way that they're even more
5 Republican than -- than the districting plan.

6 So ideally, what one would want in a
7 methodology to make these assessments is one that's
8 sort of robust to more reasonable assumptions about
9 the relationship between partisanship and
10 Congressional districting performance. I suggest
11 that by taking into account these uncertainties, if
12 his measure -- if his methodology was sound, he would
13 have got -- he would have gotten the opposite result.

14 We didn't get the opposite result. So
15 I can't tell you whether the differences are because
16 it's true that the -- that the enacted plan is
17 more -- is less Republican than his simulations or
18 whether something about his simulations. It's just
19 an uncertainty underlying the claims that he's making
20 in this case that I wanted to highlight with this
21 analysis.

22 Q. Dr. McCarty, my question was simpler
23 than that, I think, and it was intended just to be a
24 predicate.

25 The basis on which you say that

1 Dr. Chen isn't getting it right is not by comparing
2 him to real elections; it's by comparing him to
3 your -- to -- to the results that your chosen
4 methodology produces.

5 Fair?

6 A. Yes, that's the discrepancy between --
7 that's the discrepancy between the two results.

8 Q. All right. So it's very important, if
9 you're going to make these claims about Dr. Chen's
10 maps being more favorable to the Republicans than the
11 enacted plan -- it's very important that your
12 methodology be right, if you're going to make those
13 claims, right?

14 A. Yes. I'm confident in my methodology.
15 But, moreover, one doesn't want the analysis of his
16 simulated maps to depend too crucially on an input
17 that imperfectly predicts Congressional outcomes,
18 whether it's my approach or his approach.

19 If it was a robust conclusion which he
20 was offering, one would expect to find similar
21 results across both approaches to measuring
22 partisanship and performance.

23 Q. Well, it would be nice if they were
24 across both if your approach is a good approach,
25 right?

1 A. I believe my approach is a good
2 approach.

3 Q. I know you believe that, Dr. McCarty.
4 So now I'm back to where I started a couple of
5 minutes ago.

6 As a scholar, as someone whose analysis
7 depends on your approach being a good approach, when
8 you got the result that Dr. Chen's maps -- simulated
9 maps made with absolutely no partisan inputs into
10 them, when you got the result that your approach is
11 making those maps look more Republican-leaning than
12 the map produced by a government that was run by a
13 single party at that point, didn't you want to say,
14 Hmm, this is not the expected result, that the
15 nonpartisanship input maps come out as being more
16 favorable to the ruling party than the map that the
17 ruling party made on its own?

18 A. No. I would -- just simply wanted to
19 highlight what the implications of his methodology
20 were using my different approach to measurement. So
21 I'm not -- as a matter of these data, the
22 results -- the expected results that come out of the
23 simulations are more Republican than the enacted
24 plan, but I'm not concluding that the enacted plan
25 was less Republican than the simulations. I'm just

1 showing that there's lots of uncertainties about
2 claims of that sort.

3 Q. Didn't you tell WHYY that it's clear
4 that partisan -- there's partisan gerrymandering in
5 states where the redistricting is done by
6 legislatures dominated by a single party?

7 A. I don't recall -- I don't recall that.
8 If you could give me the context.

9 Q. Sure. You gave an interview to WHYY, I
10 think, shortly after the redrawing of -- the
11 redistricting was done. A guy named Dave Davies
12 interviewed you for a piece called Off the Mic. I
13 can show you the -- you know, what WHYY prints on
14 their Web site.

15 A. Sure. I'd need to see that. I don't
16 recall that interview.

17 Q. I'm sorry. You do --

18 A. I don't recall that interview.

19 MR. GERSCH: Your Honor,
20 Exhibit 27 -- would you like me to put it up
21 or just show it to him?

22 THE COURT: Let's follow the proper
23 process. I think -- you've been around the
24 block -- that you know how this works.

25

1 BY MR. GERSCH:

2 Q. I'm just going to get the right page
3 out for you, but feel free to look at all of it.

4 THE COURT: 270, what are we --

5 MR. GERSCH: 274, Your Honor.

6 THE COURT: You folks are skipping
7 around a lot.

8 Okay.

9 MR. GERSCH: That will be Page 4.

10 THE COURT: I don't want to see a
11 copy of it. I don't want to see it, but
12 thank you.

13 Professor, the next question you're
14 going to get from Mr. Gersch is does that
15 refresh your recollection about the
16 interview.

17 THE WITNESS: To be honest, no. I
18 do quite a few interviews every year,
19 usually by phone. They're usually 25,
20 30 minutes long, and then a couple of
21 quotations come out.

22 So what I'm looking for is something
23 more about the context, not -- so I don't
24 know whether that's -- I don't know whether
25 that's a direct quote or not. It's not

1 being reported as a direct quote.

2 THE COURT: So the answer as to
3 whether that refreshes your recollection is
4 a no?

5 THE WITNESS: No, I don't remember
6 this specific -- I don't remember this
7 specific interview.

8 BY MR. GERSCH:

9 Q. Sure. So without respect -- do you
10 want to look at it more?

11 A. Yeah.

12 And it's not even clear, the date of
13 the publication. So if you could help me locate
14 that, that might be helpful.

15 Q. Yeah. My understanding, I think it was
16 2012. But you're -- I don't think you're going to
17 see it on there.

18 A. Okay. Okay.

19 Q. In any case -- if you want to read it,
20 that's fine.

21 A. No, no. I see what you're pointing to
22 that I'm reported as having said.

23 Q. All right. Separate and apart from the
24 article --

25 THE COURT: Would you like to

1 retrieve that article from the witness since
2 he -- it doesn't refresh his recollection?

3 MR. GERSCH: I may ask him about one
4 other part of it, just to see if it
5 refreshes his recollection.

6 THE COURT: Okay.

7 BY MR. GERSCH:

8 Q. If you turn to Page 3, the top of
9 Page 3, there's a place where there is a quote
10 directed to you --

11 MR. GERSCH: Your Honor, I'm happy
12 to read the quote, but I'm also happy to
13 have him take a look at it.

14 THE COURT: I think you know the
15 process, Mr. Gersch.

16 BY MR. GERSCH:

17 Q. So, Dr. McCarty, take a look at the top
18 of Page 3. The lead-in is Princeton Professor Nolan
19 McCarty, so the remainder of that paragraph and then
20 the next one where you're quoted.

21 A. Um-hum.

22 On Page 3, yes?

23 Q. The top of Page 3.

24 (Whereupon, the witness reviews the
25 material provided.)

1 BY MR. GERSCH:

2 Q. You've taken a look at that?

3 A. Yeah, yeah, I've taken a look at that.

4 Q. Having seen that, does that refresh
5 your recollection of something you think you would
6 have said to WHYY?

7 A. I mean, it's -- I mean, it's possible.
8 Again, if you're asking me whether I remember this
9 specific conversation with this specific journalist,
10 I don't.

11 Q. Why don't you put that aside, unless
12 you want it?

13 But, basically, my question to you is
14 going to be, Separate and apart from WHYY, separate
15 and apart from that piece of paper, isn't it your
16 view or wasn't it your view, at least as of a couple
17 of years ago, that if you look at states that don't
18 leave the districting process up to the legislatures,
19 you tend to get election results that are much closer
20 to what you would expect?

21 A. Yeah, I believe there's a correlation
22 between using a districting commission and getting
23 more proportionality in terms of the seats-votes
24 relationship.

25 Q. And by that last part, proportionality

1 of the seats-votes, you mean that when the -- the
2 independent commissions do it, what you see is that
3 there's a closer relationship to the proportion
4 between the parties and how many seats they
5 actually get?

6 A. Yes, that's correct.

7 MR. TUCKER: Your Honor, I object.
8 This is beyond the scope of the witness's
9 opinions in this case.

10 THE COURT: Overruled.

11 BY MR. GERSCH:

12 Q. And when -- the corollary to that is
13 when the legislature controls the process, you tend
14 to see election results which are -- tend to vary
15 much more from the proportional that you would
16 expect?

17 A. That's the -- that's the correlation.
18 One of the complications in drawing conclusions is
19 that the states that do independent districting are
20 not a random sample of all states. States that tend
21 to be -- have a natural Republican geographic bias,
22 oftentimes, Republicans tend to run those
23 governments, and they do the districting.

24 So the correlation between this
25 deviation for proportionality and partisan control, I

1 think, is a correlation -- I think there's a question
2 about the extent of the causal relationship and
3 its -- and its magnitude.

4 Q. And regardless -- again, without regard
5 to WHYY, it's your opinion, isn't it, that in
6 states -- I'm not saying in all states, but in states
7 where you have one party in control, you find --
8 that's when you find gerrymandering -- partisan
9 gerrymandering?

10 A. That's where you find a bigger
11 deviation from the proportionality is what -- which
12 is what I believe is what I told WHYY. Part of that
13 could be gerrymandering; part of it could be the
14 features of states that produce Republican advantages
15 also tend to produce the opportunities for
16 Republicans to draw districts.

17 My testimony in this case is really
18 about looking at quantifying the magnitude of these
19 differences independently of what, you know, the
20 states themselves are trying to do. So there's no
21 testimony -- I've made no testimony that states --
22 that the parties -- in single-party controlled
23 states, that they're not trying to do things to at
24 least support their candidates.

25 But the question is, like, what are the

1 demonstrated magnitudes of those effects.

2 THE COURT: Mr. Gersch, are we also
3 done with this cross-examination?

4 MR. GERSCH: We are not. We are
5 making good progress, but we're not.

6 THE COURT: We can keep moving it
7 along.

8 MR. GERSCH: Yes, sir.

9 BY MR. GERSCH:

10 Q. Let's go back to the work that you did
11 with respect to Dr. Chen's simulated plans. And I
12 want to go over something you testified about this
13 morning.

14 So, as I understand it, you used a
15 somewhat different methodology with respect to the
16 simulated plans than you did with the enacted plan,
17 right?

18 A. I wouldn't say I used a different
19 methodology. I did not have a measure of PVI for all
20 the simulations, so I had to impute those.

21 Q. Fair enough.

22 In Pennsylvania, you could just look up
23 the PVI for the enacted plans, right -- or look up
24 the inputs for --

25 A. When -- yeah, for the PVI for the

1 enacted plans, I was able to acquire going back to
2 2004 and 2008. Those sort of published PVIs were the
3 most updated, so . . .

4 Q. Yeah. And -- and, of course, those
5 would not be available for the simulated plans?

6 A. Those are not available for the
7 simulated plans.

8 Q. And if I understood you correctly on
9 direct, you -- you could -- you could have computed
10 the PVIs for the simulated plans, but time was short,
11 and you used the regression analysis?

12 A. That's correct, yes.

13 Q. Okay.

14 MR. GERSCH: And let's put up
15 Petitioners' Exhibit 162.

16 BY MR. GERSCH:

17 Q. Which I think you testified about on
18 direct.

19 All right. You've seen this before.
20 This is for a map -- one of Dr. Chen's simulated
21 maps. It happens to be Number 3 in his set. And
22 this is the chart which shows, in the third column,
23 for each district, the PVI that Dr. Chen calculated
24 for these districts. And in the -- I'm sorry, the
25 fourth column. The first column is just the district

1 number.

2 But the -- and then in the fifth
3 column, that's what you estimated using your
4 regression analysis, right?

5 A. Yes.

6 Q. Okay. And so just taking that first
7 simulated district -- and this is not -- this
8 district does not necessarily line up with
9 Philadelphia, right? This is a simulated district?

10 A. This is -- exactly.

11 Q. All right. But you've got a -- this is
12 still a case where the Democrats are negative, as you
13 understand it?

14 A. Yes.

15 Q. All right. So -- so the PVI is minus
16 40 for the First District.

17 You're regression calculated minus 36;
18 is that right?

19 A. That's my understanding of what this is
20 showing. I did not check -- I did not check to see
21 that my regression coefficients predicted that, but
22 I'll take it that it does.

23 Q. But that fifth -- that fifth column
24 comes from you? I don't mean that you wrote in the
25 numbers, but that comes from your analysis?

1 A. Okay. If -- if you say that's where it
2 came from.

3 I don't know. I did not --

4 Q. You testified about this on direct,
5 didn't you?

6 A. Yes, but it was an exhibit that you
7 produced, and it was not explained to me how -- how
8 it was produced.

9 I had assumed that the regression
10 coefficients that I reported were applied to
11 Professor Chen's numbers to get what my estimate
12 would have been. I don't know whether he
13 actually used my estimate in this -- in this column.

14 That's -- that's the only distinction
15 I'm making.

16 Q. You understand this -- this was
17 an -- this document was produced in open court on
18 Monday?

19 A. Yes -- no -- I -- I -- I -- I do
20 understand that, but I -- I'm just not aware of the
21 details of whether he literally took these numbers
22 from some output file of mine or applied my
23 regression coefficients to his output to produce
24 them.

25 Either way, they should be the same

1 numbers. I'm just making a distinction about what I
2 know and what I don't know.

3 THE COURT: He's saying he'll
4 assume they're the same numbers. But
5 he's -- unless you want to put his exhibit
6 up so he can compare them. I think that's
7 the distinction we're drawing here.

8 MR. GERSCH: I think you're exactly
9 right. I agree with the Court entirely.

10 BY MR. GERSCH:

11 Q. Let's see if we can move this along
12 now.

13 The First District, there's a 4-PVI
14 differential in favor of the Republicans in terms of
15 the difference between your regression and the actual
16 PVI, right?

17 A. Yes.

18 Q. Second District, there is a 2-point
19 differential in favor of the Republicans, comparing
20 the actual PVI to you're regression analysis?

21 A. Yes.

22 Q. All right. And if we go down this
23 whole column on the right, we'll see that for 18
24 districts, there is -- the difference between your
25 regression results and the actual PVI is a change in

1 favor of the Republicans in 17 of those 18 districts?

2 A. That looks right, yes.

3 Q. Okay -- I'm sorry. I didn't hear your
4 answer.

5 A. That looks right, yes.

6 Q. And I heard you to say on direct that
7 you thought this was an outlier; is that right?

8 A. I said it was possible it was an
9 outlier. I have no way of knowing what -- what would
10 be the case for the other plans. I don't know how
11 this particular plan, Set 1, Number 3, was chosen.
12 So I just have no way of knowing whether it's an
13 outlier or not.

14 But given the high correlation between
15 Dr. Chen's measure and the PVIs, I would assume that,
16 on average, he would get it correct and that this was
17 probably an outlier.

18 Q. All right. That's what I understood
19 you to say.

20 Let's take a look at the first map in
21 the set.

22 MR. GERSCH: Map Number 1.

23 BY MR. GERSCH:

24 Q. All right. This is the same chart,
25 basically, but for the first map, not for the third

1 map. And it's set up the same way. Fourth column is
2 the column with the correct PVI; fifth column is your
3 PVI that you've regressed; fifth column are the
4 additional -- is the Republican -- the difference
5 between the two for the Republicans.

6 And what you'll see is there's a
7 positive result in every row with the exception of
8 two; is that right?

9 A. Yes.

10 Q. So -- so your regression produces a
11 more Republican-leaning outcome in 16 of the 18
12 districts as compared with the actual PVI?

13 A. Yes, yes.

14 Q. All right.

15 MR. GERSCH: Let's put up Map 2.

16 THE COURT: Mr. McCarty, could you
17 please keep that microphone toward you? If
18 you want to pull it, like, even the whole
19 base will move, probably.

20 THE WITNESS: Okay. Great. Thank
21 you.

22 THE COURT: You're welcome.

23 BY MR. GERSCH:

24 Q. All right. This is Map 2, the same
25 setup. I won't go through it unless you need me to.

1 If you look at that fifth -- I'm
2 sorry -- that last column, you'll see that the
3 difference between your regression-calculated PVI and
4 the actual PVI, your system produces a positive
5 result for the Republicans, that is, added PVI for
6 the Republicans, in 17 out of the 18 districts; is
7 that right?

8 A. That seems to be the case, yes.

9 Q. We've seen Map 3.

10 MR. GERSCH: Let's go to Map 4.

11 BY MR. GERSCH:

12 Q. Map 4, the same setup.

13 If we look at the last column, the
14 difference between the correct PVI and your regressed
15 PVI shows that the regressed PVI you calculated adds
16 Republican PVI in 16 out of the 18 maps; is that
17 right?

18 A. Yes.

19 MR. GERSCH: Let's go to Map 5.

20 BY MR. GERSCH:

21 Q. We can cut this shorter.

22 This one shows, again, 16 -- in 16 out
23 of the 18 simulated districts, your system produces
24 an added Republican PVI, right?

25 A. Yes.

1 MR. GERSCH: Let's go to the next
2 map, Number 6.

3 BY MR. GERSCH:

4 Q. In this one, 17 out of the 18 districts
5 your regressed PVI produces added -- I'm sorry --
6 your regressed PVI produces added Republican PVI as
7 compared with the actual PVI, right?

8 A. Yes.

9 Q. All right.

10 MR. GERSCH: Let's go to Number 7.

11 BY MR. GERSCH:

12 Q. All right. This is the first one we've
13 seen where -- there's a single district here where
14 your system produces a greater PVI for the Democrats,
15 correct?

16 A. Yes.

17 Q. And another one where there's no
18 effect, right?

19 A. Yes. They're the same numbers.

20 Q. Okay. So in 16 out of the 18
21 districts, your regressed PVI produces a more
22 Republican PVI than the correct one, right?

23 A. Yes.

24 Q. This is 7. Let's do a couple more.
25 Eight --

1 MR. GERSCH: Let's go to eight.

2 BY MR. GERSCH:

3 Q. Again, looking at the last column, you
4 can see that 16 out of the 18 districts, your
5 regressed PVI adds Republican PVI over the actual
6 calculation, right?

7 A. Yes.

8 Q. All right. Let's do just two more.

9 MR. GERSCH: Number 9.

10 BY MR. GERSCH:

11 Q. Number 9, 17 out of the 18 districts,
12 your regressed PVI adds a Republican-leaning -- a
13 Republican PVI over the actual calculation, right?

14 A. Yes.

15 MR. GERSCH: The last one,
16 Number 10.

17 BY MR. GERSCH:

18 Q. Again, 17 out of 18 of the districts
19 show that you've got -- that your regressed PVI adds
20 Republican PVI over the actual calculation, right?

21 A. Yes.

22 Q. Okay. I'm not going to go through all
23 500 or all thousand.

24 Dr. McCarty, have you seen enough to
25 show that that Map 3 that you looked at earlier is

1 not an outlier?

2 A. No. It's consistent with the other
3 nine maps you showed.

4 Q. Map 3 is consistent with the other
5 nine?

6 A. Yes.

7 Q. And you would no longer say that Map 3
8 is an outlier?

9 A. No.

10 Q. No, you would not?

11 A. No.

12 Q. All right. Just a little bit more on
13 your analysis with Dr. Chen, and then we'll move on
14 to Dr. Warshaw.

15 MR. GERSCH: Let's put up

16 Petitioners' Exhibit 34.

17 BY MR. GERSCH:

18 Q. Dr. McCarty, I understand that you --
19 withdrawn.

20 The column on the left, this comes from
21 your backup files in this case, right?

22 A. That's part -- that's part of one of
23 the files.

24 Q. Sure. And this is what, as I
25 understood your testimony, you say was used to

1 generate the appendix -- this is part of what you
2 used to generate the appendix?

3 A. Yes, that's the underlying data that
4 produces the appendix.

5 Q. Okay. And the -- the difference
6 between this and the measure that you use in the text
7 of your report is that, here, you're using 2008 and
8 2012 presidential elections to calculate PVI, as
9 opposed to 2004 and 2008?

10 A. I'm using 2008, 2012 to compute the
11 PVIs used to predict elections in 2012 and 2014.

12 Q. Understood. Understood.

13 But I just want -- the difference
14 between this one and the one you used in the
15 report -- 2008 is the same for both of them.

16 The difference is, in this one, you've
17 added the 2000 election; and the one in the report,
18 you use the 2004 election?

19 A. Well, in the parts of the report that
20 are referring to the enacted plan of 2011.

21 Q. Of course.

22 And -- and I understand that the
23 purpose of this was to help you generate the
24 appendix which you used to create your probabilities,
25 right?

1 A. That's correct, yes.

2 Q. All right. But, nonetheless, what this
3 illustrates is the fragility of the measure that's in
4 your report.

5 You swapped out one presidential
6 election for another, and you get 18 PVI added to the
7 Democrats, right?

8 A. Yeah. I'm averaging one point per
9 district.

10 Q. Right. And -- and so in terms of how
11 your -- your system works with respect to the enacted
12 plan, one question is whether those two elections you
13 have -- withdrawn. I'm not saying it right.

14 One thing this illustrates is with a
15 small change in the elections, you could get very
16 different results than you produced for the enacted
17 plan, right?

18 A. Could you rephrase the question? I'm
19 not sure what you're asking me.

20 Q. Sure. Let's do it this way.

21 You used only two elections to -- to --
22 to make your PVI for -- to evaluate the enacted plan,
23 right?

24 A. Yes, that's true.

25 Q. Okay. So one issue there is it's --

1 that's not a lot of elections, right?

2 A. It's -- it's -- it's two of the most
3 important elections, but, yes, it's only two.

4 Q. Okay. And no state elections, as we've
5 already talked about?

6 A. Yes.

7 Q. By contrast, Dr. Chen, I think, had
8 six; isn't that right? Six elections?

9 A. That sounds correct.

10 Q. All right. And one issue, if you only
11 use two elections, is if one of the two turns out to
12 be anomalous, you -- you now have an anomalous
13 election that's going to weight 50 percent of your
14 measure, right?

15 A. If, in fact, they're anomalous, the
16 measure could also differ because the partisanship
17 within the state has changed over time, right. So --
18 so you want to use the measure that's more proximate
19 to the decision that you're evaluating.

20 Q. Sure. But my point is you've got two
21 elections -- two elections.

22 If one of them is not a great
23 indicator, for whatever reason -- strange year, maybe
24 no one showed up to vote because there was a
25 nationwide snowstorm, whatever one can imagine -- if

1 one of those elections is not a great election to
2 predict -- you've only got two elections --
3 50 percent of your measure is going to be tainted,
4 right?

5 A. If, in fact, one were anomalous, that
6 would be true, yes.

7 Q. And by "anomalous," I don't necessarily
8 mean -- we don't have to imagine that the election is
9 crazy; it can just be not a particularly good
10 predictor of what's to come in the future, right?

11 A. Yeah, possibly. But that's -- that's
12 my point about we don't know what's going to happen
13 in the future, so we want to base these things on
14 data that have already been measured.

15 Q. Your -- your point is you don't want to
16 look at 2012 for a map that was drawn in 2011, right?

17 A. Exactly.

18 Q. Understood -- I understand that
19 completely.

20 I'm talking about, now, the fragility
21 of a measure that's based on two elections.

22 Dr. Chen, if one of his elections is
23 perhaps not such a great measure, he's still got five
24 other elections in his basket, right?

25 A. He does have five other elections, but

1 if one of them is -- is anomalous -- suppose you have
2 five of the elections. They were all essentially
3 tied. One election was a landslide for one party.
4 That would change whether or not they -- one party
5 had a majority overall to a large -- to a very large
6 degree.

7 At least in my case, I'm relating these
8 PVI measures to Congressional outcomes. And so I
9 think the measurement error problem in my study is
10 somewhat less than his because whether or not you're
11 north or south of this 50 percent threshold, even the
12 six elections could be driven by the outcome of a
13 single election.

14 Q. Dr. McCarty, you testified earlier on
15 cross-examination -- you testified earlier
16 that -- that in -- in a perfect world, you would have
17 used more elections. You would have used the
18 presidential election, you would have used statewide
19 elections --

20 A. I would have used --

21 THE COURT: You need to wait till
22 he finishes the question, please.

23 THE WITNESS: My apologies.

24 BY MR. GERSCH:

25 Q. In the ideal situation, you would have

1 had more elections, right?

2 A. I would have more elections as a
3 predictor of Democratic seat shares, yes, but I would
4 not have necessarily thought more elections with
5 anomalous elections would be good if I was only using
6 a measure like Dr. Chen's.

7 Q. All right. But in any case, more
8 elections would be better, you would say, yes?

9 A. They wouldn't make things worse in my
10 methodology. They could make things worse in
11 Dr. Chen's methodology.

12 Q. Just focusing in on yours --

13 A. Okay.

14 Q. -- I'm just asking about yours.

15 You would have preferred to have had
16 more elections?

17 A. Yes, ideally, if I had elections that
18 were held nation -- more elections that were held
19 nationwide to sort of better calibrate the
20 probabilities that Democrats win particular types of
21 seats.

22 Q. All right. And then another issue with
23 the way you chose to use your measure is you got a
24 2004 election that's going to make up 50 percent of
25 your approach, right?

1 A. In the analysis of the enacted plan,
2 yes.

3 Q. Right. Dr. Chen is using 2008 and 2010
4 elections, right?

5 A. I believe so.

6 Q. Yeah. You've got a 2004 election --
7 you have a potential staleness problem, too; isn't
8 that right?

9 A. The data is a little bit more dated,
10 but the correlation, as I recall, between the 2004
11 elections and the ones that happened later in the
12 state are very, very -- are very, very high. So I
13 still think it's -- 2004 is very informative of the
14 underlying partisanship of those geographic units.

15 Q. You -- let's talk about the appendix
16 you calculated.

17 That's historical information, 2004 to
18 2014, from all over the U.S., right?

19 A. That's correct, yes.

20 Q. And that's what you used to create your
21 uncertainty factor?

22 A. Yes.

23 Q. You did no work in the report to show
24 that that's a particularly good measure?

25 A. Well, I'm using all the -- I'm using

1 all the elections across the country. And so, you
2 know, it's not a sample; it's all of them. So we
3 know for a fact in each of these cases what the
4 probability -- what the proportion of seats won by
5 Democrats for particular PVIs is.

6 Q. Sure. But simply because you used all
7 the elections in the U.S., that doesn't necessarily
8 make it a good predictor.

9 You could imagine a situation in which,
10 say, all of the states west of the Mississippi are
11 really not good analogies for Pennsylvania, right?

12 A. Yeah, you could -- you could imagine
13 that there's variation -- that there's variation
14 across different places, different times. But what I
15 wanted to get was some sense of kind of neutral
16 conditions overall, you know, what would one
17 expect -- just purely based on partisanship, what
18 would you expect -- how would you expect the district
19 to perform.

20 You know, one would hope that in
21 reports like that of Dr. Chen, he would have tried to
22 make some -- some assessment of the uncertainty
23 around his prediction of how the districts performed.
24 He didn't do that. My contribution was to try to do
25 that, and the only way I could do that was to use the

1 national-level data.

2 Q. Okay. And -- and what I understood you
3 to say on direct is, in part, the national data is a
4 matter of convenience.

5 If you could have had robust-enough
6 results from Pennsylvania, you could have just used
7 Pennsylvania?

8 A. I could -- I could have if -- you know,
9 if we're talking about a state legislature that had,
10 you know, 100 seats, 100 elections, you could easily
11 generate that internally; but when we're talking
12 about Congressional districting plans, you know --
13 for example, I mean, there are -- there are, like, 70
14 different values of PVI in the appendix, only 18
15 elections. You know, we can't possibly cover the
16 entire range of possible outcomes.

17 And, of course, to do the -- to
18 reanalyze the simulations, I need to have
19 hypothetical values of the PVI that don't appear in
20 the Pennsylvania data, but appear in the national
21 data.

22 Q. Understood. You picked the U.S. not
23 because it's necessarily the best generator of your
24 uncertainty principle; you picked the U.S. because it
25 has enough elections that you can produce a

1 probability for every PVI imaginable?

2 A. Yes. That's fair.

3 Q. And just one last thing on the
4 uncertainty principle.

5 In real life -- withdrawn.

6 I understand the concept that if you
7 have a particular lean to a state, that doesn't mean,
8 in practice, that it's going to go the same way as
9 the lean, right? That's what you're saying?

10 A. Yeah, more or less.

11 Q. Okay. But, in fact, in Pennsylvania,
12 there has been no one certainty under this map.

13 The same 13 seats go Republican in
14 every election, and the same five seats go Democratic
15 in every election, right?

16 A. That's been true of the last three
17 elections, but there was considerable uncertainty
18 about the relationship between PVI and outcomes in
19 Pennsylvania under the previous plan.

20 Q. Right. But that was a different map?

21 A. But, again, using the partisan -- using
22 the partisan indicators, the Democrats won seats that
23 had Republican-favoring PVIs ranging from one to
24 eight. So if you look at the longer period of time,
25 Pennsylvania -- over the same time period I would

1 look nationally, 2004 to 2014, you'll find these
2 larger set of Pennsylvania elections that
3 Pennsylvania Democrats won a considerable number of
4 Republican-leaning districts.

5 Q. Well, that's one possibility. The
6 other possibility is this PVI measure doesn't do such
7 a great job of predicting who's going to win and
8 who's not going to win.

9 A. I -- that's a possibility, but I think
10 it's -- it's a reason -- you know, based on the
11 national level, it does a pretty good job.

12 Q. I'm sorry. Based on what, it does a
13 pretty good job?

14 A. The national-level data, historical
15 patterns.

16 MR. GERSCH: Your Honor, we are
17 making progress.

18 BY MR. GERSCH:

19 Q. All right. Let's turn to Dr. Warshaw.

20 A. Okay.

21 Q. The first thing I want to talk about
22 is, you do -- you have a discussion in the report and
23 you testified on direct to the notion that there's
24 not much difference in the expected positions of a
25 representative in a minus 1 that is a

1 Democratic-leaning district and a plus 1
2 Republican-leaning district; is that right?

3 A. I don't know -- I don't know what my
4 exact words were.

5 Q. Let me point you to it.

6 A. Sure.

7 Q. Take a look at the top of Page 17 of
8 your report, where you say, on the top line and going
9 to the next two lines, Consistent with the points
10 raised in the last section, there's not much
11 difference in the expected position of a
12 representative in a minus 1 district from that of a
13 plus 1 district.

14 A. Yes, that's true once you account for
15 the fact that both of those types of districts will
16 elect Democrats and Republicans at reasonably
17 comparable rates, and those Democrats and Republicans
18 will be somewhat more moderate than Democrats and
19 Republicans in -- in more partisan districts.

20 Q. That may answer what will be the next
21 question.

22 Let me just stop there and say -- so
23 the plus 1 and minus 1 districts, those are the
24 moderate districts, right?

25 A. It's a set of the moderate districts.

1 Obviously, there are more -- more just than those
2 two, but I drew that comparison.

3 Q. Sure. Let's take a look at your
4 Figure Number 5.

5 MR. GERSCH: Figure 5, Page 15.

6 BY MR. GERSCH:

7 Q. All right. So I don't know if I can do
8 it on here. Let's see if I can.

9 No.

10 Well, just take a look at -- the plus 1
11 and minus 1 is going to be the area right around the
12 zero, correct?

13 A. Um-hum. That's correct.

14 Q. And if you follow -- well -- and the
15 top dots, those are Republican --

16 A. That's correct.

17 Q. -- those are the Republican dots?

18 The blue dots at the bottom of the
19 graph, those are the Democratic dots?

20 A. That's correct.

21 Q. And what I want to focus on is -- if
22 you just sort of trace the line up from zero and look
23 a little bit to the left of that imaginary line, a
24 little bit to the right of the imaginary line,
25 there's a lost white space between those dots.

1 A. That's correct, but the full context of
2 this statement refers to the purple line that I'm
3 drawing, which is the expected position of the
4 legislators in such districts, not the difference
5 between the red line and the blue line or between the
6 red cloud and the blue cloud.

7 Q. The purple line, though, is essentially
8 an average?

9 A. Yes, it's -- it's an expect -- it's an
10 expectation or an average.

11 Q. Right. So we -- we could move all the
12 red dots to the very top of the chart and all the
13 blue dots to the very bottom of the chart, and if we
14 keep the horizontal, you know, array between them the
15 same, that -- that purple line is going to stay in
16 the exact same place?

17 A. That's true. What drives my statement,
18 because I'm referencing my findings of the previous
19 session, is that in districts like -- with a minus 1
20 or plus 1, Democrats and Republicans win in
21 approximately equal numbers. That's what the
22 statement refers to, not the distance between the two
23 clouds or the dots, but the fact that there's a
24 moderating effect on average by the fact that
25 Democrats and Republicans both win those sorts of

1 districts.

2 Q. Okay. So that's -- that's a useful
3 clarification. And so let me test my understanding
4 here.

5 You're not saying that a Republican
6 representative from a moderate district is going to
7 cast votes in Congress that are moderate votes?

8 A. A representative -- a Republican
9 representative in a moderate district is going to
10 vote with Democrats more often than Republican in a
11 less -- in a less moderate district. The same is
12 true for Democrats. Democrats who represent moderate
13 districts are going to vote with Republicans more
14 often than Democrats in more partisan districts.

15 That's reflected in that figure.

16 Q. Isn't the fact that there are no dots
17 in the white space mean that the Republicans aren't
18 in -- the moderate districts are not voting with the
19 Democrats?

20 A. I mean, there's going to be differences
21 on average, but they're not voting exactly like a
22 Democrat. But the gap between Democrats and
23 Republicans in those moderate districts is much
24 smaller than the gap that would be between a Democrat
25 representing a minus 30 district and a Republican

1 representing a plus 30 district.

2 Q. Sure. But -- but there's -- there's no
3 real overlap in terms of the dots, right? There's no
4 place where --

5 A. No.

6 Q. -- where there are a bunch of red dots
7 and a bunch of blue dots mixed together in the
8 moderate districts?

9 A. No; that's -- that's true. That's been
10 a feature of American politics for 20 years now.

11 MR. GERSCH: Let's put up

12 Exhibit 266.

13 BY MR. GERSCH:

14 Q. And you'll see this in a moment,
15 Doctor.

16 This is your article, Does
17 Gerrymandering Cause Polarization?

18 A. Yes, I recognize --

19 Q. Do you need one in hard copy, too, or
20 is it good on the screen?

21 A. I think the screen should be fine.
22 I'll let you know.

23 MR. GERSCH: Let's go with the first
24 page first.

25

1 BY MR. GERSCH:

2 Q. So that's your article, correct?

3 A. Yes.

4 MR. GERSCH: Let's go to Page 671 at
5 the figure at the very top.

6 BY MR. GERSCH:

7 Q. And this is a very similar-looking set
8 of points, right?

9 A. Yes. It's exactly the same idea.

10 Q. Right. Exactly the same idea.

11 Perfect. I couldn't have said it better.

12 MR. GERSCH: And let's focus on
13 the -- if we can scroll down to the --
14 what's underneath the chart.

15 BY MR. GERSCH:

16 Q. Okay. So this is what your observation
17 was in your report -- in your article.

18 The presidential vote in a
19 Congressional district is plotted against the
20 nominate score of the district's representative. And
21 then you say, Republican representatives from
22 districts with a given presidential vote are much
23 more conservative than are Democratic representatives
24 from districts with similar presidential votes.

25 Right? Fair?

1 A. Yes. That's true.

2 Q. So -- so -- so there's a big difference
3 between the two. Then you go on and you say, The
4 difference between the parties increased
5 substantially from the 93rd to the 108th House; is
6 that right?

7 A. Yes.

8 Q. So -- so there's a big difference
9 between the parties -- this map also has no white
10 space between the two sets of dots, even though
11 they're not -- I'm sorry -- has plenty of -- of white
12 space between the two sets of dots even though
13 they're not in color, right?

14 A. That's correct, the top plan has white
15 space; the bottom half from the 1970s does not,
16 right.

17 Q. That's your point, is that there --
18 there -- things are different now than they were
19 then?

20 A. That's correct, yes.

21 Q. And -- and you're not going to say that
22 there's a big difference between the way things were
23 in the 108th Congress, which is what your academic
24 publication is about and the way things stand today?

25 A. No, no, they're very similar -- I mean,

1 you know, it's essentially the same -- it's
2 essentially the same chart in the report, in here, in
3 terms of the overall pattern.

4 MR. GERSCH: All right. And if we
5 can take a look at Exhibit 273.

6 Your Honor, I'm reminded I should
7 move Exhibit 266 into evidence.

8 THE COURT: Any objection?

9 MR. TUCKER: No objection.

10 THE COURT: Hold on for a second.

11 MR. GERSCH: I'm sorry.

12 THE COURT: You said 266, right?

13 Mr. Gersch? 266, right?

14 MR. GERSCH: Yes.

15 THE COURT: Petitioners'
16 Exhibit 266 is admitted without objection.

17 - - -

18 (Whereupon, Petitioners' Exhibit Number
19 266 was admitted into evidence.)

20 - - -

21 MR. GERSCH: Thank you, Your Honor.

22 All right. Let's move to

23 Exhibit 273.

24 BY MR. GERSCH:

25 Q. This is your opinion piece in

1 The Washington Post, October 26th, 2012.

2 Do you need a hard copy of that, sir?

3 A. No, I think I'm good.

4 Q. All right. And you recognize this
5 document?

6 A. Sure, yes.

7 Q. All right. And if you go to the
8 second --

9 MR. GERSCH: Let's go to the second
10 page, one, two, three, four, five paragraphs
11 down.

12 That's it.

13 BY MR. GERSCH:

14 Q. Here, you report your research and you
15 say, Our research suggests that the main cause of
16 political division is the behavior of Democratic and
17 Republican legislators representing similar
18 districts, not how the lines are the drawn. In other
19 words, polarization has grown because Democrats and
20 Republicans are representing moderate districts in
21 increasingly extreme ways.

22 That's what you wrote?

23 A. Yes.

24 Q. Right.

25 A. Yes.

1 Q. And that's what you believe?

2 A. Yes, but it's also true of more extreme
3 districts as well. It's just highlighting that
4 creating moderate districts is not a remedy to
5 polarization.

6 Q. Sure. Sure. So -- so if -- if the
7 concern were -- if the concern is about polarization,
8 the moderate districts aren't going to solve that
9 problem?

10 A. That's what the statement says, yes.

11 Q. All right. Now, another notion that
12 you advanced in -- in your testimony in your report,
13 I think, was that well, in -- in -- in the more -- at
14 least in the toss-up districts, you might expect them
15 to go either way, Democratic or Republican; is that
16 right?

17 A. Yes, on some occasion.

18 Q. But you don't see that happening in
19 Pennsylvania, do you?

20 A. Not in the last three elections. But,
21 certainly, it was true over, you know, the previous
22 plan, which had very big swings back and forth, even
23 for districts that lean fairly substantially toward
24 the Republicans.

25 Q. Well, when you say, districts that lean

1 towards the Republicans -- well, withdrawn.

2 MR. GERSCH: Let's put up Stipulated

3 Fact 82.

4 BY MR. GERSCH:

5 Q. These, I'll represent, Dr. McCarty, are
6 facts that both -- that all parties to the case
7 have -- have agreed to, and they're just calculated
8 off of election results. There's nothing fancy about
9 them.

10 A. Okay.

11 Q. So if we take a look at the chart in
12 82, there are no toss-up elections? There's no 51-49
13 election, for example?

14 A. And these are Congressional votes.

15 No, there's -- no, there's not.

16 Q. And just to be clear, these are votes
17 for candidates for -- for election?

18 A. For candidates, yes.

19 Q. Right. And the average for -- for the
20 Democratic share in the districts won by the
21 Democrats, that's 75.2 percent?

22 A. Yeah, that's what it says.

23 Q. And the average Republican share is
24 61.8 percent?

25 A. Yes.

1 Q. So these -- so these are not close
2 elections?

3 A. No, they're not. Not on average, no.

4 MR. GERSCH: And let's take a look
5 at Stipulated Fact 78 and the chart there.

6 Can we blow up that chart?

7 BY MR. GERSCH:

8 Q. All right. And there's -- there's no
9 51-49 race here either, is there?

10 A. No, there's not.

11 Q. And -- wow.

12 -- and, again, what you see is, on
13 average, the Democratic vote in the districts they
14 win is 73.6 percent, right?

15 A. Yes.

16 Q. Republican vote is 63.4 percent?

17 A. Yes.

18 MR. GERSCH: And then if we pull up
19 Stipulated Fact 73.

20 BY MR. GERSCH:

21 Q. And here, if you take a look at this,
22 Dr. McCarty, I think you'll see there's a single
23 close race.

24 A. Yes, I see that.

25 Q. That's in the 12th?

1 A. Yes.

2 Q. And that's for 2012.

3 And let's -- taking a look at the
4 average, the average Democratic vote in the districts
5 they won is 76.4, and the average won by the
6 Republicans is 59.5 percent; is that right?

7 A. Yeah, that's what the --

8 Q. All right.

9 So -- so in reality -- withdrawn.

10 It may be that, in theory, in a toss-up
11 situation, that the voters will get an opportunity to
12 have someone from each party represent a district,
13 but, in reality, in Pennsylvania, at least the way
14 these districts are performing, we have what looks
15 like one toss-up race out of -- 3 times 18 -- 54
16 election seats, right?

17 A. Based on these facts, yes.

18 Q. Basically what?

19 A. Based on these numbers, yes.

20 Q. All right.

21 MR. GERSCH: Your Honor, if I can
22 consult with my colleagues, I hope to
23 conclude shortly.

24 THE COURT: How long is "shortly"?

25 It's almost 3:00. And there's going

1 to be redirect. I suspect there might be
2 another cross-examination.

3 MR. LEVINE: Brief
4 cross-examination.

5 THE COURT: Recross?

6 MR. LEVINE: Brief, brief.

7 THE COURT: Brief cross on this
8 side. And then I'm expecting you're going
9 to call a rebuttal witness. And it's almost
10 3:00.

11 So how long are you anticipating?

12 MR. GERSCH: I'd like to consult
13 with my colleagues, and I think -- I think
14 Dr. McCarty has something to say.

15 THE WITNESS: I would -- a short
16 break would be --

17 THE COURT: We're going to take a
18 break, Dr. McCarty, definitely.

19 THE WITNESS: Yeah, good.

20 THE COURT: We're going to take a
21 10-minute recess.

22 MR. GERSCH: Thank you, Your Honor.

23 THE CLERK: The Court is now in
24 recess.

25 - - -

1 (Whereupon, a recess was taken from
2 2:55 p.m. to 3:12 p.m.)

3 - - -

4 THE CLERK: All rise. The
5 Commonwealth Court is back in session.

6 THE COURT: Please be seated,
7 everyone, except for Mr. Gersch.

8 Proceed.

9 MR. GERSCH: Thank you, Your Honor.
10 Just a couple of housekeeping
11 things, and then I think we can conclude in
12 a few minutes.

13 Your Honor, I'd like to offer into
14 evidence Petitioners' Exhibit 272. That was
15 the report in the Florida case Romo versus
16 Detzner.

17 THE COURT: Any objection?

18 MR. TUCKER: Your Honor, we object
19 that the report is hearsay.

20 THE COURT: Response?

21 MR. GERSCH: It's the witness's
22 report. He's here on the stand. If they
23 have questions about them, they're free to
24 ask him. I think as a general matter,
25 although not always, I think the Court has

1 leaned in the direction of keeping the
2 record fuller.

3 THE COURT: Well, I think you
4 examined him on -- I think you examined him
5 on a document that was said to be a report.
6 I'm not sure you ever showed it to him.

7 So I'm going to sustain the
8 objection.

9 MR. GERSCH: All right.

10 BY MR. GERSCH:

11 Q. Doctor, if we can tie up the area we
12 were talking about before the break.

13 I take it you would agree that Members
14 of Congress are taking positions that are more
15 extreme than the average voter in their district?

16 A. Yes, I would agree with that.

17 Q. And that as a result, polarization may
18 lead to poor representation if Members of Congress
19 generally take positions that are more extreme than
20 the voters?

21 A. Yes, I agree with that.

22 Q. Okay. And that's exactly word-for-word
23 what Dr. Warshaw says?

24 A. I agree with -- I agree with those
25 statements, yeah.

1 Q. All right. You mentioned some issues
2 about political geography on direct.

3 I take it you did not conduct any
4 analysis to determine whether geographic factors
5 caused the large efficiency gaps that we see in
6 Pennsylvania?

7 A. I did not do that, no.

8 Q. And you would also agree that political
9 geography tends to change slowly; isn't that right?

10 A. Yes, that's correct. Yeah.

11 Q. And you would agree, or you would
12 acknowledge, that at least, the efficiency gap is a
13 rough measure of partisan advantage?

14 A. Yes, it's better to lose -- to waste
15 fewer votes than to waste more, but the question is
16 whether that advantage comes -- how that advantage
17 arises.

18 Q. And -- and if you're making the map, if
19 you're a gerrymandering mapmaker, your goal is to
20 make the other guys waste more and to use your side's
21 votes as efficiently as possible?

22 A. That's the theory, if you're engaging
23 in partisan gerrymandering.

24 MR. GERSCH: Let's put up
25 Petitioners' Exhibit 42.

1 BY MR. GERSCH:

2 Q. All right. You raised certain concerns
3 about the efficiency gap. But let's see if we can
4 see where there's common ground.

5 You do not dispute that Pennsylvania
6 had the largest efficiency gap in the nation in 2012
7 and the largest efficiency gap in history, do you?

8 A. I have no reason -- well, not in
9 history. I'm seeing a dot -- I'm seeing another dot
10 about halfway down screen that appears to be --

11 Q. You're right.

12 All right. With that exception?

13 A. Well, that, and, you know, without the
14 resolution on the thing, there's a second dot, but
15 close to.

16 Q. Close to.

17 All right. And this is
18 Professor Warshaw's chart.

19 You've seen this before?

20 A. Yes, I have seen this before.

21 Q. All right. I should have started with
22 that.

23 And you don't dispute in your -- that
24 Pennsylvania's efficiency gaps in 2014 and 2016 were
25 larger than any efficiency gap in favor of any party

1 in Pennsylvania in history, save 2012?

2 Excuse me. I'm losing my voice.

3 A. Yeah; no, I don't dispute that.

4 Q. All right. And you also don't dispute
5 that your -- in your report, that averaging over the
6 three elections following the 2011 redistricting,
7 Pennsylvania had the second largest efficiency gap in
8 the nation, second only by 1 percent in
9 North Carolina?

10 A. I have no reason to dispute that.

11 Q. All right. You talked about durability
12 on direct. And you can correct me if I'm wrong, but
13 I got the impression, listening, that what you want
14 us to take away is we can't judge whether an
15 efficiency gap is -- whether -- I'm sorry --
16 whether -- whether a gerrymander or an efficiency gap
17 are durable until the end of the decade, five
18 election cycles, if I understood you correctly?

19 A. I would frame what I said slightly
20 differently. I would say that the evidence that
21 efficiency gaps move quite dramatically over the
22 course of a decade calls into question the
23 assumptions that they will be durable.

24 Q. All right. But -- but -- so with that
25 clarification, you wouldn't say we have to wait all

1 five election cycles of the decade to decide whether
2 or not it's durable -- or would you?

3 A. I'm -- I'm trying to figure out what
4 the -- what the question -- getting -- so the
5 question is whether the efficiency gap is durable.
6 The question can be answered historically by looking
7 at the amount of variation within states within a
8 districting plan over time.

9 I take it your question is, like, do we
10 need to say that efficiency gap -- this particular
11 efficiency gap as of now is a durable one or not. I
12 would say you don't have to wait, but I would say the
13 historical pattern of variation calls into question
14 the precision of which we can predict what the
15 efficiency gap will be in a subsequent election.

16 Q. All right. I think on direct, you
17 identified 10 districts you said were competitive.

18 Do you recall that testimony?

19 A. I identified 10 districts where, based
20 on my estimated probabilities, either party had a
21 20 percent chance of winning, and I call that
22 competitive, as a shorthand.

23 Q. And you do understand that in three
24 election cycles, a total of 30 elections, the
25 Republicans have won every single one of those?

1 A. Yes, that is true.

2 Q. All right. And -- and just so we're
3 clear in terms of where you stand on whether this is
4 good. Your view of gerrymandering is that the
5 practice of elected politicians drawing districts for
6 themselves and their political allies is an
7 invitation to overt corruption?

8 A. I don't recall saying that.

9 MR. GERSCH: Can we pull up
10 Exhibit 273, the doctor's Washington Post
11 opinion piece?

12 Let's go to the last page, and if we
13 can focus in on the last paragraph.

14 THE WITNESS: Okay. I'm refreshed.

15 BY MR. GERSCH:

16 Q. You did say that?

17 A. Yeah. Yeah, I did.

18 Q. And you also said that having
19 incumbents participate in designing districts,
20 promoting their job security does little to enhance
21 legitimacy of American democracy?

22 A. Yes, but that statement has less to do
23 with partisan gerrymandering than
24 incumbency-protection gerrymandering. It was really
25 about the self-dealing that might be involved in

1 particular incumbents participating in the
2 redistricting process, not -- I -- it doesn't say
3 that partisan gerrymandering is an invitation to --
4 whatever I said --

5 Q. Corruption, overt corruption.

6 A. -- overt corruption.

7 Q. So the way we should read this is that
8 gerrymandering done for incumbent purposes, to
9 protect incumbents, that's an invitation to overt
10 corruption?

11 A. A lot -- to the extent to which
12 members, the incumbents themselves, are involved
13 in -- in making those decisions could be perceived as
14 self-dealing. That was the point I was trying to
15 make.

16 Q. And if their allies do it, you wouldn't
17 say it's any different?

18 A. Well, it depends on what the -- it
19 depends what the allies are doing it for, whether
20 they have a rationale for doing it beyond the
21 self-dealing.

22 Q. All right.

23 MR. GERSCH: Your Honor, I would
24 offer Exhibit 273 into evidence.

25 THE COURT: Any objection?

1 MR. TUCKER: Yes, Your Honor. It's
2 hearsay.

3 THE COURT: Response?

4 MR. GERSCH: It is hearsay.
5 It's -- it's the views of the expert and a
6 position where he's not testifying and
7 giving his opinions without regard to any --
8 any work done in this case. I think it's a
9 good indication of his views --

10 THE COURT: Is that an exception to
11 the hearsay rule?

12 MR. GERSCH: -- very reliable.
13 I think, on occasions, the Court
14 allows hearsay to be admitted in the
15 examination of experts.

16 THE COURT: Do you have a -- a
17 citation to a Pennsylvania Rule of Evidence?

18 MR. GERSCH: I do not, not offhand.

19 THE COURT: Your objection is
20 sustained. 273 will not be admitted.

21 BY MR. GERSCH:

22 Q. Dr. McCarty, we've been going a long
23 time. I appreciate your patience.

24 Just -- just before we conclude, we've
25 looked at evidence that showed that you -- your

1 measure -- your chosen measure of partisan preference
2 failed to identify the correct number of seats won by
3 the Republicans 97 percent of the time. We saw that
4 the 10 House seats that you thought were competitive
5 seats went Republican every time. We also saw that
6 Dr. Chen's predictor predicted the number of seats
7 won by the Republicans exactly. His robustness check
8 also predicts the number of seats won by the
9 Republicans exactly.

10 Dr. McCarty, at some point, don't you
11 have to consider the possibility that the measure
12 that you are using to evaluate Dr. Chen's work is
13 just not a good predictor of how the real world
14 works?

15 A. I disagree. I think it does a very
16 good job of predicting elections, and -- and the
17 variation -- the uncertainty around that prediction
18 is consistent with what was observed in Pennsylvania.
19 And -- so things happen. Elections are about more
20 than partisanship.

21 My only point in the testimony I've
22 made is that we can't attribute the entire success of
23 the Republican Party in obtaining those 13 seats to
24 the partisan composition of the districts.

25 Q. Doctor, if you're back at Princeton --

1 not tomorrow, but, say, Monday -- at a seminar and
2 one of your students comes to you or -- or makes a
3 presentation and he presents some kind of model,
4 predictor, measure and it's wrong 97 percent of the
5 time, aren't you going to suggest to the student --
6 we'll call him Fred, great student; he's done a lot
7 of work, it's -- as far as effort and intelligence,
8 it's a well-designed model, but it's wrong 97 percent
9 of the time, Doctor, aren't you going to say to Fred,
10 Fred, I would just like you to consider the
11 possibility that notwithstanding all your work and
12 your intelligence, which I'm a great admirer of,
13 maybe, just maybe, your model is a bad model, it
14 doesn't get the job done?

15 Aren't you going to do that if that
16 happens back at Princeton?

17 A. It depends on the -- there's lots of
18 ways of evaluating models. Prediction is one of
19 them.

20 The fact that in the real world there's
21 lots of election variation that can't be accounted
22 for by raw vote totals, I would not dissuade such a
23 student from pursuing what I would consider to be the
24 better -- the better approach. There's always going
25 to be uncertainty around measurement. Prediction is

1 one criteria, but it's not the only criteria.

2 One of the things that we do know is
3 true in the real world is that Democratic candidates
4 do win in Republican-leaning districts, both
5 nationally and in Pennsylvania, and any assessment of
6 the district plan that doesn't take that into
7 account, I would find an equally flawed approach.

8 Q. Doctor, my question isn't whether you
9 would dissuade him. I'm asking whether at some point
10 you wouldn't say to Fred, Fred, I'd like you to at
11 least consider the possibility and investigate the
12 possibility that your model, which is wrong
13 97 percent of the time, may not be a good model.

14 Isn't that something that you want to
15 tell your student?

16 A. Well, we always want to improve our
17 work and our models and, you know, we -- things move
18 forward. But I wouldn't say that making a move to
19 incorporate the uncertainty in election outcomes is
20 wrong-headed simply on the basis of it not getting a
21 prediction in one particular state, in one particular
22 time.

23 Q. I don't know if I can take that as a
24 yes.

25 MR. GERSCH: But I'll pass the

1 witness.

2 THE COURT: Redirect?

3 MR. LEVINE: Your Honor --

4 THE COURT: I forgot.

5 Mr. Levine.

6 If you can move it along, too,
7 Mr. Levine. We've covered a lot of
8 territory already. I'm sure much of it is
9 done.

10 MR. LEVINE: I haven't even asked
11 one question yet.

12 THE COURT: That's excellent. A
13 lot of books that you're bringing up for one
14 question.

15 MR. LEVINE: No, no, I said I
16 haven't asked one question yet. But I
17 appreciate what you're saying.

18 - - -

19 CROSS-EXAMINATION

20 - - -

21 BY MR. LEVINE:

22 Q. Professor, my name is Clifford Levine.
23 I represent the Lieutenant Governor in this action.

24 I have a question, first, about just
25 the PVI that we've been using and discussing, and

1 that basically takes the way you did -- performed
2 your analysis.

3 You took the average of the national
4 U.S. presidential 2004 and 2008, correct?

5 A. That's correct, yes.

6 Q. And so I believe that average came out
7 to approximately 50.6 percent Democratic. And I
8 simply took the Obama number and the Kerry numbers
9 and just averaged them nationally.

10 A. You would need to make an adjustment
11 for the fact that there were third-party votes --

12 Q. Okay.

13 A. -- in both of those elections.

14 Q. So approximately, though, but there
15 were some, but, generally, that we would be in the
16 ballpark there, right?

17 A. Yes, it sounds about right.

18 Q. And then, as I understand it, you take
19 each Congressional district and you compare the
20 Congressional district to that, say, 50 -- we'll say
21 50.6 percent for the sake of discussion?

22 A. That's correct, yes.

23 Q. All right. And just so I can
24 appreciate how this would work over time, if, for
25 instance, there was a Congressional district in

1 Pennsylvania that voted 50/50 the same way every
2 single time, but nationally, if the country went more
3 Republican, for instance, then that district might
4 become a plus 1 or plus 2 Democrat. You would be
5 influenced by the national changes, correct?

6 A. That is correct. The reason why the
7 measure does that is to account for national-level
8 variation in presidential vote totals.

9 Q. That's right.

10 So even if the district did not change,
11 it was exactly the same five elections in a row, its
12 plus 1 or plus 2 or plus 4 ranking might change on
13 the PVI based on how other Congressional districts
14 in -- throughout the country voted?

15 A. That's correct. But if they did that,
16 they would be deviating from the national trends, and
17 so the PVI is going to pick that up. So I think
18 those changes can be justified, because what we're
19 saying is the district remains the same level of
20 Democratic relative to the rest of the country.

21 So it's a way of kind of adjusting for,
22 you know, the fact that John McCain -- so
23 underperformed typical Republican candidates and
24 other candidates have overperformed. So we take the
25 averages, we deduct off the national average.

1 Q. And you're familiar with
2 Montgomery County, Pennsylvania?

3 A. Yes, basically.

4 Q. So it's the third largest county in
5 Pennsylvania?

6 A. I think so, yeah.

7 Q. I'll represent to you that it had
8 approximately 800,000 people at the time -- at the
9 2010 Census.

10 A. If you say so.

11 Q. All right. And I'll also represent to
12 you that we discussed that each Congressional
13 district, per the current map, has 705,688
14 individuals.

15 Are you familiar with that number?

16 A. Yeah, that sounds right.

17 Q. We discussed that.

18 So 705,000 can obviously fit into
19 800,000, correct?

20 A. Yes.

21 Q. And so it would be possible to design a
22 map having one Congressional district within
23 Montgomery County?

24 A. Yes, surely a map could exist of that.

25 Q. And I'll also represent to you that

1 Montgomery County voted -- in the 2004 presidential
2 election, it had a 55.6 percent Democratic vote,
3 compared to the national 48.3 percent; and in 2008,
4 it had a 59.9 percent Democratic vote, compared to
5 the 52.9 percent nationally.

6 A. Sure, okay.

7 Q. And I'll just -- okay.

8 So it average -- so what -- it averaged
9 57.8 percent for those elections, compared to the
10 national average that we discussed at 50.6 percent --

11 A. Okay.

12 Q. -- accepting those figures.

13 And that would -- so then if you would
14 do a plus PVI value, you could say that
15 Montgomery County actually had a plus 7 value if it
16 was 57 percent versus the 15 percent, or so, rounded
17 off; is that correct?

18 A. Yes, that's how it's done.

19 Q. And so the legislature would have had
20 an opportunity, respecting county boundaries, to
21 create a Congressional seat in Montgomery County, and
22 that -- assuming that that Congressional seat
23 generally reflected the county, it would have
24 approximately a plus 7 percent, or so, value. Okay?

25 A. Yes, okay.

1 Q. In fact, they didn't do that.

2 And do you know how many times
3 Montgomery County is split by the legislature?

4 A. I don't recall the number.

5 Q. Five times. Split five times.

6 And you're familiar with the famous
7 Sixth and Seventh District? What do we call it,
8 Goofy --

9 A. Yes, I know the one you're talking
10 about.

11 Q. Right. And so somewhat are twist --
12 twisting districts. And those districts are
13 reflected in your analysis -- that's the Sixth and
14 Seventh -- it includes the Sixth and Seventh
15 districts, and you list the Sixth District as --

16 MR. LEVINE: Can you go to Table 1?

17 Thank you for that. All right.

18 Thank you.

19 BY MR. LEVINE:

20 Q. Do you see here I have Table 1?

21 THE COURT: Give it one second,
22 Mr. Levine.

23 MR. LEVINE: I'm sorry. Thank you.

24 BY MR. LEVINE:

25 Q. So do you see District 6 and 7? You're

1 familiar that they both include portions of
2 Montgomery County.

3 A. Yes.

4 Q. And you have the PVI at 1 and zero,
5 right?

6 A. Yes.

7 Q. And that possibly could reflect an
8 effort to cut out some of the Democratic votes that
9 may have occurred -- let me strike that.

10 I'll strike that question.

11 You indicated that you felt that
12 anything at 20 percent probability was a competitive
13 district. You defined it that way?

14 A. Yeah, I just -- as a term of art, yes.

15 Q. Well, is that based on some sort of
16 analysis or statistic -- is that your own just
17 general conclusion?

18 A. No, 20 percent seemed a reasonable
19 number. I believe The Cook Political Report, when
20 they're defining -- which uses the PVI when they're
21 defining competitive districts, they go 6 to minus 6.

22 So I agree that that that's a
23 reasonable ballpark, either of those two thresholds.
24 I chose, you know, 20 percent, which, basically,
25 comes out where they -- where they do.

1 Q. All right. And it's -- and by that
2 definition, you defined Pennsylvania as having 10
3 competitive Congressional districts, I believe?

4 A. Yeah, 10, which either party had
5 20 percent chance of winning.

6 Q. And, again, the Republicans won all 30
7 elections, right, three years -- or three cycles, 10
8 districts, correct?

9 A. Yes.

10 Q. Now, in respect to the ones that you
11 have identified as being closer, you identified Six,
12 Seven and Eight as being plus 1, zero or a minus 1.

13 Do you see that?

14 A. Yes, that's correct.

15 Q. So that would suggest to you, then,
16 that they should be very competitive, these are 50/50
17 districts, more or less?

18 A. Yes.

19 Q. Okay. And, again, those were part of
20 the competitive districts that went for the
21 Republicans on all occasions, correct?

22 A. Yes.

23 Q. And they were pretty substantial, and
24 Mr. Gersch, I believe, pointed out -- and we've
25 stipulated to these numbers -- but they were in the

1 57 percent, 58 percent Republican margins, generally
2 speaking, for these districts?

3 A. Yes. But, of course, the actual
4 elections in the districts depend on lots of factors
5 other than partisanship, and so I have no way of
6 assessing what other factors went into those
7 outcomes.

8 Q. So in assessing the 30 elections, the
9 30, quote, competitive elections that you've
10 identified, you've done no analysis to rule out
11 anything but the way the maps were designed. You
12 haven't identified any other factors. Is that fair
13 to say?

14 A. No, no; that's correct. My statement
15 is, really, it's hard to attribute those outcomes
16 purely to the partisan leans of the districts. There
17 must be other factors involved.

18 Q. Now, looking at the same chart, I see
19 that there are clearly the five Democratic districts
20 that we've seen over this last decade: one, two, 13,
21 14 and 17.

22 Those have been the districts that have
23 gone consistently Democratic, correct?

24 A. That's correct.

25 Q. Okay. And then you have some that are

1 close that we've discussed that have gone Republican.

2 You indicate -- you come to a value of
3 expected Democratic seats -- you say there's 8.1
4 Democratic seats. So when I look at that, not as a
5 mathematician, I see the probability that there's --
6 there's 5, maybe 6 if we debate, but how do you come
7 to the 8?

8 A. Simply -- it's a simple calculation,
9 computing expected value, you just simply sum -- you
10 sum the probabilities.

11 Q. So you sum all the probabilities that
12 are set forth in this column (indicating)?

13 A. That's correct, yes.

14 Q. Do you just -- you just add up -- add
15 those up, add up all the probabilities?

16 A. Yep.

17 Q. And then you -- you divide it by 18?

18 A. Yes, to get that last cell.

19 Q. So that's all you did, you added
20 columns 1 through 18 and came up with a total number,
21 then you divided it by 18 and came out with 8.150?

22 A. No, no. No, the 8.150 is the sum of --

23 Q. I'm sorry. Strike that.

24 A. -- the DEM share is 8.15 divided by 18.

25 Q. Let me -- so you took -- the totals

1 came out to this 40.453?

2 A. No, the totals is .815, you know, if
3 you -- first cell 1, add 1, add 2.14, sum all the way
4 down, that totals 8.15.

5 Q. Let me try it again, one more time.

6 CD 1 through 18, we have values between
7 1 and, like, .277, or whatever, right?

8 A. Yes.

9 Q. You add those up and come up with a
10 total number?

11 A. That's correct, yes. And that's the
12 expected number of seats.

13 Q. And then you could divide that -- or
14 you could -- you could create an average, right?

15 A. (No audible response.)

16 Q. And is the .453 the average?

17 A. Yes, the .453 would be the average of
18 the probabilities. It would also come out to be the
19 expected share of the seats held by the
20 Democratic Party.

21 Q. So you take the .453 and then you
22 simply multiply that by the 18 available seats, so
23 there's a 45 percent chance of winning?

24 A. I mean, it works that way. That's not
25 the way I did it. The way I did it is I summed up

1 the rows as I suggested, got 8. There's 18 seats, so
2 if they're getting 8 seats out of 18, that's
3 45 percent of the seats. But doing it as the average
4 of those probabilities works exactly the same way
5 because that's how averages work.

6 Q. It would work the same way?

7 A. It would work the same way, yes.

8 Q. And would it change, if, for instance,
9 these numbers were redistributed a little bit?
10 Instead of the 1, it was .9, it all totaled to the
11 same number in the end?

12 A. Yes, if it totaled -- it had the same
13 total all the way to the end, then it would have the
14 same performance.

15 So -- so, yes, you can -- in fact, this
16 is one of the points I like to make is, you can
17 reallocate these probabilities across districts, so
18 if you make a district more Republican, you generally
19 have to make another district more Democratic, so
20 that's going to shift one of the probabilities in a
21 Republican direction but be offset by a shift of
22 probabilities in the Democratic direction, and so
23 they at least partially will cancel each other out.

24 Q. So as an illustrative exhibit, I have a
25 question for you.

1 If you were to have hypothetically
2 eight districts --

3 Do you see that?

4 A. That's correct, yes.

5 Q. -- and each one had a probability of
6 .6 --

7 A. Yes.

8 Q. -- and you added those up and you had
9 the 4.80, and then you divide it by the eight
10 districts, that would come out to each district would
11 have a 60 percent probability, right?

12 A. That's correct.

13 Q. And then to -- to calculate your
14 expected Democratic share, what would you do then --
15 or the expected number of Democratic seats, what
16 would you do then?

17 A. Well, I would multiply .6 times 8,
18 which would be 4.8, which is the same as the total.

19 Q. And how many seats -- then, using your
20 analysis, how many expected Democratic seats would
21 you calculate?

22 Would all eight be expected Democrat,
23 or less?

24 A. No, there would be 4.8.

25 No, we don't talk about whether an

1 individual seat is expected Democrat or not. We talk
2 about, over the -- over an election, what do we
3 expect -- how many seats do we expect the Democrats
4 to win.

5 In your example, we would expect the
6 Democrats to win 4.8 seats.

7 Q. 4.8 seats would be how many you would
8 expect the Democrats to win, correct?

9 A. Yes.

10 Q. I'm going to ask you this other
11 illustration.

12 So this is the first -- Set A was our
13 first example.

14 Do you see that? And you indicated you
15 would expect 4.8 Democratic seats with that analysis.

16 A. Yes, that's correct.

17 Q. Okay. Now, how would you analyze the
18 second set?

19 A. Exactly the same way. I would total
20 the probabilities to get the total, 4.8. That would
21 be the expected number of seats. And then the seat
22 share would be 4.8 divided by 6, which is .6.

23 Q. So you would -- the answer would be, to
24 correlate this, 4.8 seats in the Set B?

25 A. Yes, that's correct. So in terms of

1 expected number of seats, both of those plans are the
2 same in terms of expectations.

3 Q. So in Set A, you could have eight
4 districts, each with a 60 percent probability that
5 the Democrat would win.

6 And it would be your expectation that
7 that would produce 4.8 seats, from a probability
8 basis, correct?

9 A. That's right. I mean, if we did, you
10 know, a thousand of my simulations where we flipped
11 60 percent coins, the average of those simulations
12 would be 4.8.

13 Q. Now, if we engaged -- let's say we
14 engaged in partisan gerrymandering and we move these
15 seats around in a way that we had District 1,
16 District 2 and District 3, just like those
17 Philadelphia districts that 100 percent chance that a
18 Democrat is going to win, right?

19 A. Sure.

20 Q. And we put the Democrat -- we -- we
21 configured these three seats at 100 percent chance
22 for the Democrats, and then we took the other five
23 districts and we made -- we -- we created a
24 probability factor of only 36 percent for a Democrat
25 to win each of those seats --

1 A. Sure.

2 Q. -- okay?

3 And so if we engaged in the partisan
4 gerrymandering, your analysis would conclude that we
5 would end up with the same number of seats in both
6 cases; is that correct? 4.8?

7 A. That's right, because the
8 partisan -- the partisan change had no partisan
9 advantage for the Republicans. In order to get those
10 four districts down to 36 percent, they had to give
11 away 40 percent in three other districts. Those two
12 cancel each other out, and the plan is going to
13 perform exactly the same in expectation.

14 MR. LEVINE: Okay. I'd like to mark
15 this as Stack Exhibit 12 and ask to be
16 introduced. I think it's an important
17 illustrative exhibit based on the testimony.

18 THE COURT: Have you given copies
19 to everybody?

20 MR. LEVINE: No, but this is
21 cross-examination. So, no, I have not,
22 Your Honor. But I can make them available.

23 It's simply illustrative.

24 THE COURT: So you're moving it as
25 simply an illustrative exhibit?

1 MR. LEVINE: Yes, that's fine.

2 THE COURT: Any objection?

3 MR. TUCKER: No, Your Honor.

4 THE COURT: What number was that,
5 Mr. Levine?

6 MR. LEVINE: Stack 12.

7 THE COURT: Was there a Stack 11?

8 MR. LEVINE: There will be. There
9 was a stipulation -- well, there was a
10 stipulation a little out of order.

11 THE COURT: Okay. Stack 12 is
12 moved and admitted for illustrative purposes
13 only without objection.

14 - - -

15 (Whereupon, Stack Exhibit Number 12 was
16 marked and admitted into evidence.)

17 - - -

18 BY MR. LEVINE:

19 Q. I'd like to direct your attention to
20 Figure 3 of your report.

21 So these are your outcomes after you
22 ran -- I guess you ran simulations off of the table
23 we just looked at?

24 A. That's right. A thousand.

25 Q. And so you have identified a

1 probability of the Republicans getting 13 seats.

2 What is that probability?

3 A. I think -- as we've been discussing it
4 before, I think it's around 3 percent.

5 Q. Three percent?

6 A. Yeah. And technically, there's some
7 that are -- I mean --

8 Q. I'm sorry. Can you talk in the mic a
9 little?

10 A. Sure.

11 -- technically, you know, 13 or more
12 would be slightly higher, because there were a few
13 14s.

14 Q. So -- but to get 13 Republican seats,
15 you would say that there's a 3 percent probability,
16 based on your analysis of that, correct?

17 A. Yes. That's what the simulations show.

18 Q. What's the probability of the
19 Republicans winning only seven out of 18 seats?

20 A. It looks like it's about six.

21 Q. So is it fair to say there's twice as
22 much of a chance, in your analysis, of the
23 Republicans winning seven seats as compared to 13
24 seats?

25 A. That's what the table shows -- that's

1 what the figure shows.

2 Q. What about eight? What about the
3 Republicans winning only eight seats? What's the
4 probability of the Republicans winning eight seats,
5 according to the analysis that you undertook?

6 A. It looks like about 14 percent.

7 Q. And what about the probability of the
8 Republicans winning nine out of 18 seats, under your
9 analysis?

10 A. Twenty percent.

11 Q. So under your analysis, there's almost
12 seven times as much of a chance of the Republicans
13 winning nine seats as there are 13?

14 A. Yes, from these simulations, yes.

15 Q. And then, finally, in respect to the
16 Republicans winning 10 seats, what is the probability
17 of the Republicans winning 10 seats out of 18?

18 A. It looks like 25 percent.

19 MR. LEVINE: I have no further
20 questions. Thank you.

21 THE COURT: Anyone else to
22 cross-examine the witness?

23 MS. HANGLEY: No, Your Honor.

24 MR. TABAS: No.

25 THE COURT: Redirect.

1 Can we go off the record for a
2 minute?

3 - - -

4 (Whereupon, a discussion was held off
5 the record.)

6 - - -

7 - - -

8 REDIRECT EXAMINATION

9 - - -

10 BY MR. TUCKER:

11 Q. Dr. McCarty, I want to discuss with you
12 a little bit about the 97 percent/3 percent number we
13 keep hearing over and over again during your
14 testimony.

15 Can you clarify again -- why was it
16 important for you to use 2004 and 2008 presidential
17 election data in calculating the PVIs that would
18 apply to the Congressional districts in Pennsylvania?

19 A. Well, two things: one is those
20 elections had occurred before the redistricting, so
21 they were information that would have been underlying
22 any understandings about the districts at the time;
23 second is because I needed to be able to measure the
24 probability that a seat performs in a Democratic way
25 based on its PVI. I needed a measure that I could

1 use across all Congressional elections in the
2 country.

3 Q. So you were analyzing, as I understand
4 it, the partisan makeup of the districts based upon
5 partisan data that would have existed at the time the
6 legislature was drawing the map, correct?

7 A. That is correct.

8 Q. And based upon the analysis you've
9 done, if the legislature was attempting to draw a map
10 that would result in 13 Republican seats, how many
11 times would that have occurred?

12 A. I don't know how many times exactly it
13 would have occurred. I think it would have occurred
14 much more frequently if it was a -- a districting
15 plan that were designed to produce 13 seats. I would
16 think that would be the modal outcome.

17 Q. Well, I guess let me rephrase. Instead
18 of number of times, this is where I want you to --
19 the number.

20 What percentage of the time, based upon
21 your analysis, would the map have resulted in 13
22 seats for Republicans?

23 A. If they were trying to draw a
24 districting plan to --

25 Q. I'm saying based upon your analysis,

1 analyzing the data that would have been available to
2 the General Assembly at the time that the 2000 Plan
3 was enacted, what percentage of time would 13 --
4 would it result in 13 Republican seats?

5 A. As I understand your question, I think
6 the answer is the one given by Figure 3: about
7 3 percent of the time.

8 Q. So if the General Assembly was
9 attempting to draw a map that had 13 seats for the
10 Republicans, under your analysis, again, how many
11 times -- what percentage of the time would that
12 actually have been the result?

13 A. Again, the kind of underlying idea is
14 that if it had been designed to perform in this way,
15 it would -- 13 seats would be a much more frequent
16 outcome than the one we observed. It looks more
17 like -- if you take these -- look at these results of
18 the simulation, it looks more like a plan that was
19 designed to create something like 10 seats, and then
20 there was an overperformance of the Republicans.

21 Again, the thing I want to stress is
22 that what my simulations show, if you're only taking
23 into consideration the partisanship of the district,
24 none of the other factors which lead to Congressional
25 districting outcomes, you would have an expectation

1 of 10 and then some variation. And sometimes that
2 variation can result in three seats.

3 Q. And you were only using this model
4 for -- to predict in how many elections?

5 A. I think the model really only applies
6 to making predictions about 2012, because the
7 underlying PVIs, partisanship shifts, would have been
8 different for 2014 and 2016.

9 Q. So you're talking about just one
10 election?

11 A. Just one election, yes.

12 Q. So there's been a lot of discussion
13 about your model having failed to predict the outcome
14 correctly 97 percent of the time.

15 Do you agree with that
16 characterization?

17 A. No. I -- I think that the model was to
18 make one prediction, what the seat share was in 2012.
19 It was off.

20 But to suggest that it means that the
21 model was wrong 97 percent of the time across all of
22 its applications, across all of the simulations, I
23 think, is an incorrect characterization.

24 Q. And, in fact, your model did come up
25 with a range of outcomes, correct?

1 MR. GERSCH: Objection: leading.

2 THE WITNESS: That's correct.

3 BY MR. TUCKER:

4 Q. Did your model come up with a range of
5 outcomes?

6 A. Yes.

7 Q. And was 13 Republican seats one of
8 those range of outcomes?

9 A. Yes, it was.

10 Q. Do you consider either the 2004 or the
11 2008 president elections to have been anomalies?

12 A. No, I don't.

13 Q. And do you agree that statewide
14 elections generally are more anomalous than
15 presidential elections?

16 A. There's usually wider variation in the
17 margins. Presidential elections are always tightly
18 contested. Not all statewide elections in all states
19 are contested by equally qualified candidates.

20 Q. So is it why you, again, used 2004,
21 2008 presidential elections instead of statewide
22 elections?

23 A. That's one of the reasons why I'm sort
24 of confident in the measure that just uses
25 presidential votes. If I had been able to

1 incorporate, statistically, statewide elections and
2 then use it nationally, this kind of weird
3 hypothetical, yeah, I would have -- I would have used
4 more -- more elections. There are ways of adjusting
5 for the anomalies. I could have done that.

6 But in order to get this kind of set of
7 predictions across a wide number of values of the
8 PVI, I had to go nationally. And there's only one
9 election that every voter in the country is casting
10 his or her ballot on, and that's a presidential
11 election. And so that drives my choice, in large
12 measure.

13 THE COURT: Counsel, we -- you seem
14 to be asking the same questions now that you
15 asked on direct examination.

16 Do you have any questions of this
17 witness prompted by cross?

18 MR. TUCKER: I do have additional
19 questions, Your Honor.

20 THE COURT: If you can get to the
21 ones that are prompted by cross, I think
22 that will help move things along.

23 BY MR. TUCKER:

24 Q. You were shown how many -- let me
25 strike that.

1 There was a bunch of discussion with
2 Petitioners' counsel during your cross-examination,
3 Dr. McCarty, about the difference between the PVI
4 numbers that were calculated with your regression
5 analysis for Dr. Chen's simulations and then the ones
6 that he claims to have actually calculated.

7 Do you recall that?

8 A. Yes, I recall that discussion.

9 Q. Okay. And how many of those plans were
10 you shown?

11 A. I was shown 10 of them.

12 Q. And how many different simulations did
13 Dr. Chen run?

14 A. He ran a thousand.

15 Q. Dr. McCarty, are only -- the only close
16 elections ones that you consider toss-ups?

17 A. Excuse me?

18 Q. Are -- are toss-up elections -- that
19 phrase was used during your cross-examination -- are
20 those the only types of close elections?

21 A. Do you mean close elections in terms of
22 the Congressional vote -- in terms of the
23 Congressional vote or --

24 Q. Sure. Let me reword, I guess.

25 Can an election be competitive and not

1 necessarily be a toss-up?

2 A. Yes. I mean, I've noted on several
3 occasions, lots of times, Democratic candidates win
4 districts that are not toss-up, and they lean
5 Republican from one to five or six points.

6 Q. Dr. McCarty, this is your article on
7 Does Gerrymandering Cause Polarizations, correct?

8 A. Yes.

9 Q. Part of your article?

10 A. Yes.

11 Q. And I believe you testified earlier
12 that polarization hasn't changed in the last
13 20 years, or it's been fairly -- fairly similar in
14 the last 20 years?

15 A. No. What I testified to was that the
16 existence of this gap that was noted before between
17 the most conservative Democrat and the most liberal
18 Republican has been there for about 20 years.

19 Q. And the chart at the top, do you
20 recall -- or you can look at it -- what year that is
21 looking at?

22 A. That uses the 2004 George W. Bush vote.
23 So I believe that those -- I -- those DW-NOMINATE
24 scores come from the Congressional term that was just
25 subsequent to that election.

1 Q. So that was in 2004?

2 A. That's correct.

3 Q. And Figure 5 from your report, what
4 year was that data drawn from?

5 A. Well, these are all of the DW-NOMINATE
6 scores for all of the members who have served between
7 2004 and 2014.

8 Q. And -- and does Figure 5 look similar
9 to your figure in your article?

10 A. Strikingly.

11 Q. Are you aware of any causal
12 relationship between polarization and the
13 competitiveness of seats?

14 A. No, I'm not.

15 MR. TUCKER: No further questions,
16 Your Honor. Thank you.

17 THE COURT: Dr. McCarty, I think
18 you're done.

19 THE WITNESS: Oh, great.

20 THE COURT: Thank you for your
21 testimony.

22 THE WITNESS: Thank you.

23 (The witness was excused.)

24 THE COURT: I had to make sure I got
25 that right and didn't mess it up again. I

1 think that's done.

2 Do Legislative Respondents have any
3 more witnesses?

4 MR. TUCKER: We have no more
5 witnesses, Your Honor, but we do have a few
6 exhibits we'd like to seek to admit.

7 THE COURT: Okay.

8 MR. TUCKER: The first is by
9 stipulation of all the parties that
10 Legislative Respondents move to admit
11 Legislative Respondents' Exhibit 19.

12 THE COURT: You're saying that's
13 admitted by stipulation?

14 MR. TUCKER: Correct, Your Honor.

15 THE COURT: Petitioners?

16 MS. THEODORE: No objection.

17 THE COURT: Well, no objection is
18 different from stipulation.

19 MS. THEODORE: It's stipulated.

20 THE COURT: Okay. So Legislative
21 Respondents' Exhibit 19 is admitted by
22 stipulation.

23 - - -

24 (Whereupon, Legislative Respondents'
25 Exhibit Number 19 was admitted into

1 evidence by stipulation.)

2 - - -

3 MR. TUCKER: Your Honor,
4 Legislative Respondents also move to admit
5 Legislative Respondents' Exhibits 32 through
6 38, which were marked and identified during
7 Dr. Chen's cross-examination testimony.

8 These are the maps from his
9 shapefiles that he had produced in this
10 case.

11 THE COURT: Thirty-two through 38?

12 MR. TUCKER: Yes, Your Honor.

13 THE COURT: Any objection?

14 MR. JACOBSON: Yes, we object,
15 Your Honor.

16 THE COURT: On what basis?

17 MR. JACOBSON: These maps -- if you
18 recall, these were used during the
19 cross-examination. They were created by
20 Dr. Gimpel. They were not simply taken --
21 output from Dr. Chen. He created -- he made
22 various changes to create this map and so on
23 and so forth. And --

24 THE COURT: I remember now.

25 That's these?

1 MR. JACOBSON: Yes.

2 THE COURT: We're going to sustain
3 the objection on 32 through 38. They will
4 not be admitted.

5 Anything else?

6 MR. TUCKER: No, Your Honor.

7 THE COURT: That's the end of your
8 case?

9 MR. TUCKER: It is, Your Honor.

10 THE COURT: Okay.

11 I'm not sure who to go to next.

12 Why don't we try -- in deference for
13 the Executive Branch, we'll go to the
14 Governor's Office, as well as officials from
15 the Department of State.

16 Does that make sense?

17 MS. HANGLEY: Yes, Your Honor.

18 Should I do it from here,
19 Your Honor?

20 THE COURT: You've been sitting
21 there for a long time.

22 Why don't you come up to the podium?

23 MS. HANGLEY: A new view on life.

24 THE COURT: Yes.

25 MS. HANGLEY: Your Honor,

1 Michelle Hangley, representing Governor Wolf
2 and officials from the Department of State.

3 We have one exhibit to offer into
4 evidence. This has been agreed to by the
5 parties, so this can be placed in the
6 record. It is an affidavit of Commissioner
7 Jonathan Marks relating to scheduling -- the
8 current scheduling of the 2018 primaries and
9 potential alterations to that schedule.

10 THE COURT: Has it been marked?

11 MS. HANGLEY: It's been marked as
12 EBD Exhibit 1.

13 THE COURT: I have an EBD Exhibit 1
14 already --

15 MS. HANGLEY: Ah.

16 THE COURT: -- which seems to be
17 the -- that's been premarked as
18 2018 Pennsylvania Elections Important Dates
19 to Remember.

20 MS. HANGLEY: Okay. We will have to
21 re-mark this as Exhibit 2, EBD Exhibit 2.

22 THE COURT: Okay. It's been marked
23 and moved.

24 Is it in by stipulation,
25 Petitioners?

1 MS. THEODORE: Yes.

2 THE COURT: Any Respondent?

3 MR. TUCKER: Yes, Your Honor.

4 THE COURT: It's in by stipulation?

5 MR. TUCKER: Yes, Your Honor.

6 THE COURT: Executive Branch

7 Defendant's Exhibit 2 is admitted by

8 stipulation.

9 - - -

10 (Whereupon, Executive Branch Exhibit
11 Number 2 was marked and admitted into
12 evidence by stipulation.)

13 - - -

14 MS. HANGLEY: Thank you.

15 THE COURT: And you will put that
16 in your binder on -- by the witness stand?

17 MS. HANGLEY: Okay.

18 THE COURT: Oh, okay. You will
19 give it to Mrs. Gacki.

20 Anything else, Counsel?

21 MS. HANGLEY: Nothing else,
22 Your Honor.

23 THE COURT: You have no further
24 evidence for this matter?

25 MS. HANGLEY: No further evidence.

1 THE COURT: Thank you very much.
2 Lieutenant Governor.

3 MR. PALNICK: Your Honor,
4 Lazar Palnick for the Lieutenant Governor.

5 First, I would like to present the
6 Court with the original of the demonstrative
7 that Mr. Levine marked Exhibit 12. And we
8 made copies for everyone --

9 THE COURT: Okay --

10 MR. PALNICK: -- as per your
11 request.

12 THE COURT: -- please pass that up
13 to Mrs. Gake and hand the copies out.

14 I'm assuming everybody got copies of
15 Illustrative Exhibit 9, which I think was in
16 your binder.

17 Is that right, Mr. Levine?

18 MR. LEVINE: Yes, Your Honor.

19 MR. PALNICK: Yes, Your Honor.

20 I also have what we've marked as
21 Respondent Stack's Exhibit Number 11, which
22 is an affidavit of the Lieutenant Governor
23 in lieu of his testimony, which we
24 understand is being agreed to by stipulation
25 of the parties.

1 THE COURT: Lieutenant Governor
2 Stack has moved his Exhibit Number 11, which
3 he is proffering is to be admitted by
4 stipulation.

5 Does anybody disagree with its
6 admission by stipulation?

7 MR. TUCKER: No.

8 THE COURT: Hearing nothing, it
9 will be admitted by stipulation.

10 - - -

11 (Whereupon, Stack Exhibit Number 11 was
12 admitted into evidence by stipulation.)

13 - - -

14 MR. PALNICK: We have nothing
15 further, Your Honor. Lieutenant Governor
16 rests.

17 THE COURT: Thank you.
18 Intervenors.

19 Mr. Tabas.

20 MR. TABAS: Yes, thank you,
21 Your Honor.

22 The Intervenors only have in their
23 case three exhibits that they wish to admit.
24 The first would be Intervenor 16, which is
25 the affidavit of Thomas Whitehead, a county

1 party chair. The parties have all agreed to
2 stipulate to the admission of this
3 affidavit.

4 Intervenor Exhibit 17 is the
5 affidavit of Carol Lynne Ryan of
6 Lawrence County, an activist Republican.

7 And I have the original affidavits
8 with me that I will leave with the Court.
9 Copies are being handed out. They have been
10 previously sent electronically.

11 The only other exhibit, Your Honor,
12 that I would offer is what we'll call
13 Intervenor Exhibit 2. It was in our
14 pretrial submission. It is the voter
15 registration by county in the Commonwealth
16 of Pennsylvania from the Department of
17 State's Web site. I have the URL link.

18 This was seen by the parties in our
19 pretrial notebook. It's for voter
20 registration by county as of November 6th,
21 2012, November 4th, 2014 and November 8th,
22 2016.

23 THE COURT: Let's deal with that
24 one first.

25 Intervenors' premarked

1 Exhibit Number 1 has been moved for
2 admission.

3 Does anyone have an objection?

4 MS. THEODORE: Your Honor, I think
5 it's Number -- Number 2 is the one --

6 THE COURT: I'm sorry, I'm sorry.
7 I -- if I said something other than 2 --
8 trust me, I was looking at the Number 2, and
9 I'm looking at Tab Number 2 in their binder.

10 So Intervenors' Exhibit 2.

11 Is that what we're talking about?

12 MR. TABAS: Right. Yes, Your Honor.

13 MS. THEODORE: Your Honor, just for
14 clarity, there are a couple of things in
15 this exhibit. Petitioners have no objection
16 to what I believe are the final three pages,
17 which are just printed, as Mr. Tabas said,
18 of the voter registration statistics. But
19 we do object to the sort of colored charts,
20 the first two pages of this exhibit, which I
21 think is something that counsel created.

22 MR. TABAS: Your Honor, I agree with
23 counsel. We only are seeking to put in the
24 three charts from the Department of State
25 Web site, not all of the other items that

1 are in --

2 THE COURT: So the first two pages
3 of the exhibit, you would like to pull?

4 MR. TABAS: Pull, yes, Your Honor.
5 Thank you.

6 THE COURT: They're pulled.

7 MR. TABAS: They're pulled.

8 THE COURT: We're now left with what
9 looks like Bates -- Exhibit 2.

10 Do you want this Exhibit I-2 cover
11 page on it, too, or not?

12 MR. TABAS: Only so that it's not
13 lost in the record, please, Your Honor.

14 THE COURT: I'm going to pull that,
15 too.

16 MR. TABAS: Thank you, Your Honor.

17 THE COURT: So this exhibit is --
18 now has Bates Numbers at the bottom
19 right-hand corner of INT_089 followed by 090
20 and 091.

21 That is now Intervenor's
22 Exhibit Number 2, which has been marked and
23 moved.

24 Is there any objection?

25 MS. THEODORE: No, Your Honor.

1 THE COURT: Any objection on the
2 Respondents' side?

3 The exhibit is admitted without
4 objection.

5 - - -

6 (Whereupon, Intervenors' Exhibit Number
7 2 was marked and admitted into
8 evidence.)

9 - - -

10 MR. TABAS: Thank you, Your Honor.

11 THE COURT: Now, Mr. Tabas, 16 and
12 17 are affidavits of two of your clients?

13 MR. TABAS: Yes, Your Honor.

14 THE COURT: And you have indicated
15 to the Court that they are admitted to by
16 stipulation.

17 I'm going to ask the parties whether
18 anybody disagrees with that.

19 Hearing nothing --

20 MS. THEODORE: Your Honor, I just
21 want to make one quick clarification. We're
22 stipulating to the admission in lieu of live
23 testimony, but, of course, Petitioners do
24 not stipulate to the veracity of the -- of
25 the affidavit.

1 THE COURT: Of course.

2 MS. THEODORE: Yes.

3 THE COURT: You're stipulating that
4 if they were here, that that's what they
5 would say?

6 MS. THEODORE: Yes, Your Honor.

7 THE COURT: Okay. True.

8 Intervenor's Exhibits 16 and 17 are
9 admitted without objection.

10 - - -

11 (Whereupon, Intervenor's Exhibit Number
12 16 was admitted into evidence.)

13 - - -

14 - - -

15 (Whereupon, Intervenor's Exhibit Number
16 17 was admitted into evidence.)

17 - - -

18 MR. TABAS: Thank you, Your Honor.

19 THE COURT: Anything else?

20 MR. TABAS: No, Your Honor. We
21 would rest.

22 May I have permission to turn the
23 documents over?

24 THE COURT: Please.

25 MR. TABAS: Thank you.

1 THE COURT: Has everybody now
2 rested their case on Respondents' side?
3 Speak now or forever hold your peace. I
4 didn't ask the General Assembly whether they
5 were doing anything.

6 MR. MYERS: Your Honor, in view of
7 the fact that the General Assembly is a
8 bicameral branch of state government, and
9 each of the elected leaders of the two
10 chambers are represented and have put on a
11 case, the General Assembly has nothing to
12 add.

13 THE COURT: You had indicated that
14 in your pretrial memo, I believe, but it's
15 always good to have it on the record.

16 MR. MYERS: Yes, Your Honor. Thank
17 you.

18 THE COURT: Thank you.

19 We heard some of Petitioners'
20 rebuttal case yesterday.

21 I'm assuming you have additional
22 rebuttal today?

23 MR. JACOBSON: Yes, Your Honor. We
24 have one motion to make before we begin --
25 or conclude our rebuttal case.

1 THE COURT: Please approach.

2 MR. JACOBSON: Your Honor, with
3 respect to the --

4 THE COURT: I hate to see you
5 hunched over like that.

6 MR. JACOBSON: It's, like, my
7 natural posture.

8 THE COURT: Does that go up any
9 higher or not? The podium, does it go up
10 any higher or not?

11 MR. JACOBSON: Thank you,
12 Your Honor.

13 THE COURT: At least it will reduce
14 your hunch.

15 MR. JACOBSON: With respect to
16 the -- I'll call them "the Gimpel maps," the
17 maps that we were just discussing that
18 Dr. Gimpel apparently created, which they
19 asked Dr. Chen about extensively during his
20 cross-examination.

21 We would move to strike the portion
22 of the cross-examination that related, you
23 know, in its entirety to those maps.

24 We had a right to cross-examine
25 Dr. Gimpel with respect to those maps. I

1 can aver to the Court that we had every
2 intention of doing so and cross-examining
3 him about how he created them, various
4 choices he made in creating them. And we
5 believe, as it currently stands, it's
6 prejudicial that in the record, the only
7 sort of testimony about those maps is
8 cross-examination -- I'm sorry -- is the
9 cross-examination of Dr. Chen without us
10 having an opportunity to cross-examine the
11 person who they have said actually created
12 the maps.

13 THE COURT: Okay.

14 Legislative Respondents?

15 MR. TUCKER: Your Honor, these
16 aren't Dr. Gimpel's maps; they're Dr. Chen's
17 maps. They're his shapefiles. The only
18 thing that was done was they were put into a
19 GIS software so that they turn into a map.

20 So, I mean, if Dr. Chen wants to go
21 look at them, all he has to do is go look at
22 his own shapefiles.

23 These were used as impeachment
24 exhibits during cross-examination. We moved
25 to admit them. Your Honor's denied that,

1 but that doesn't mean they still can't be
2 used as impeachment exhibits. There's been
3 lots of things throughout this trial that
4 witnesses have been impeached with that
5 weren't necessarily admitted into evidence,
6 and that testimony hasn't been stricken
7 either. Neither should this testimony.

8 THE COURT: Okay.

9 Your motion is going to be denied.
10 We didn't let the maps in, so the value of
11 the examination on the maps is fairly
12 reduced considering that the maps are not in
13 the record.

14 So, you know, when we approach
15 reviewing Dr. Chen's testimony, we'll take
16 into account that the maps are not in the
17 record.

18 MR. JACOBSON: Thank you,
19 Your Honor.

20 THE COURT: Any other motions?

21 MS. THEODORE: Yes, Your Honor.

22 So as you will recall, we left our
23 case open to move the admission of the
24 deposition designations for the Petitioners
25 who did not testify live.

1 THE COURT: And did you have
2 agreement from all counsel on those
3 designations?

4 MS. THEODORE: We do.

5 THE COURT: Okay.

6 MS. THEODORE: So that's
7 Petitioners' Exhibits 163 through 177.

8 THE COURT: I'm running out of
9 space.

10 163 through 177?

11 MS. THEODORE: Yes, Your Honor.

12 THE COURT: Do we actually have
13 those?

14 MS. THEODORE: I believe that one of
15 my colleagues is retrieving them. I
16 apologize.

17 THE COURT: I'm assuming the other
18 side said it, so I'm going to ask.

19 It's been represented that those
20 have been stipulated to.

21 Is that correct from the
22 Respondents' side?

23 MR. TUCKER: Yes, Your Honor.

24 THE COURT: So Petitioners'
25 Exhibits 163 through 177 are going to be

1 admitted by stipulation.
2 - - -
3 (Whereupon, Petitioners' Exhibit Number
4 163 was admitted into evidence by
5 stipulation.)
6 - - -
7 - - -
8 (Whereupon, Petitioners' Exhibit Number
9 164 was admitted into evidence by
10 stipulation.)
11 - - -
12 - - -
13 (Whereupon, Petitioners' Exhibit Number
14 165 was admitted into evidence by
15 stipulation.)
16 - - -
17 - - -
18 (Whereupon, Petitioners' Exhibit Number
19 166 was admitted into evidence by
20 stipulation.)
21 - - -
22 - - -
23 (Whereupon, Petitioners' Exhibit Number
24 167 was admitted into evidence by
25

1 stipulation.)
2 - - -
3 - - -
4 (Whereupon, Petitioners' Exhibit Number
5 168 was admitted into evidence by
6 stipulation.)
7 - - -
8 - - -
9 (Whereupon, Petitioners' Exhibit Number
10 169 was admitted into evidence by
11 stipulation.)
12 - - -
13 - - -
14 (Whereupon, Petitioners' Exhibit Number
15 170 was admitted into evidence by
16 stipulation.)
17 - - -
18 - - -
19 (Whereupon, Petitioners' Exhibit Number
20 171 was admitted into evidence by
21 stipulation.)
22 - - -
23 - - -
24 (Whereupon, Petitioners' Exhibit Number
25 172 was admitted into evidence by

1 stipulation.)

2 - - -

3 - - -

4 (Whereupon, Petitioners' Exhibit Number
5 173 was admitted into evidence by
6 stipulation.)

7 - - -

8 - - -

9 (Whereupon, Petitioners' Exhibit Number
10 174 was admitted into evidence by
11 stipulation.)

12 - - -

13 - - -

14 (Whereupon, Petitioners' Exhibit Number
15 175 was admitted into evidence by
16 stipulation.)

17 - - -

18 - - -

19 (Whereupon, Petitioners' Exhibit Number
20 176 was admitted into evidence by
21 stipulation.)

22 - - -

23 - - -

24 (Whereupon, Petitioners' Exhibit Number
25 177 was admitted into evidence by

1 stipulation.)

2 - - -

3 THE COURT: And your colleague can
4 hand them to our Court crier when he gets
5 back into the room.

6 MS. THEODORE: Thank you,
7 Your Honor.

8 And just two more. Also by
9 stipulation, we move the admission of
10 deposition designations from
11 Congressman Vitali and Senator Dinniman.

12 THE COURT: Which are marked as
13 what?

14 MS. THEODORE: Representative
15 Vitali --

16 THE COURT: He might like the
17 promotion.

18 MS. THEODORE: -- which are marked
19 as Petitioners' 178 and 179.

20 THE COURT: 178 and 179 have --
21 Petitioners' Exhibit 178 and 179 have been
22 moved -- have been marked and moved, and
23 have been represented to the Court that they
24 should be admitted by stipulation.

25 Any objections?

1 MR. TUCKER: No, Your Honor. Just
2 one clarification.

3 Which one is which?

4 MS. THEODORE: That's a good
5 question.

6 THE COURT: It's a good question.

7 MR. TUCKER: I'm sure we can look
8 and see. I just wanted it for the record.

9 THE COURT: One of them is going to
10 be 178, and one of them is going to be 179.

11 MS. THEODORE: I'm told 178 is
12 Senator Dinniman.

13 THE COURT: Okay.

14 Any objection?

15 MR. TUCKER: No, Your Honor.

16 THE COURT: Petitioners' Exhibits
17 178 and 179 are admitted by stipulation.

18 - - -

19 (Petitioners' Exhibit Number 178
20 admitted into evidence by stipulation.)

21 - - -

22 - - -

23 (Petitioners' Exhibit Number 179
24 admitted into evidence by stipulation.)

25 - - -

1 THE COURT: Any other motions before
2 we get to your rebuttal witness?

3 MR. JACOBSON: Your Honor, I could
4 be blinking we already do this, but I think
5 we were going to read into the record the
6 portions of Dr. Cho's transcript that were
7 going to be struck, and then -- we have
8 already conferred with the court reporter.
9 But I just wanted to get that on the record
10 before we go to our rebuttal case.

11 THE COURT: That's fine.

12 MR. LEWIS: And, Your Honor, while
13 we're on the topic, we also represent to the
14 Court that Legislative Respondents' Exhibits
15 11 and 12 in redacted form were placed into
16 the binders in the presence of all counsel
17 and with the stipulation of counsel.

18 THE COURT: Thank you.

19 MR. LEWIS: So we've agreed with
20 Petitioners that Pages 1,000 -- well, from
21 1,144, Line 14, to Page 1,154, Line 11, were
22 the portions -- constitute the portion of
23 Dr. Cho's testimony that referred to
24 Exhibit 2, which was -- which was withdrawn.

25 So those -- that would be the

1 portion of the transcript that should be
2 struck.

3 THE COURT: Petitioners, does that
4 adequately represent your agreement?

5 MR. JACOBSON: Yes, Your Honor.

6 THE COURT: Okay. They will be
7 struck from the record.

8 Anything else from Petitioners
9 before we get to the rebuttal?

10 MR. JACOBSON: Just one quick
11 question, Your Honor. I'm going to be
12 referring to yesterday's transcript in my
13 rebuttal case. I don't know if Your Honor
14 already has a copy. We have extra copies of
15 yesterday's transcript. Whatever is
16 convenient for the Court.

17 THE COURT: I'm not sure -- I'm
18 going to listen to you very attentively,
19 if -- if that's okay. And I'll listen to
20 the witness very attentively. I'm not sure
21 I'll need to follow along on the transcript.

22 MR. JACOBSON: Okay. Thank you,
23 Your Honor.

24 THE COURT: The great thing is if I
25 do need it, I can actually stop everything

1 and get it.

2 MR. JACOBSON: Exactly.

3 THE COURT: Okay. Should we take a
4 short break before we start the rebuttal
5 witness?

6 MR. JACOBSON: Yes. That would be
7 great, Your Honor.

8 THE COURT: Let's go off the
9 record.

10 THE CLERK: The Court is now in
11 recess.

12 - - -

13 (Whereupon, a recess was taken from
14 4:17 p.m. to 4:32 p.m.)

15 - - -

16 THE CLERK: The Commonwealth Court
17 is back in session.

18 THE COURT: Please be seated,
19 everyone.

20 Petitioners call your rebuttal
21 witness.

22 MR. JACOBSON: Petitioners call
23 Dr. Jowei Chen.

24 THE COURT: Dr. Chen, please step
25 up to the stand. I remind you, you've been

1 sworn and you're still under oath.

2 - - -

3 JOWEI CHEN, PH.D.,

4 after having been previously duly sworn, was

5 examined and testified further as follows:

6 - - -

7 - - -

8 REBUTTAL - DIRECT EXAMINATION

9 - - -

10 BY MR. JACOBSON:

11 Q. Dr. Chen, do you have a copy of the
12 transcript from yesterday, or do you want me to give
13 you an extra copy?

14 A. No, sir, I don't have it.

15 MR. JACOBSON: With permission of
16 the Court?

17 THE COURT: Yeah, you can approach.

18 I'm assuming Respondents have copies
19 of the transcripts from yesterday.

20 MR. LEWIS: Yes, Your Honor.

21 BY MR. JACOBSON:

22 Q. Good afternoon, Dr. Chen.

23 A. Good afternoon, sir.

24 Q. I hope you enjoyed your half day back
25 in Ann Arbor before we called you back here?

1 A. Yes, sir.

2 Q. Dr. Chen, did you read the expert
3 report of Dr. Cho in this case?

4 A. Yes, sir, I did.

5 Q. In her report -- not her testimony, but
6 her report, did Dr. Cho analyze sort of the granular
7 details of your computer algorithms?

8 A. No, sir, she did not. She did not do
9 so in the report.

10 Q. Did you review Dr. Cho's trial
11 testimony from yesterday?

12 A. Yes, sir, I did.

13 Q. Did Dr. Cho discuss the details of your
14 algorithm in that testimony?

15 A. She purported to; she did, sir.

16 Q. And, Dr. Chen, what algorithm of yours
17 formed the basis of Dr. Cho's testimony with respect
18 to your work in this case?

19 A. She claimed yesterday that she was
20 describing an algorithm that I used in a 2013
21 article, a 2013 academic article.

22 Q. Thank you.

23 And for reference, I believe Dr. Cho's
24 discussion of your 2013 algorithm began on Page 1136
25 of the transcript yesterday and continued on for many

1 pages after that.

2 A. Yes, sir, that appears to be the case.

3 Q. Dr. Chen, what was the very first step
4 in that 2013 algorithm that you used for purposes of
5 that 2013 paper -- what was the very first step in
6 creating a simulated districting map?

7 A. And just to clarify, you're asking me
8 about the 2013 algorithm; you're not asking me about
9 my algorithm in the expert report, right?

10 Q. Thank you for giving away where we're
11 going. But, yes. I'm only asking about the 2013
12 algorithm.

13 THE COURT: He might get there
14 faster than you are.

15 BY MR. JACOBSON:

16 Q. Yes, just the 2013 algorithm.

17 A. Okay. I just wanted to make sure I
18 understood.

19 The first step is that the simulation
20 algorithm instructs the computer to pick a building
21 block at random, to pick a geographic block at
22 random, somewhere in the state and use that as the
23 starting point for first district. So that is just a
24 random pick.

25 Q. And -- and, Dr. Chen, what -- based on

1 her testimony yesterday, what was Dr. Cho's
2 understanding of the second step in that 2013
3 algorithm?

4 A. Dr. Cho testified yesterday that her
5 understanding of the second step is that the second
6 step then tells the computer to pick the nearest
7 neighbor that is geographically closest to that first
8 randomly chosen block, to pick the geographically
9 nearest neighboring block and to adjoin it to the
10 first randomly chosen block in forming the
11 first district.

12 Q. And, Dr. Chen, if I can just point you
13 to the bottom of Page 1137 of the transcript and then
14 going onto 1138.

15 Is that general understanding of the
16 second step -- is that what Dr. Cho was referring to
17 in her testimony when she said, and I quote, And what
18 he's doing is -- is -- sorry -- And what he's doing
19 is, he starts with a unit -- he randomly picks a
20 unit, and then he starts to build. And the way he
21 starts to build is he takes the centroid of the units
22 surrounding that district that he has, and he takes
23 the one that is closest and he adds to it.

24 Is that a fair characterization -- or
25 was that Dr. Cho's characterization of the

1 very -- the second step in how you build a simulated
2 map?

3 A. Yes, sir, that appears to be Dr. Cho's
4 characterization of that second step in the
5 simulation algorithm.

6 Q. And does this second step relate to the
7 central critique that Dr. Cho had yesterday of your
8 2013 algorithm?

9 A. Yes, sir, it does. She was
10 critiquing -- her critique yesterday was that this
11 second step and all subsequent steps following this
12 second step are deterministic and not random. She is
13 claiming that because of that second step -- her
14 understanding of that second step, that that second
15 building block was chosen in a deterministic,
16 therefore, a nonrandom way because it is simply
17 taking the nearest geographical neighbor, that is,
18 the neighboring block that is geographically nearest
19 to the first randomly chosen block.

20 That is what she testified yesterday,
21 yes, sir.

22 Q. Thank you.

23 And is this a fair characterization,
24 that Dr. Cho's understanding was that if you pick the
25 same exact first -- the first step, you pick the same

1 block twice just by chance, you would always pick the
2 same second block as your second step, and that was
3 sort of the central thrust of her criticism of
4 your -- your algorithm --

5 A. Yes, sir, that was --

6 Q. -- I should say, your 2013 algorithm?

7 A. The 2013 algorithm. That is exactly
8 what she said is her understanding and her critique
9 of that 2013 algorithm, that the second choice was
10 deterministic and not random.

11 Q. And, Dr. Chen, if I could point you to
12 Page 1142 of the transcript, Line 14.

13 That same second step and that
14 critique, what Dr. Cho was referring to when she
15 said, and I quote, The randomness is just in where to
16 start. So if we start there again, it always picks
17 the one to the right.

18 Closed quote.

19 A. Yes, sir. That is exactly what she's
20 describing.

21 Q. And, Dr. Chen, if I can draw your
22 attention to Page 1142 at lines 3 to 4.

23 What conclusion does Dr. Cho draw based
24 on this understanding of your 2013 algorithm?

25 A. Based on her understanding of that 2013

1 paper's algorithm, she testified yesterday, her
2 critique yesterday was that the simulation algorithm
3 is producing districting maps that are not truly
4 random; instead, her critique is that they are
5 deterministic because of the second step that you and
6 I have just been talking about.

7 Q. Dr. Chen, in your opinion, is it fair
8 to say that Dr. Cho's understanding, that
9 understanding of the 2013 algorithm, forms the basis
10 for her critique of your simulations in this case?

11 A. If I could just ask you to repeat the
12 question, because I think there was a little stumble
13 there.

14 Q. Sure.

15 In your opinion, is it fair to say that
16 Dr. Cho's understanding, that understanding that I
17 just described -- or that you just described of your
18 2013 algorithm, forms the basis of her critique of
19 your simulations in this case?

20 A. Yes, sir, it is the very basis of her
21 critique.

22 Q. Dr. Chen, did you use your 2013
23 algorithm in this case?

24 A. No, sir, I did not.

25 Q. Did you use, in this case, an algorithm

1 that has a, quote, deterministic feature of the one
2 Dr. Cho described, and by that I mean where the
3 second block that's picked is predetermined based on
4 the first block, so if you pick the same first block,
5 you're always going to pick the same second block?

6 Is that -- the algorithm that you used
7 in this case, does it have that feature?

8 A. No, sir, I did not, absolutely not.

9 Q. Okay. Now that we've gone through the
10 part that you gave away before, let's talk about the
11 algorithm that you used in this case.

12 Dr. Chen, for the algorithm that you
13 did use, what was the first step in building a
14 simulated map?

15 A. The first step is that the computer is
16 instructed to pick a building block at random, and
17 that is the beginning point of the formation of the
18 first district. So it picks a point at random,
19 essentially.

20 Q. And now here's the critical point:
21 What is the second step of the algorithm -- the -- in
22 the algorithm that you used to build your simulated
23 maps in this case?

24 A. The second step of the algorithm
25 instructs the computer to pick an adjoining

1 neighboring block at random. It picks that second
2 block at random.

3 Q. And how about after that?

4 A. Again, it picks adjoining neighboring
5 blocks at random and attaches them to the ones that
6 have already been chosen. So each step -- each
7 subsequent step along the way, another adjoining
8 block is picked at random.

9 Q. Dr. Chen, do we have proof of this?

10 A. I suppose so. You could look at the
11 computer code that I turned over in connection with
12 my expert report.

13 MR. JACOBSON: If we could pull up
14 Dr. Chen's code.

15 BY MR. JACOBSON:

16 Q. Dr. Chen, do you recognize this as the
17 computer code that you used to create the algorithm
18 to create simulated maps in this case?

19 A. Yes, sir, it is. It's the computer
20 code that I used, and it's the computer code that I
21 turned over.

22 MR. JACOBSON: And if we can go to
23 Page 2, there's a yellow highlighted line.
24 If we can blow it up.

25

1 BY MR. JACOBSON:

2 Q. It says, quote, Random local random
3 equals new random.

4 What does that mean?

5 A. That's a line in the Java code, and it
6 sets up a random number generator. It gives the
7 computer the ability to call random numbers, as the
8 name suggests. And that's going to be, as we'll see
9 later on in this code, a key feature of what this
10 computer does -- what this computer code does in
11 creating random districting plans.

12 MR. JACOBSON: If we can go now to
13 Page 3 and the yellow highlighted part
14 again.

15 BY MR. JACOBSON:

16 Q. You can see the yellow highlighted part
17 says, quote, Local random.

18 What does that mean?

19 A. That call of local random right there
20 in that line -- in that code -- line of the code in
21 front of us, that is the first instance in which the
22 computer is instructed to use that random number
23 generator we just saw on the previous page. And,
24 literally, what this computer code is doing -- what
25 this line of the code is doing is it's instructing

1 the computer, pick a random point on the map, and
2 that will be where the first district starts
3 building.

4 Q. So that's -- this -- what we're looking
5 at right now is the -- how you pick the first
6 building block on one of your simulated maps?

7 A. Yes, sir. It's starting the
8 districting process using a random choice of a
9 building block.

10 MR. JACOBSON: And if we can go now
11 to Page 4 and, again, the highlighted part
12 that says, quote, Local random.

13 BY MR. JACOBSON:

14 Q. What does this line of code do?

15 A. This line of code encompasses the
16 second step, as well as all subsequent steps, in the
17 construction of simulated districting plans. It
18 tells the computer, pick an adjoining neighbor at
19 random, hence called the "local random" again.

20 That's what "local random" means.
21 That's what the local random does here in this
22 program. It tells the computer, pick a locally
23 adjoining neighboring block at random.

24 Q. So -- so, not to beat a dead horse,
25 after you pick the first block, is there anything

1 predetermined in terms of the second block that is
2 built and then so on and so forth building?

3 A. No, sir. It is picking them at random.

4 Q. Now, Dr. Chen, if Dr. Cho had looked at
5 your computer code in this case, would she have been
6 able to glean this rather easily?

7 A. Yes, sir, assuming that she has the
8 ability to read very basic Java code.

9 Q. And, in fact, Dr. Chen, after you
10 published that 2013 paper that put out that algorithm
11 that Dr. Cho gave her understanding of yesterday, you
12 published another simulation paper in 2016 that we've
13 already talked about in this case; is that right?

14 A. Yes, sir, I did.

15 Q. And I believe in her testimony
16 yesterday, Dr. Cho said on three different occasions,
17 she describes -- she -- she said that for that paper,
18 you describe the algorithm used in merely a footnote.

19 Did you read those -- those portions of
20 the testimony yesterday?

21 A. I read -- I did read her testimony on
22 that, yes, sir.

23 MR. JACOBSON: And just for the
24 record, I believe that was on Pages 1135,
25 1171 and 1172 of the transcript.

1 BY MR. JACOBSON:

2 Q. If I can actually now point your
3 attention to the third of those, Page 1172.

4 And if you see Lines 19 through 21.
5 Let me know when you're there.

6 A. Yes, sir, I see it.

7 Q. And do you see there Dr. Cho said in
8 her testimony, quote, If you publish in Political
9 Science and put the algorithm in a footnote, that's
10 not validation of the algorithm.

11 Do you see that?

12 A. Yes, sir.

13 MR. JACOBSON: If we could pull up
14 Legislative Respondents' Exhibit 39, which
15 is the 2016 paper that we're talking about
16 now.

17 BY MR. JACOBSON:

18 Q. Dr. Chen, do you recognize this as your
19 2016 paper?

20 A. Yes, sir, it is.

21 MR. JACOBSON: If we could scroll
22 down to Page 331 of the article.

23 Apologies. We're having technical
24 problems. And we're on Page 331. And zoom
25 in on the right side, the section titled --

1 Number 3.1, that's titled, quote, The
2 Automated Districting Algorithm.

3 And if we can now just zoom out.

4 BY MR. JACOBSON:

5 Q. And if you see, Dr. Chen, that
6 section of the text in that bottom right corner --

7 MR. JACOBSON: And then scroll down
8 to the next page.

9 BY MR. JACOBSON:

10 Q. -- all of that lengthy text on the left
11 side of the page.

12 MR. JACOBSON: If we can zoom in to
13 it.

14 BY MR. JACOBSON:

15 Q. I won't make you reread the whole
16 thing, but what is that lengthy, multiple
17 single-space paragraph there describing?

18 A. Sir, that is a long section in that
19 2016 published article that describes the technical
20 details of my computer simulation algorithm.

21 Q. And so was it true or false when
22 Dr. Cho said that you described it merely in a
23 footnote?

24 A. That was clearly a false statement.

25 Q. And, Dr. Chen, again, with respect to

1 this -- sort of the second step in the algorithm that
2 we've been talking about, whether that's
3 predetermined or chosen at random after the first
4 step, in this 2016 paper and the algorithm described
5 in this paper, was the second step predetermined or
6 was it random?

7 A. It was random, sir.

8 Q. And, Dr. Chen, if I could direct your
9 attention to Pages 1246 to 1247 of the algorithm -- I
10 should say -- not the algorithm -- of the transcript,
11 the very bottom of Page 1246.

12 A. Yes, sir.

13 Q. And if you see there, I think mainly on
14 Page 1247, Dr. Cho said that you did not disclose
15 the, quote, source code with respect to this 2016
16 paper; you only disclosed a, quote, binary
17 executable. And I believe she said "binary
18 executable" several times.

19 Do you see that on the page?

20 A. Yes, sir, I see that.

21 MR. JACOBSON: If we could pull up
22 Petitioners' Exhibit 26 and scroll all the
23 way down.

24 BY MR. JACOBSON:

25 Q. Dr. Chen, if the -- the portion there

1 at the very bottom that says, quote, Districting
2 Simulation Code, what is that?

3 A. That is the computer source code that I
4 turned over in connection with this 2016 article
5 we've just been talking about.

6 Q. And is that -- and for those of us who
7 don't know what this means, is that a, quote, binary
8 executable?

9 A. No, sir, absolutely not.

10 Q. And anyone, including Dr. Cho or anyone
11 else, could right now, or since this paper was
12 published, go to your Web site, your academic home
13 page, scroll -- scroll down and look at that code; is
14 that right?

15 A. Assuming that Dr. Cho has a computer
16 and access to the Internet, yes, sir.

17 Q. Thank you for that.

18 What -- Dr. Chen, what implications do
19 you believe it has for Dr. Cho's analysis of your
20 work in this case that she based her testimony on her
21 understanding of your 2013 algorithm?

22 A. Well, her critique is entirely directed
23 at a feature that's simply not in place in the
24 simulation algorithm that I used with my expert
25 report in this case. It's just puzzling, because

1 that feature is simply not in the code. And anyone
2 who looks at that code could see that. It's plainly
3 obvious when you see the code that it is using random
4 steps along the way, every step along the way, in
5 building simulated districting plans.

6 Q. Dr. Chen, do you believe that Dr. Cho
7 could form a reliable opinion about your work in this
8 case without knowing the actual algorithm that you
9 used to simulate districting plans, nonpartisan
10 districting plans?

11 A. No, sir. It would be important to
12 actually understand the actual algorithm I used.

13 Q. I'd like to turn now to Dr. Cho's
14 discussion of the Voting Rights Act.

15 MR. JACOBSON: If we could pull up
16 Petitioners' Exhibit 15.

17 BY MR. JACOBSON:

18 Q. Dr. Chen, can you refresh us, what do
19 these charts depict?

20 A. These two charts are looking at subsets
21 of the 1,000 simulated plans that I described to the
22 Court earlier this week. And it is specifically
23 looking at the subset of these plans that contain one
24 district with an African-American voting-age
25 population of at least 56.8 percent or higher. And

1 what I'm describing here in the figures -- in these
2 two figures is the number of Republican seats in each
3 of these plans that satisfy that particular racial
4 threshold.

5 On the left, we're looking at
6 Simulation Set Number 1 plans. And on the right,
7 we're looking at plans within Simulation Set
8 Number 2.

9 Q. And, Dr. Chen, if I could point your
10 attention -- pardon me -- to Page 1277 of the
11 transcript from yesterday, specifically, lines 21
12 through 24 on Page 1277.

13 A. Yes, sir.

14 Q. Dr. Chen, do you see where Dr. Cho
15 stated in her testimony that she believed that this
16 particular chart, Petitioners' Exhibit 15, quote,
17 Implies that Dr. Chen thinks that these are the ones
18 that would -- he would proffer as satisfying the VRA,
19 closed quote?

20 Dr. Chen, was Dr. Cho correct that you
21 were proffering these as the only of your 1,000
22 simulated plans that satisfy the Voting Rights Act?

23 A. No, sir, absolutely not.

24 Q. Could you remind us why you conducted
25 the analysis that went into this chart?

1 A. I conducted the analysis that went into
2 the chart in order to analyze whether a hypothetical
3 racial goal of creating one district with an
4 African-American voting-age population of
5 56.8 percent or higher could possibly cause the 13-5
6 Republican outcome that we see in the enacted plan.

7 Q. And -- and, Dr. Chen, did you conduct
8 an analysis as well of the subset of your 1,000 plans
9 that produced a district with an African-American
10 voting-age population over 50 percent, as opposed to
11 56.8 percent?

12 A. Yes, sir, I did.

13 MR. JACOBSON: If we could pull up
14 Petitioners' Exhibit 21.

15 BY MR. JACOBSON:

16 Q. Dr. Chen, what was this chart
17 depicting?

18 A. This chart describes the subset of
19 simulated plans within Simulation Set Number 1 that
20 contain at least one district with an
21 African-American voting-age population of over
22 50 percent. And so it describes 234 plans within
23 Simulation Set Number 1, satisfying that particular
24 threshold. And here again, what we see here in this
25 figure is the number of Republican seats in every one

1 of those 234 simulated plans.

2 MR. JACOBSON: And if we can pull up
3 Petitioners' Exhibit 23.

4 BY MR. JACOBSON:

5 Q. What was this chart depicting?

6 A. Exhibit Number 23 describes the subset
7 of plans within Simulation Set Number 2 that also
8 contain one district with an African-American
9 voting-age population of over 50 percent. And so
10 this figure is describing the number of Republican
11 seats in each one of these simulated plans. There
12 are 300 simulated plans within this subset that
13 satisfy that racial threshold.

14 Q. And, Dr. Chen, if you can just remind
15 us, what is sort of the major distinction between
16 Simulation Set 1 and Set 2 in terms of the criteria
17 that you use?

18 A. Simulation Set Number 1 simply follows
19 nonpartisan traditional districting criteria and
20 adheres to them. Simulation Set Number 2 does the
21 same thing, except that it also guarantees the
22 protection of 17 incumbents by not pairing two
23 incumbents into the same district in 17 of the 18
24 incumbents --

25 Q. And Dr. Chen --

1 A. I'm sorry.

2 -- 17 of the 18 districts.

3 Q. Thank you.

4 Dr. Chen, you said a moment ago that
5 just looking at Simulation Set 2, which was, for lack
6 of a better term, the incumbency-protection version
7 of your -- your algorithm, there are 300 plans in
8 that Set 2 of the 500 that produced an
9 African-American -- that produced one district with
10 an African-American voting-age population over
11 50 percent; is that right?

12 A. Yes, sir.

13 Q. And what was the -- if we look at this
14 chart, Exhibit 23, what was the partisan breakdown in
15 terms of expected partisan outcome in those 300 plans
16 in Set 2?

17 A. We see that under Set 2, when you just
18 look at districting plans that contain a majority
19 African-American voting-age population district, the
20 most common outcome is a plan with 10 Republican
21 seats. That's 10 Republican seats and eight
22 Democratic seats. We also see that other common
23 outcomes range from about eight to 11. And then
24 under 1 percent of the time, we see a plan with 12
25 Republican seats. But the vast majority of the plans

1 create eight, nine, 10 or 11 Republican seats.

2 Q. And just to the far right of the chart,
3 how many seats have -- are expected to win in the
4 enacted plan?

5 A. In the enacted plan, we see that there
6 are 13 Republican seats. That is an outcome that
7 occurs not a single time in all of these 300
8 simulated plans, so that tells us that the enacted
9 plan is a partisan outlier that could not have been
10 caused or explained or warranted by a districting
11 process following traditional districting criteria
12 and the protection of 17 incumbents and a
13 hypothetical racial goal of achieving one district
14 with an African-American voting-age population of
15 over 50 percent.

16 Q. And, roughly, how many additional seats
17 do Republicans win under the Act 131 enacted plan as
18 compared to just the 300 plans -- these 300 plans in
19 Simulation Set 2?

20 A. They win, in general, two to four
21 additional Republican seats. And we can see that
22 from this chart. You can see that the vast majority
23 of the simulations fall in the range of nine, 10 or
24 11. So the enacted plan's creation of 13 Republican
25 seats is an outcome that, in general, is two, three

1 or four more Republican seats than -- than most of
2 the simulated plans.

3 MR. JACOBSON: And if we can, moving
4 on, pull up Legislative Respondents' Exhibit
5 12, which is, I believe, Dr. Cho's report,
6 and then go to Page 5 of that report -- I'm
7 sorry -- Legislative Respondents' Exhibit
8 11, and then Page 5 of the report -- or --
9 I'm sorry -- I'm looking for Figure 3, which
10 is the chart that has the blue oval.

11 And apologies that I had the page
12 number wrong.

13 There we go. If we can just zoom in
14 on that chart.

15 BY MR. JACOBSON:

16 Q. So, Dr. Chen, this is from Dr. Cho's
17 report, and it's the figure for the number of county
18 and municipality splits in your Simulation Set 2,
19 but, as you can see, Dr. Cho has drawn a blue oval in
20 the large gulf of white space between the enacted
21 plan and your simulated plans.

22 Do you see that?

23 A. Yes, sir, I see that.

24 Q. Dr. Chen, why aren't there any black
25 circles, why aren't there any simulated plans in that

1 white space?

2 A. Let me just explain what the horizontal
3 axis here represents. It tells us a number of
4 counties that are split into multiple districts in
5 each plan, and so it shows, for example, that the 500
6 simulated plans here split anywhere from about 12 to
7 as many as 19 counties, whereas the enacted plan
8 splits 28 counties.

9 Now, your question, sir, was why aren't
10 there any plans where that blue circle is. And the
11 answer is that the simulation algorithm that I used
12 was instructed to adhere to the traditional
13 districting criterion of avoiding county splits as
14 well as avoiding municipal splits.

15 So what happened in the simulation
16 plans? They avoided splitting counties, except when
17 absolutely necessary to achieve equal population.
18 That's why you don't see plans splitting as many
19 counties as where that blue circle is. The algorithm
20 was instructed to follow traditional districting
21 criteria.

22 Q. So you didn't produce any plans that
23 fell into that circle, whether they're hiding
24 somewhere?

25 A. They're not hiding somewhere, no, sir,

1 they're not.

2 Q. And what does the size, just in terms
3 of the magnitude of that white space between your
4 simulated plans and the enacted plans in terms of
5 county splits -- what does that tell you about the
6 enacted plan?

7 A. There's a wide gap here in that the
8 enacted plans split 28 counties, while the simulated
9 plans split anywhere from 12 to 19 counties. What
10 that tells us is that the enacted plan significantly
11 subordinated the traditional districting criterion of
12 avoiding county splits.

13 Q. And if -- if -- if, like your
14 simulations, there was a nonpartisan process that did
15 sort of, for lack of a better word, prioritize
16 traditional districting criteria, would it ever split
17 anywhere -- in your analysis, would it ever split
18 anywhere close to the 28 counties that are split
19 under the enacted plan?

20 A. No, sir, not a single time out of 500
21 simulated plans.

22 What that tells us is that the enacted
23 plan was not created with a process -- under a
24 districting process that adhered to traditional
25 districting criteria, particularly the criterion of

1 avoiding county splits.

2 Q. And -- thank you.

3 I'd like to move on now to
4 Dr. McCarty's testimony.

5 MR. JACOBSON: If we can pull up
6 Legislative Respondents' Exhibit 17, which I
7 believe is Dr. McCarty's report, and
8 specifically Table 1.

9 Yep.

10 And if we look just at the right
11 side of this figure, which is the analysis
12 of the 2011 Congressional Districting Plan,
13 and the middle column that says PVI.

14 BY MR. JACOBSON:

15 Q. Dr. Chen, what elections data did -- or
16 what -- I should say, what state's elections data did
17 Dr. McCarty use to calculate that PVI?

18 A. As Dr. McCarty testified today, he used
19 Pennsylvania's 2004 and 2008 presidential elections.

20 Q. And if we can now move to Appendix A of
21 Dr. McCarty's report.

22 And looking at the middle column that
23 says Number of Elections, what elections do those
24 represent?

25 A. Well, as Dr. McCarty stated in his

1 report and as he testified today, those elections
2 represent Congressional elections from all 50 states
3 around the country.

4 Q. And so this is, I guess, maybe sort of
5 the critical point in Dr. McCarty's calculation.
6 There's obviously other critical points.

7 How does Dr. McCarty then use these
8 elections in the middle column to translate the PVI
9 on the left to the Democratic probability of winning
10 on the right?

11 A. What Dr. McCarty states in his report,
12 as well as in his testimony, is that if we have a
13 Congressional district in Pennsylvania with a --
14 let's say, plus 1 Republican PVI, then what
15 Dr. McCarty does is he goes to this appendix that we
16 see in front of us here and he says, What were the
17 partisan outcomes of Congressional elections around
18 the country in other states, like Arizona and
19 New Mexico and Alaska, in Congressional districts
20 that had what looked, to Dr. McCarty, like similar
21 PVIs.

22 Q. And so putting Pennsylvania aside for a
23 second, just focusing on this appendix, how is
24 Dr. McCarty calculating the number on the far right
25 column based on the elections in the middle column?

1 A. He's looking at Congressional elections
2 across the country, and he's saying, If we have a
3 district with a Republican PVI of plus 1 or plus 20
4 or plus 30, then here is the percentage of those
5 districts around the country that have elected
6 Democrats. And that is how he makes inferences about
7 the probability that such a district, in general,
8 would elect a Democrat.

9 Q. And does Dr. McCarty then use those
10 probabilities in the far right column that are
11 calculated based on elections from around the country
12 to estimate probability that a Democrat will win a
13 particular district in Pennsylvania?

14 A. Yes, sir, that's exactly what he does.

15 Q. Dr. Chen, are you aware of any
16 peer-reviewed article that uses this sort of
17 conversion methodology, where you take a Republican
18 PVI in a particular district and in a particular
19 state, like Pennsylvania, and convert it to a
20 probability of winning the district based on -- on
21 winning back district in that state based on
22 Congressional election returns from other states that
23 have the exact same PVI?

24 A. No, sir, absolutely not.

25 That sort of conversion methodology

1 would be highly irregular and considered by academics
2 to be unreliable, particularly in the estimation of
3 actual Congressional elections in a state like
4 Pennsylvania.

5 Q. And -- and even more broadly, based on
6 your experience in redistricting, do you know of any
7 partisan mapmakers, anywhere in any state in the
8 country, who are trying to predict the partisanship
9 of the districts that they are creating, that look to
10 election results in other states, in any way?

11 MR. TUCKER: Your Honor, I'm going
12 to object to this testimony, including the
13 prior question and answer, as outside the
14 scope of Dr. Chen's opinions in this case,
15 including his expertise that's been
16 demonstrated in this case.

17 THE COURT: I think the objection
18 is that I do not believe that Dr. Chen was
19 qualified on the question of mapmaking. So
20 they're arguing that he wouldn't necessarily
21 know what mapmakers do throughout the
22 country. That's the nature of the
23 objection.

24 MR. JACOBSON: If I may, Dr. Chen
25 was qualified in several areas, one of which

1 was, quote, legislative districting. And he
2 testified about his experience in working on
3 other legislative districting cases in other
4 states around the country.

5 THE COURT: What case --
6 analyzing -- analyzing maps that are already
7 drawn are different from sitting in a room
8 and drawing an actual map. That's what I
9 understand the distinction is.

10 Dr. Chen, do you have any experience
11 in actually drawing an actual map for a
12 state?

13 THE WITNESS: No, sir.

14 THE COURT: Okay.

15 MR. JACOBSON: Maybe I can rephrase
16 my question. That was probably a bad
17 question.

18 THE COURT: I'm going to sustain
19 the objection to that question.

20 I'm not going to strike the prior
21 answer, because you didn't object fast
22 enough.

23 But I'll sustain the objection to
24 that question.

25

1 BY MR. JACOBSON:

2 Q. Based on your experience in working --
3 in studying legislative districting and working on
4 redistricting cases as an expert witness and
5 otherwise, have you encountered any case where in a
6 particular state that -- you know, any case that you
7 have personal experience and knowledge about, where
8 in a particular state, election results from other
9 states were used in predicting the partisanship of
10 the districts that were created?

11 MR. TUCKER: Objection, again, Your
12 Honor. It's outside the scope of this
13 witness's report, his testimony in this case
14 and his expertise.

15 THE COURT: That's a different
16 question. That's relating specifically to
17 the cases that he has been involved in, and
18 this is a rebuttal expert, so he's rebutting
19 the testimony of your expert. So I'm going
20 to allow it.

21 Overruled.

22 MR. JACOBSON: Thank you.

23 BY MR. JACOBSON:

24 Q. You may answer, Dr. Chen.

25 A. No, sir, I have never seen such a

1 thing. It just wouldn't make sense to evaluate how
2 voters might behave in New York by looking to how
3 Congressional elections in Alaska or New Mexico have
4 been going.

5 Q. When you worked as an expert in the
6 North Carolina case, which I believe was a case in
7 which it was disclosed the partisan data that they
8 used in predicting partisanship --

9 Was that right, it was disclosed by the
10 state?

11 A. Yes, sir.

12 Q. -- in that case, did the --

13 THE COURT: Counsel, can I -- do
14 you have a citation for that North Carolina
15 case?

16 MR. JACOBSON: It's -- you can
17 correct me if I'm wrong. I believe it's
18 Common Cause v. Rucho, and League of Women
19 Voters v. Rucho as well.

20 THE COURT: Is it a Federal case?

21 MR. JACOBSON: It was a Federal
22 case. The trial was --

23 BY MR. JACOBSON:

24 Q. Well, you can tell us.

25 When was the trial?

1 I think it was very recently.

2 A. I think October 16th through the 19th.

3 THE COURT: Has a decision been
4 issued in that case yet?

5 MR. JACOBSON: I don't believe so.

6 THE COURT: But it is a Federal
7 Court case?

8 MR. JACOBSON: It is a Federal Court
9 case, yes.

10 THE COURT: Thank you.

11 BY MR. JACOBSON:

12 Q. In that North Carolina case, where the
13 State disclosed the partisanship data -- the partisan
14 history data that they used in predicting the
15 partnership of the districts that they were creating,
16 did they look at elections in South Carolina?

17 A. No, sir. That wouldn't make any sense.
18 They looked to elections in North Carolina because
19 they were considering the partisan performance of
20 Congressional districts in North Carolina.

21 Q. Did they look to Congressional
22 elections in Alaska?

23 A. No, sir, they did not.

24 Q. I'll make this easy: Did they look to
25 Congressional elections or any elections in any state

1 other than North Carolina?

2 A. No, sir, they did not.

3 Q. Dr. Chen, what state's election results
4 did you use in estimating partisanship in this case
5 of precinct-level partisanship?

6 A. I used all the statewide elections in
7 Pennsylvania over the past 10 years.

8 Q. Did you use election results from any
9 state, except for Pennsylvania?

10 A. No, sir. I was trying to evaluate the
11 partisan performance of districts in Pennsylvania.

12 Q. I'd like to now turn to some of the
13 anomalous results that we find using Dr. McCarty's
14 approach.

15 MR. JACOBSON: If we could pull up,
16 again, Appendix A and zoom in on the two
17 rows that are zero and minus 1 in that
18 Appendix A table.

19 BY MR. JACOBSON:

20 Q. And just to orient you, Dr. Chen, can
21 you remind us, if a PVI in this table is more
22 negative, does that mean it's more
23 Democratic-leaning?

24 A. More Democratic-leaning district, yes,
25 sir. A negative PVI means it's more

1 Democratic-leaning PVI.

2 Q. And what do you -- what's on the far
3 right of the column?

4 A. On the far right of the column is
5 Dr. McCarty's own predictions about the probability
6 of a Democratic victory in the district that has such
7 a PVI as what we see in the left column.

8 Q. And do you notice anything anomalous
9 about comparing the Democratic probabilities in these
10 two rows, where you're going from a zero PVI to a
11 negative 1 PVI, which, in theory, should make it more
12 Democratic-leaning?

13 A. Well, let's take these two rows one at
14 a time. What these two rows are telling us is that
15 if we have a zero PVI, then the Democrats have a
16 51.9 percent probability of winning the district.
17 That's what the top row tells us.

18 Now, what does the second row tell us?
19 It tells us if -- that if we have a
20 Democratic-leaning PVI of negative 1, that is, a
21 district that is slightly more Democratic than
22 Republican, then the Democrats actually have a lower
23 probability of victory, a lower probability of
24 45.5 percent.

25 In other words, an increase in the

1 Democratic presidential vote in a given district, in
2 a hypothetical district, would, under Dr. McCarty's
3 calculations, lead to a decrease in the probability
4 of a Democratic candidate winning that Congressional
5 district.

6 Q. So -- so Dr. McCarty would estimate
7 that a Democrat in a district that's minus one in
8 favor of Democrats has a better probability of
9 winning his or her election than a Democrat in a zero
10 PVI district that's less Democratic-leaning? If I
11 said it backwards, tell me to rephrase the question.

12 A. I think you got it backwards. So let
13 me --

14 Q. All right. Let me try that again.

15 Under Dr. McCarty's approach, a
16 Democrat in a minus one district has a worse
17 probability of winning -- a lower probability of
18 winning than a Democrat in a zero PVI district,
19 which, according to Dr. McCarty, is less
20 Democratic-leaning?

21 A. That's exactly what Dr. McCarty is
22 telling us here in his expert report.

23 Q. Do you notice the same anomaly
24 elsewhere in this chart? And you don't have to tell
25 me now.

1 Did you find similar anomalies
2 elsewhere in this chart?

3 A. I looked up and down the chart, and,
4 yes, I saw multiple places where the same thing
5 happens.

6 MR. JACOBSON: If we could move to
7 the part of the chart that's minus 4 --
8 minus 4 and minus 5.

9 BY MR. JACOBSON:

10 Q. Do we see a similar anomaly here,
11 Dr. Chen?

12 No -- did I get it wrong? Is it minus
13 5 and minus 6?

14 THE COURT: We're all saying yes.

15 MR. JACOBSON: There we go.

16 BY MR. JACOBSON:

17 Q. Thank you for not causing you to
18 perjure yourself by saying you found the same anomaly
19 there.

20 Dr. Chen, did you find the same anomaly
21 for these two rows? And by "these two rows," I mean
22 minus 5 and minus 6?

23 A. Yes, sir. Right here, Dr. McCarty is
24 considering two hypothetical districts: one with a
25 Democratic PVI of 5, and one with a Democratic PVI

1 of 6.

2 What Dr. McCarty is telling us is that
3 that more heavily Democratic PVI district, the one
4 with a PVI of 6, actually gives a Democratic
5 candidate a lower probability of winning a
6 Congressional election.

7 Q. And one final one -- and hopefully I
8 get this right and -- the page cuts off -- but the
9 difference between a Republican PVI of plus 6 and a
10 Republican PVI of plus 5.

11 MR. JACOBSON: So that's 6, bottom
12 of this page. And then the top of the next
13 page would be 5.

14 BY MR. JACOBSON:

15 Q. Do you find the same anomaly here,
16 Dr. Chen?

17 A. Yes, we see the exact same thing. What
18 Dr. McCarty is telling us here is that the more
19 Republican-favorable PVI district, the one with the
20 Republican PVI of 6, that one, to Dr. McCarty,
21 actually gives the Democrats a greater chance of
22 victory in a Congressional election.

23 Q. And -- and this anomaly -- or I should
24 say the first of these three anomalies, does this
25 actually come into play in Pennsylvania in

1 Dr. McCarty's analysis?

2 A. Yes, sir, it is directly relevant for
3 his analysis of Congressional District 7 and 8 in
4 Pennsylvania.

5 MR. JACOBSON: And if we can pull up
6 again -- I believe it was Table 1 of
7 Dr. McCarty's report.

8 And if we look again at the right
9 side.

10 BY MR. JACOBSON:

11 Q. Districts 7 and 8 -- what are the
12 respective PVIs that Dr. McCarty calculates in
13 Districts 7 and 8?

14 A. District 7, according to Dr. McCarty,
15 has a zero PVI; it's even. District 8, according to
16 Dr. McCarty, has a slightly Democratic-leaning PVI.
17 Negative 1 means that it's slightly
18 Democratic-leaning.

19 Q. So this means that Dr. McCarty
20 estimates that in Pennsylvania, the Democrat -- the
21 Democratic candidate in District 8, which Dr. McCarty
22 says is more Democratic-leaning than District 7, has
23 a worse chance of winning?

24 A. That is what the column on the right
25 tells us. Dr. McCarty is telling us that the more

1 heavily Democratic of these two districts, the one
2 with the better Democratic PVI, District 8,
3 actually has a lower chance of Democratic victory in
4 the Congressional election, according to his model
5 and according to that appendix that we just look at a
6 minute ago and according to -- with his numbers here
7 on Table 1.

8 Q. Dr. Chen, what do these three anomalies
9 that we just identified tell you about the
10 reliability of Dr. McCarty's methodology?

11 A. Well, what they're telling us is that
12 Dr. McCarty is perceiving districts that are more
13 Democratic-leaning as having, in some cases, a lower
14 probability of Democratic victory in Congressional
15 elections. That tells us it's not a reliable model.

16 You don't need a Ph.D. in political
17 science to tell you that a district that has more
18 Democratic voters is more likely to elect a
19 Democratic candidate to Congress.

20 Q. And is that anomaly caused by looking
21 at just sort of the collection of elections from
22 around the country -- Congressional elections from
23 around the country that just happen to have a
24 particular PVI and whether the Democrat won in those
25 scattered elections from around the country?

1 A. That's exactly what the problem is.
2 The problem is with trying to predict the partisan
3 outcomes of elections in Pennsylvania by looking at a
4 scattered, small number of elections in states like
5 New Mexico and Alaska.

6 Q. Thank you. It's now -- we've just been
7 discussing how Dr. McCarty calculates the
8 partisanship of the enacted plan, his estimates of
9 how Democratic-leaning the enacted plan is.

10 I'd like to turn now to how Dr. McCarty
11 calculates the expected partisanship of your
12 simulated districts. Mr. Gersch touched on this
13 earlier.

14 Does Dr. McCarty calculate PVI directly
15 for each of your simulated districts?

16 A. No, sir, he does not.

17 Q. What does he do instead?

18 A. He, instead, conducts a regression
19 model in which he predicts --

20 MR. TUCKER: Your Honor, I'm going
21 to object. I don't think this is rebuttal
22 testimony anymore. This is testimony that
23 Dr. Chen has already given in this case.

24 THE COURT: If I remember
25 Dr. Chen's testimony on direct, you

1 prebuttaled some stuff.

2 So I'm going to overrule the
3 objection, but what I'm going to ask you to
4 do is try to limit your rebuttal case today
5 to stuff you haven't already prebuttaled.

6 MR. JACOBSON: I think I can do
7 that, Your Honor, yes --

8 THE COURT: Okay. Thank you.

9 MR. JACOBSON: -- that was the plan.

10 If I could just have him complete
11 that answer, then I promise I will do that.

12 THE COURT: I will give you this
13 freebie.

14 MR. JACOBSON: Thank you.

15 BY MR. JACOBSON:

16 Q. Dr. Chen, how does Dr. McCarty
17 calculate -- estimate PVI in your simulated
18 districts?

19 A. He conducts a regression model in which
20 he estimates what the PVI would have been in his
21 opinion using Republican vote share in 2008 and 2010
22 statewide elections.

23 Q. And, Dr. Chen, Dr. McCarty said in his
24 testimony earlier today that the reason he doesn't
25 calculate PVI directly but, instead, does this

1 alternative regression approach is because, quote,
2 The data released by -- by you, Dr. Chen, did not
3 provide sufficient information to allow Dr. McCarty
4 to calculate the PVI in the simulated districts under
5 the tight timeline that he was provided.

6 Will you accept that representation
7 that that was Dr. McCarty's testimony?

8 A. Yes, sir.

9 Q. Dr. Chen, did you calculate the PVI for
10 the simulated districts directly using Dr. McCarty's
11 2004 and 2008 presidential elections -- or I should
12 say the rolling two presidential elections that he
13 uses for each of your simulated districts?

14 A. Yes, sir, I did.

15 Q. How long did it take you to do that?

16 A. It took me about 10 minutes.

17 Q. Dr. Chen, how long would it take just
18 an average person of -- of reasonable --

19 THE COURT: Watch it. It might
20 take me a long time.

21 BY MR. JACOBSON:

22 Q. How long would it take the average
23 political scientist with extensive quantitative
24 experience and ability to calculate PVI directly in
25 your simulated districts with the data that you

1 turned over, the shapefiles that you turned over?

2 A. I turned over the maps, and that's why
3 I turned over the maps, so that other experts
4 could -- could look at them in exactly the way that
5 Dr. McCarty states that he wanted to do.

6 How long would it take? I would
7 imagine it would take the average political scientist
8 maybe 30 minutes or an hour.

9 MR. JACOBSON: If we could pull up
10 Petitioners' Exhibit 162.

11 MR. TUCKER: Objection, Your Honor.
12 Again, this is -- as Your Honor words --
13 "prebuttal."

14 MR. JACOBSON: I will not retread
15 prior territory, I promise, Your Honor.

16 THE COURT: Why don't we let him
17 ask the question first, Counsel, before we
18 lodge the objection?

19 MR. JACOBSON: Actually, I have a
20 better idea.

21 If we could pull up Petitioners'
22 Exhibit 276, which is the same Microsoft
23 Excel file that Mr. Gersch showed
24 Dr. McCarty during his cross-examination
25 earlier today.

1 THE COURT: I don't think I have
2 that marked, but I'll now say that that's
3 276.

4 MR. JACOBSON: Sure. Sorry about
5 that, Your Honor.

6 THE COURT: I may have. I just --
7 there were several 2 -- there were several
8 2-somethings that were marked. I just --
9 I've now marked a 276, and this will be it.

10 MR. JACOBSON: Thank you,
11 Your Honor.

12 BY MR. JACOBSON:

13 Q. Well, Dr. Chen, did you create the tabs
14 in this -- in these -- these 10 tabs in this Excel
15 file?

16 A. Yes, sir, I did.

17 Q. And what does each one of these 10 tabs
18 represent?

19 A. It represents the first 10 of the
20 simulated plans among the 500 simulated plans in
21 Simulation Set Number 2.

22 Q. And without belaboring it,
23 Mr. Gersch -- I'll represent to you -- and you know
24 because you created it -- that Mr. Gersch showed that
25 in each of these 10 simulations, Dr. McCarty's

1 alternative regression methodology of estimating PVI
2 made your simulated districts look more Republican
3 than they would have if he had just calculated PVI
4 directly.

5 Is that -- will you accept that
6 representation?

7 A. Yes, sir.

8 Q. And on redirect, I believe Dr. McCarty
9 was asked, and answered, could it be -- you know,
10 these were only 10 of the thousand simulations, so it
11 could be an anomaly.

12 Did you analyze whether this -- the
13 data and whether this same phenomenon existed across
14 your thousand simulations?

15 MR. TUCKER: Objection, Your Honor.

16 THE COURT: The basis?

17 MR. TUCKER: He hasn't provided any
18 of that analysis or -- or anything related
19 to analyzing all of these thousand
20 simulations. We have seen thus far, and
21 been unable to verify because it wasn't
22 produced to us in advance, 10 out of his
23 thousand simulations.

24 THE COURT: Response?

25 MR. JACOBSON: He's rebutting

1 testimony from just an hour or so ago.
2 There was no way we could have anticipated
3 that particular answer.

4 THE COURT: Well, did you produce
5 this exhibit in discovery -- in -- disclose
6 this exhibit to Petitioners?

7 MR. JACOBSON: So if I could,
8 Your Honor, I'm not asking Dr. Chen now to
9 comment specifically on this exhibit. I'm
10 just asking him to -- what he did --

11 THE COURT: That wasn't my question
12 --

13 MR. JACOBSON: Sure.

14 THE COURT: -- did you disclose this
15 particular exhibit that has now been marked
16 as 276 to the Respondents as -- in your
17 pretrial disclosures?

18 MR. JACOBSON: If I may, Your Honor,
19 I think this is the confusion before. We
20 did not, and we're not moving to admit this
21 exhibit into evidence --

22 THE COURT: I have -- I have no
23 confusion. Just answer my question.

24 MR. JACOBSON: No, we did not,
25 Your Honor.

1 THE COURT: Okay. So you developed
2 this exhibit in response to the McCarty
3 report?

4 MR. JACOBSON: That's correct,
5 Your Honor.

6 THE COURT: Okay. You can
7 cross-examine him. It seems, to me, to be a
8 fair rebuttal in the light of the challenge
9 that was made today by your expert.

10 So overruled.

11 BY MR. JACOBSON:

12 Q. Dr. Chen, did you analyze whether this
13 same bias in making your simulations look more
14 Republican than they would have been had Dr. McCarty
15 just directly calculated PVI -- did you analyze
16 whether that same bias existed across all thousand of
17 your simulations?

18 A. Yes, sir. I analyzed that with respect
19 to every single one of the 1,000 simulations, the 500
20 in Set 1 and 500 in Set 2, and I found the same thing
21 in all thousand of them, the same Republican bias.

22 And what is in this Excel file in front
23 of us is just the first 10 of the simulated plans in
24 Set 2.

25 Q. And, Dr. Chen, could this, what I'll

1 call "systematic bias" -- could this explain why
2 Dr. McCarty finds that your nonpartisan simulations
3 somehow are more Republican-favorable than an enacted
4 plan that was drawn by a Republican-controlled
5 legislature and signed into law by a Republican
6 governor?

7 A. Yes, sir. It very clearly explains why
8 Dr. McCarty came to the conclusion that he perceived
9 the 1,000 simulated plans in my report to all be more
10 Republican-favorable than the enacted Act 131
11 Congressional Plan in Pennsylvania.

12 MR. JACOBSON: If we can go back to
13 Petitioners' Exhibit 162.

14 BY MR. JACOBSON:

15 Q. I believe several times earlier today,
16 Dr. McCarty said that he -- and I'm paraphrasing --
17 that there was nothing to worry about with this
18 because there was a high R-squared.

19 Will you accept my representation that
20 Dr. McCarty said that?

21 A. Yes, sir.

22 Q. And by "a high R-squared," you said
23 there was a high correlation -- I withdraw that.

24 Does the fact that his regression
25 produced a high R-squared alleviate your concerns or

1 the bias produced from this map?

2 A. No, sir. That is a completely separate
3 matter. A high R-squared just means that these two
4 columns are correlated. It means that when one goes
5 up, the other goes up; when one goes down, the other
6 goes down.

7 That tells nothing about the systematic
8 directional bias of Dr. McCarty's estimated PVI
9 relative to the actual PVI if he had used the correct
10 presidential vote data.

11 Q. And sorry. When you -- to back up --
12 and that was my fault for asking a bad question --
13 which -- when you say "these two columns," which two
14 columns on the chart are you referring to?

15 A. I'm referring to this fourth column
16 here that's called Correct PVI using 2004 and 2008
17 presidential elections. Those are the PVIs that one
18 would reach -- one would measure if one had
19 actually used the correct presidential elections data
20 that Dr. McCarty wanted to use and says he could not
21 do.

22 Now, the next column over on the right
23 is labeled McCarty estimated PVI. That is
24 Dr. McCarty's actual estimate because he states that
25 he didn't have access to the data.

1 So we can see the directional bias
2 here. And I won't repeat it because I've already
3 described it to the Court on Tuesday morning. But,
4 again, what I just explained is that the high
5 R-squared simply speaks to the correlation, meaning
6 when one column goes up, the other column goes up;
7 when one column goes down, the other column goes
8 down.

9 And you can see that, for example, in
10 the fact that Row Number 1, Simulated District
11 Number 2, has a negative 40 and a negative 36. So
12 those are clearly correlated. That's what that high
13 R-squared means. But that high R-squared tells us
14 nothing about the directional bias.

15 Q. And when you say "when one goes up, one
16 goes down," you mean when the fourth column, you
17 know, is more Democratic, the fifth column also tends
18 to be -- go in the same direction, is also more
19 Democratic?

20 A. Yes, sir, that's what correlation is
21 telling us.

22 Q. And the vice versa, if it -- if one
23 column is more Republican, it's very likely that the
24 other column is going to also move in the same
25 direction?

1 A. Yes, sir. That's what's meant by the
2 correlation, or the high R-squared.

3 Q. But does that correlation -- given that
4 correlation, is there still a gap between the two
5 columns?

6 A. There is a very clear gap -- as I said,
7 there's a very clear gap. And the directional bias
8 of that gap is consistent and very clear from not
9 just this figure in front of us here, this exhibit,
10 162, but all of those tabs that we just saw in that
11 Excel file.

12 The directional bias is very clear. It
13 caused Dr. McCarty to perceive the PVI of the
14 simulated districting plans, up and down the plan, as
15 being more Republican-leaning than if he had used the
16 correct data that he wanted to use.

17 MR. JACOBSON: Thank you.

18 We pass the witness. No more
19 questions.

20 THE COURT: Thank you.

21 Cross-examination.

22 MR. LEWIS: Your Honor, can we take
23 a short recess before we do that? We have
24 very few questions, and this is our last
25 witness. And it shouldn't take long.

1 THE COURT: Ten-minute recess.

2 THE CLERK: The Court is now in
3 recess.

4 - - -

5 (Whereupon, a recess was taken from
6 5:30 p.m. to 5:41 p.m.)

7 - - -

8 THE CLERK: All rise. The
9 Commonwealth Court is back in session.

10 THE COURT: Please be seated,
11 everyone.

12 Cross-examination.

13 - - -

14 REBUTTAL CROSS-EXAMINATION

15 - - -

16 BY MR. LEWIS:

17 Q. Good afternoon, Dr. Chen.

18 A. Good afternoon, sir.

19 Q. You testified -- if my laptop will
20 cooperate, and it does.

21 Sir, you were discussing your Figure 10
22 from -- from your report.

23 Dr. Chen, as you sit here today, how
24 many of the 54 simulations in Simulation Set 2 do you
25 believe contain at least one district that satisfies

1 the Voting Rights Act?

2 A. Sir, that is a legal question that is
3 beyond my expertise as an empirical political
4 scientist.

5 Q. Okay. I'm going to show you next
6 Petitioners' Exhibit 23, which is the -- your
7 Figure 11, Base 2.

8 I suspect I already know what the
9 answer is going to be, but, sir, do you know how many
10 of the 300 simulated plans here would satisfy the
11 Voting Rights Act?

12 A. Sir, that is a legal question beyond my
13 expertise as an empirical political scientist.

14 Q. Okay. And so you don't know if merely
15 having a 50 percent black voting-age population in a
16 district is sufficient to satisfy the Voting Rights
17 Act?

18 A. As I've said, sir, it is beyond my
19 expertise to tell you what the Voting Rights Act
20 requires or allows.

21 Q. Okay. And is it fair to say, Dr. Chen,
22 that your model -- your simulation model makes no
23 effort to confirm whether the maps it produces would
24 satisfy the Voting Rights Act?

25 A. My computer is not a lawyer. So, no,

1 my computer is not going to tell you whether or not a
2 map satisfies the Voting Rights Act.

3 Q. Okay. Dr. Chen, you also testified
4 concerning the code that you published in connection
5 with your 2016 article that I believe you testified
6 about in this case.

7 Do you recall that testimony?

8 A. Yes, sir.

9 Q. Okay. So I'm going to show you what's
10 been marked as Petitioners' Exhibit 26.

11 Is this a printout of your -- this is a
12 printout of your Web site regarding the 2016 article;
13 is that correct?

14 A. Yes, sir, it looks like it.

15 Q. Do you recall when you put this Web
16 page up on your Web site?

17 A. It would have been sometime after I
18 actually published the article. The article was
19 published, I believe, late 2016, so it probably took
20 me until the beginning of this year, beginning of
21 2017, sometime in the early part of 2017.

22 Q. And have you ever submitted your code
23 or -- or your model to any statistics, computer
24 science or operations research journals for
25 validation?

1 A. Well, sir, I'm a political scientist.
2 That means I publish in political science and law
3 journals.

4 Q. So is the answer to my question no?

5 A. That's correct. I publish in political
6 science and law journals, not in statistics,
7 operations research -- and I can't remember what else
8 you listed.

9 Q. Okay. Sir, do you have formal training
10 in the field of computer science?

11 A. I don't have any degrees in computer
12 science, if that's what you're asking.

13 Q. Okay.

14 Okay. I'd like to turn now to your
15 discussion of Dr. McCarty's report.

16 You were critical of Dr. McCarty for
17 attempting to use national Congressional election
18 outcomes to measure the partisan -- or to measure the
19 performance of Congressional districts under a
20 state's redistricting plan.

21 Do you recall raising that criticism?

22 A. To be more precise, what I criticized
23 was the translation of PVI into an estimated
24 probability of Democratic victory using state
25 elections from outside of Pennsylvania.

1 Q. Okay. And did you use -- so you
2 believe -- so do you believe that
3 it's -- it's -- it's appropriate to use national
4 Congressional election outcomes to measure the
5 performance of -- of districting -- of Congressional
6 districts under a state's districting plan?

7 A. Hold on. There was a blizzard of words
8 there. If I could just ask you to repeat that --

9 Q. Sure.

10 A. -- you said national Congressional
11 elections. I'm not sure what you mean by that.

12 Q. Right. So if you're looking -- so the
13 question is, Can you -- so do you believe that it's
14 appropriate to use national Congressional election
15 outcomes -- data for national election outcomes to
16 measure the performance of specific Congressional
17 districts under one state's districting plan? So,
18 for example, for Pennsylvania.

19 A. Okay. So you said national
20 Congressional election results.

21 You were talking about the partisan
22 results of a -- of a Congressional election -- of
23 the -- of the legislative election itself, right?

24 Q. Correct. Yes.

25 A. And you're asking me whether or not it

1 would be appropriate to use those elections to do
2 what?

3 Q. To measure the performance of a
4 Congressional district under a state's districting
5 plan; so, in other words, something similar to what
6 Dr. McCarty was attempting to do here.

7 A. Except using the actual Congressional
8 election results, not Dr. McCarty's PVI? Is that
9 what you're asking?

10 Q. Well, Dr. McCarty uses --

11 A. I just want to -- sorry. I apologize.

12 Q. -- Dr. McCarty uses PVI from the
13 district within Pennsylvania, right? He's using PVI
14 from Pennsylvania only, correct?

15 A. He's calculating district-level PVIs
16 when he evaluates the enacted plan --

17 Q. Okay.

18 A. -- he's not looking at all of
19 Pennsylvania; Dr. McCarty is just looking at the
20 specific districts.

21 Q. Right. And he's comparing that to
22 national -- to data from national Congressional
23 elections, right? He's looking across the country,
24 right?

25 A. He is comparing it to -- to other

1 districts around the country that have similar PVIs
2 in his -- under his estimation.

3 Q. Okay. And so what about the PVI in
4 Pennsylvania, in your view, makes it unreliable to
5 use as a comparator against -- or a comparison
6 against those national Congressional outcomes?

7 A. Well, as I testified on Tuesday, there
8 were two things: one is that Dr. McCarty's particular
9 version of the PVI uses older elections,
10 intentionally goes back and skips over statewide
11 elections that are more recent and still available as
12 of the 2011 redistricting. So that was one thing I
13 touched on on Tuesday.

14 The second thing that I explained to
15 the Court on Tuesday is the specific translation of
16 PVI into a Democratic victory probability that
17 Dr. McCarty uses in his report.

18 So those were the two things that I
19 talked about.

20 Q. Okay. And PVI just looks at
21 presidential elections, right?

22 A. Dr. McCarty's version of PVI just looks
23 at presidential.

24 Q. Okay. So what you don't like -- and
25 you know more political science than I do -- so what

1 I'm hearing you don't like is the comparison -- is
2 the use of that presidential data, on one hand, from
3 Pennsylvania -- for -- you know, from presidential
4 elections in Pennsylvania to compare against national
5 Congressional data, correct?

6 A. Just to be clear, I don't like it or
7 don't like it [verbatim]. I'm just describing its
8 characteristics and what it does here in
9 Dr. McCarty's report.

10 And as I explained, the strange feature
11 here is that Dr. McCarty is using Congressional
12 elections from states like Arizona and New Mexico and
13 Alaska to try and tell us something about how
14 election outcomes would emerge in the State of
15 Pennsylvania. And so it's just important to
16 understand that quality about it.

17 Q. I see.

18 And that was the claim, if I recall,
19 where you stated there were no peer-reviewed articles
20 that would support the use of such a methodology,
21 correct?

22 A. What I said earlier today was that
23 there are no peer-reviewed articles that use this
24 particular translation of PVI into Democratic win
25 probability.

1 Q. Okay. Are there any articles
2 that -- that use presidential election data to
3 compare against Congressional outcomes in the matter
4 that we've been talking about?

5 A. Oh, absolutely. That's a very common
6 technique.

7 Q. Okay. So do you believe that you
8 cannot use national Congressional elections to
9 predict the likely election outcomes in Pennsylvania
10 Congressional districts?

11 A. You can do it; you're just going to get
12 wrong answers very often.

13 Q. Sir, you recall your -- your article in
14 2016 in Electoral Studies you wrote with
15 Dr. Cottrell, do you not?

16 A. Yes, sir.

17 Q. That's Legislative Respondents'
18 Exhibit 39.

19 All right.

20 Okay. So, sir, I'd like to draw your
21 attention to Page 333. I'm just going to read the
22 paragraph I've marked for you.

23 From this distribution of presidential
24 votes across districts, we can make inferences about
25 the resulting partisanship of Florida's Congressional

1 districts. Yet, we can be more precise about how
2 presidential votes translate into Congressional
3 outcomes by using Congressional election data to
4 inform our predictions.

5 You go on, We do this by performing a
6 simple logit transformation, where a binary indicator
7 for whether a Congressional seat was won by a
8 Republican is regressed on McCain's share of the
9 two-party vote for that district. We estimate the
10 model by matching the Congressional -- or, excuse
11 me -- the electoral outcomes from the 2006, 2008,
12 2010 and 2012 Congressional elections across each
13 district in every state to the McCain share of the
14 two-party vote contained in the District. As a
15 result, the *i*th District's McCain vote share is
16 transformed into the likelihood that a Republican
17 wins the Congressional election in that district
18 using the following estimated model.

19 And then you provide a model.

20 Do you see where that's written?

21 A. Yes, absolutely.

22 Q. Okay. So you would agree with me,
23 then, that what you did was you used national
24 Congressional outcomes and you compared them --
25 McCain, of course, is a presidential candidate in

1 2008, right?

2 A. Yes, sir.

3 Q. Okay. So you -- your own research, you
4 compared national Congressional election results in
5 every state to the McCain share of the two-party vote
6 contained within a specific district -- and I believe
7 this particular state was Florida -- correct?

8 A. Yes, sir, I did. I did so using a
9 probit model, a predictive model here, and that is
10 what makes it so important here to distinguish
11 between what I did there and what Dr. McCarty did in
12 his report. Because the salient feature of that
13 model that you just had up on the screen is that it
14 avoids the fundamental flaw that I just spent quite a
15 bit of time earlier today describing in response to
16 Mr. Jacobson's question about Dr. McCarty's
17 translation method.

18 Q. Okay. Sir, you also -- turning to your
19 discussion of the R-squareds that appear in
20 references from Dr. McCarty's report, R-squared deals
21 with magnitude and not just direction, right?

22 A. You're asking me about Dr. McCarty's
23 testimony about his R-squared measure; is that right?

24 Q. Yes, that's right.

25 A. Okay. As I understood Dr. McCarty's

1 testimony, he was talking about R-squared in the
2 sense of the correlation of those two columns that
3 you saw up on the screen about 15 minutes ago.

4 Q. Okay. Let's put them up.

5 We're referring to Table 1 from
6 McCarty's report, correct?

7 Okay. So this is -- this is the -- the
8 chart we were referring to, correct?

9 A. I can't really see the numbers, but I
10 can sort of recognize what you're trying to put
11 there.

12 Q. All right. PVI Democratic Win
13 Probabilities by Congressional District from 2004
14 Compared to 2011, correct?

15 A. Yes, sir. I see that.

16 Q. Okay. Now, an R-squared of .9982
17 means that the two variables are moving in almost
18 perfect lockstep, correct?

19 A. I'm not sure where you got the number
20 .9982. Maybe you can point it to me in the report.

21 Q. Page 11, Note 13.

22 A. Could I ask to have that exhibit in
23 front of me here?

24 Q. Sure. Let me --

25 THE COURT: What's the exhibit

1 number?

2 MR. TUCKER: Exhibit 17, Your Honor.

3 THE COURT: Petitioners' Exhibit
4 17?

5 MR. TUCKER: No;
6 Legislative Respondents' Exhibit 17.

7 MR. LEWIS: Yeah,
8 Legislative Respondents'.

9 THE COURT: Dr. Chen, if you pull
10 the white binder -- I don't know if it's
11 still there.

12 Right up here. There's a white
13 binder. Tab 17.

14 Give him a page number again,
15 please.

16 MR. LEWIS: Absolutely.

17 BY MR. LEWIS:

18 Q. Dr. Chen, I'm referring to Page 11 of
19 Dr. McCarty's report. And you can find the R-squared
20 value appearing in Footnote 13 at the bottom of the
21 page.

22 (Whereupon, the witness reviews the
23 material provided.)

24 THE WITNESS: Yes, I see that.

25

1 BY MR. LEWIS:

2 Q. So the R-squared from that .998 [sic]
3 R-squared would indicate that the -- that the -- the
4 two variables you're looking at are moving in almost
5 perfect lockstep, right?

6 A. To be very precise, it tells us about
7 correlation, not about bias.

8 Q. It's telling you that as one moves --
9 as one -- as the one variable they compare moves, the
10 other is moving in almost perfect lockstep, right?
11 It's not telling you one causes the other,
12 necessarily, but it's telling you that they're moving
13 together in almost perfect lockstep?

14 A. I'll help you out. When one moves up,
15 the other also moves up; when one moves down, the
16 other moves down. That's what correlation tells us.

17 Q. But it's also telling us something
18 about magnitude and not just direction, doesn't it?
19 It's telling you when it's moving up, if that
20 R-squared is really high, they're moving together
21 almost in lockstep, right?

22 A. You confused two different ideas there,
23 sir. So let me help sort those out for you.

24 Magnitude is not the same thing as
25 correlation. Correlation, once again, tells you if

1 one moves up, the other moves up. Magnitude is
2 telling you something about the actual size. That
3 is -- gets to the issue of bias.

4 THE COURT: Let me see if I can
5 help out, because I need to understand this.

6 I think the question was, Does the
7 R -- does the R-squared tell you both
8 correlation and magnitude, or just
9 correlation?

10 THE WITNESS: Your Honor, the answer
11 is it only tells us about correlation. It
12 does not tell us about the magnitude here.

13 THE COURT: Okay. Thank you.

14 BY MR. LEWIS:

15 Q. Isn't the purpose of R-squared, as a
16 statistical measure -- so you run a regression, so
17 you have your plot, right? And then the regression
18 line -- when you're running a regression, it's -- now
19 you're taking me way back to my college days --

20 A. I'll help you out --

21 Q. -- the regression line -- what's the
22 regression line doing?

23 A. The regression line takes an
24 independent variable, and it produces predicted
25 values. Now, what that R-squared is telling us, what

1 that correlation is telling us is what is the
2 correlation between the predicted values and what we
3 started with, the independent variable.

4 So it tells us about the correlation.
5 It does not tell us about the magnitude, and it does
6 not tell us about the bias of those estimated values
7 that you just produced with that regression model.

8 Q. Now, earlier, you were talking about --
9 you were describing some of that bias, and we -- and
10 you looked at -- well, two exhibits: one I have, the
11 other I don't.

12 Okay. So this is an example -- this is
13 Petitioners' 162. And you calculate -- the column on
14 the right for this particular simulation example to
15 indicate that you found what you're contending is a
16 skew between Dr. McCarty's estimate and the -- what
17 you're calling the correct PVI, correct?

18 A. If I could just ask you to be specific.
19 You said the column on the right.

20 Q. I'm sorry. So the Added Republican
21 PVI, that column on the far right.

22 A. Okay. You're talking about the column
23 that's labeled Added Republican PVI Caused By
24 McCarthy Shortcut?

25 Q. That's right.

1 A. And you were asking me what that is?

2 Q. Well, I'm just asking you to confirm
3 that that's what we're talking about, right -- that's
4 what you're saying is the bias or the skew, right?

5 A. Well, that is simply the error that
6 Dr. McCarty created for himself by not actually using
7 the presidential election results that he wanted to
8 use.

9 Q. And this was just from a single -- a
10 single set, right? A single one -- a single
11 simulation from, it looks like, Set 1, Plan 3, right?

12 A. Yes, sir. What we're looking at here
13 are the 18 districts in one single simulated plan.

14 Q. Okay. And to move this along,
15 Petitioners' Exhibit 276, which was that Excel
16 spreadsheet that you created with the 10 tabs -- and
17 you did, apparently, 10 more analyses just like this
18 one, right?

19 A. What I specifically did was I showed
20 the first 10 simulated plans in Simulation -- I
21 believe it was Simulation Set Number 2.

22 Q. Okay.

23 A. I could be misremembering if it was
24 Set 1 or Set 2.

25 Q. Okay. But you've not provided --

1 you've not provided a similar analysis for all 1,000
2 simulations in this case, have you?

3 A. I did those calculations. They were
4 not exhibits here.

5 MR. LEWIS: Your Honor, we have
6 nothing further for this witness.

7 THE COURT: Anyone else to
8 cross-examine Dr. Chen?

9 Redirect?

10 MR. JACOBSON: Nothing further,
11 Your Honor.

12 THE COURT: Dr. Chen, thank you for
13 coming back.

14 Did you go home and come back?

15 THE WITNESS: Yes, sir.

16 THE COURT: Okay. It's lovely
17 weather in Harrisburg this time of year.

18 So safe travels, and thank you for
19 your testimony.

20 THE WITNESS: Thank you, Your Honor.

21 (The witness was excused.)

22 THE COURT: Do the Petitioners have
23 any other evidence or rebuttal?

24 MR. GERSCH: No, Your Honor.

25 THE COURT: Any final evidentiary

1 matters that we have to take care of before
2 we close the record?

3 MR. GERSCH: No, Your Honor.

4 THE COURT: Legislative
5 Respondents?

6 MR. TUCKER: No, Your Honor.

7 THE COURT: Governor and other
8 Executive Branch, minus Lieutenant Governor?

9 MS. HANGLEY: No, Your Honor.

10 THE COURT: Lieutenant Governor?

11 MR. LEVINE: No, Your Honor.

12 THE COURT: Intervenors?

13 MR. TABAS: No, Your Honor.

14 THE COURT: General Assembly?

15 MR. MYERS: No, Your Honor.

16 THE COURT: Okay. The record in
17 this trial is now closed.

18 On behalf of the Commonwealth Court
19 and myself, I certainly want to thank
20 counsel for the extraordinary effort on all
21 sides to get this rather extensive record
22 completed in a week. I know it was not -- I
23 know personally it was not without great
24 efforts on your part.

25 And there was a lot of

1 professionalism in this room and there was a
2 lot of professionalism outside of this room
3 that allowed to us complete this trial. Now
4 I just want to thank you and commend you all
5 for that.

6 And with that, we will -- we will
7 adjourn.

8 THE CLERK: Commonwealth Court is
9 now adjourned.

10 THE COURT: Before we adjourn, I do
11 want to talk about posttrial briefing
12 schedule.

13 Given the exigencies associated with
14 the matter, I think I indicated during the
15 pretrial conference that we would be doing
16 simultaneous posttrial filings.

17 So there will be simultaneous
18 posttrial filings by all parties. I would
19 like those posttrial filings to be filed by
20 PACFile by 9:00 on Monday morning, proposed
21 findings of fact, proposed conclusions of
22 law.

23 Proposed findings of fact shall cite
24 specific record references or stipulations,
25 however you want to do it. But if I see a

1 proposed finding of fact that does not have
2 a record reference, that's going to be a
3 ding.

4 Proposed conclusions of law should
5 also have citation to authority.

6 To the extent you want to include
7 any analysis in a separate section, a
8 separate discussion section, if you will,
9 you are free to do that. If you don't want
10 to do that, you are free not to do that as
11 well. I will leave that up to you.

12 I am not going to limit the parties
13 in terms of the size of their posttrial
14 filing. I ask that you not attach
15 appendices because we have the record, but
16 I'm not going to limit you on size.

17 Just keep in my mind -- although I
18 am not certain about this -- I think you can
19 expect to probably have yet another briefing
20 opportunity in the Supreme Court. But I
21 just want to remind you of that. I can't
22 guarantee it, but I think you know what I'm
23 saying.

24 So simultaneous briefs -- if you
25 could also adhere to our Court's conventions

1 with regard to the format of those things,
2 particularly the font size because, as you
3 can see, I struggle a little bit. So if you
4 can keep it to -- to those conventions, the
5 Court would greatly appreciate it.

6 Any other types of those matters
7 before we adjourn?

8 MS. THEODORE: Your Honor, just
9 to -- just to make sure we understand, the
10 proposed findings of fact and proposed
11 conclusions of law -- conclusions of law
12 will be in numbered paragraphs, and then the
13 sort of optional analysis would not be? Is
14 that -- is that --

15 THE COURT: That's typically how
16 it's done.

17 MS. THEODORE: Thank you.

18 THE COURT: Anything else?

19 Now, we will adjourn.

20 THE CLERK: The Commonwealth Court
21 is now adjourned.

22

23 - - -

24 (Whereupon, the trial concluded at
25 6:14 p.m.)

CERTIFICATE

1724

COMMONWEALTH OF PENNSYLVANIA:

I, Cindy L. Sebo, a court reporter within and for the Jurisdiction aforesaid, do hereby certify that the foregoing proceeding were pursuant to notice, at the time and place indicated; that the testimony of said was correctly recorded in machine shorthand by me and thereafter transcribed under my supervision with computer-aided transcription; that the proceedings are true record of the testimony given; and that I am neither of counsel nor kin to any party in said action, nor interested in the outcome thereof.



Cindy L. Sebo, RMR, CRR, RPR, CSR,
CCR, CLR, RSA, LiveDeposition
Authorized Reporter, and Notary Public