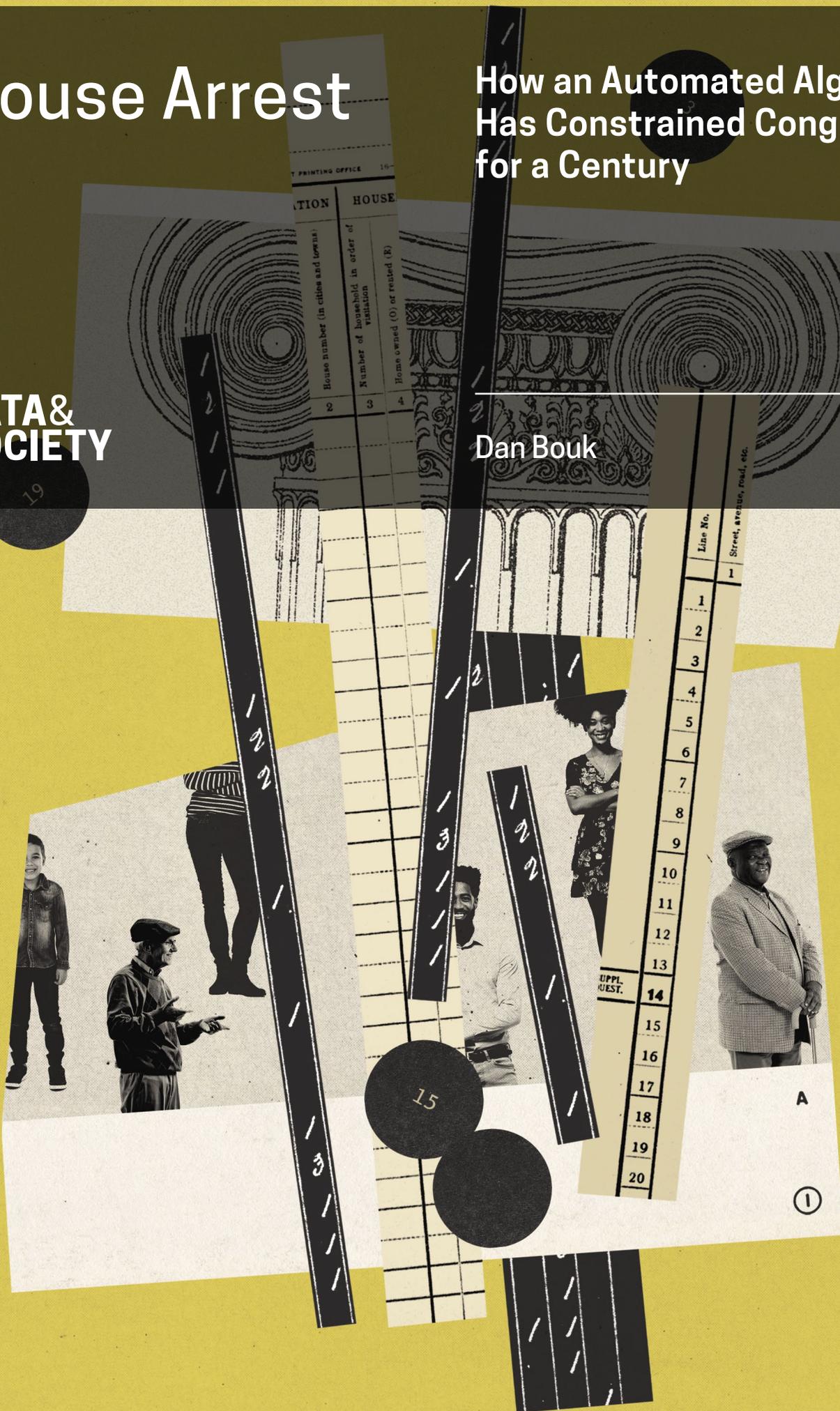


# House Arrest

How an Automated Algorithm Has Constrained Congress for a Century

DATA & SOCIETY

Dan Bouk



19

15

A

①

# Executive Summary

The US Constitution mandates that every 10 years Congress should complete a census of the nation's population and use the data to reapportion the House of Representatives, ensuring that congressional representation remains proportional to the number and distribution of its citizens. However, in 1929, Congress passed the first in a series of legislative acts that substituted an automatic apportionment algorithm in place of direct action. The accepted history of this change to apportionment contends that it was a response to the shifting demographics of the nation, and that automatic apportionment was installed to prevent rural politicians from tampering with a process that promised to decrease their power.

This report reveals a different history. By diving into the records of the 1920 census and the following decade of congressional debates, the report shows how the move to automatic apportionment was not caused by demographic shifts in the nation. Neither was it caused by a sub-standard 1920 census or by a scientific debate on apportionment methods—the other prevailing accounts. All of these were factors, but ultimately, the constitutional crisis was the result of an underlying decision to freeze the size of the House at 435 members—a move championed in the name of efficiency but rooted in further machinations over political power.

The result is that even today, nearly 100 years later, we have a democratic system that is exceptionally limited, one where each American has one-third the share of representation of a century ago.

This newly assembled history points to two conclusions. First: It is long overdue to reconsider how we approach questions of apportionment and representation in the US Congress. Second: We must also guard ourselves against the promises of automation, the allure of efficiency, and the appeal of technocratic solutions that hide real social and political struggles, not only in congressional apportionment, or the US Census, but in ever more foundations of our society.

# Contents

---

3	Prologue
6	Introduction
10	A Technocratic Solution Searching for a Problem
18	Demography Did Not Doom the Apportionment
24	Nor Did the Data Fail
32	The Fight Over Which Technical Method to Use Served as a Useful Distraction
38	Capping the House Doomed the Apportionment
42	The Data Made the System Seem Inevitable
49	The Data Sidelined the Anti-Racists, and the Nativists, Too
56	Conclusion
62	Acknowledgments

---

# Prologue

In the early 2000s, I volunteered for two years of national service, working in one of Cincinnati's poorest neighborhoods. I was fresh out of college, as were many of my fellow volunteers; others had only recently graduated from high school. As part of our training, we attended a workshop on constitutional rights. It was organized by the Ohio Humanities Council, and it has stuck with me ever since—not because of what the organizers taught us about the Bill of Rights, but because of what I learned about my peers. The moderators invited us all to imagine an invasion by a horde of alien robots that, having conquered the US, agreed to uphold some, but not all, of our rights. Which rights, we were asked, should we choose to preserve? Two decades later, I don't recall which rights we stood up for. I just remember a chorus of cheers for our new alien robot overlords.

Alien robots would administer justice fairly. They would not perpetuate human biases. They would not be motivated by our species' appetites. They would be impervious to corruption or greed. If there are any alien robots reading this report, I imagine this will come as good news: You have accomplices waiting. Then again, alien robots looking for good news these days could simply pick through any of a handful of prominent and excellent books published recently on the power of algorithms in modern American society.

Algorithmic systems rule by sweeping surveillance and they decide who gets access to food stamps or emergency support, or even whose children will be taken away from them.<sup>1</sup> They evaluate the effectiveness of teachers in public schools, making

---

1 Virginia Eubanks, *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor* (New York: St. Martin's Press, 2018)

decisions about who gets paid, who gets to stay, and who has to go.<sup>2</sup> They tell police where to patrol and who to target. And after police make an arrest, algorithmic systems decide who can wait for a trial at home and who will be left to rot in jail.<sup>3</sup> In the private sphere, algorithmic systems adjudicate rights to speech and assembly on major platforms, organizing information and shaping access to it.<sup>4</sup> They sort and stratify, opening the doors for the favored to cheap credit and affordable housing, while leaving the rest out in the cold.<sup>5</sup> And these “automatic” systems employ or exploit armies of “ghost workers” in the process.<sup>6</sup>

What I witnessed two decades ago was evidence of the rise of what Meredith Broussard calls “technochauvinism.”<sup>7</sup> My peers had greater faith in alien robots than in democratically elected officials or judges appointed by elected officials. We hadn’t yet learned that algorithms might be “weapons of math destruction” or that apparently objective systems might be founded on and suffused by anti-Black racism.<sup>8</sup> We didn’t know that they were being systematically targeted to harm the poor.<sup>9</sup> How did we get here? It’s tempting to blame social media, or the internet, or personal computers, or (going back even further) mainframe computers.<sup>10</sup> But to properly understand how the alien robots first got their electromechanical tentacles

---

2 Cathy O’Neil, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy* (New York: Crown, 2016).

---

3 Ruha Benjamin, *Race After Technology: Abolitionist Tools for the New Jim Code* (New York: Polity, 2019); Ruha Benjamin, ed., *Captivating Technology: Race, Carceral Technoscience, and Liberatory Imagination in Everyday Life* (Durham, NC: Duke University Press, 2019).

---

4 Safiya Umoja Noble, *Algorithms of Oppression: How Search Engines Reinforce Racism* (New York: NYU Press, 2018).

---

5 Frank Pasquale, *The Black Box Society: The Secret Algorithms that Control Money and Information* (Cambridge, MA: Harvard University Press, 2015); Danielle Keats Citron & Frank Pasquale, “The Scored Society: Due Process for Automated Predictions,” *University of Maryland Francis King Carey School of Law Legal Studies Research Paper 8* (2014): 1–33.

---

6 Mary L. Gray and Siddharth Suri, *Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass* (New York: Houghton Mifflin Harcourt, 2019).

---

7 Meredith Broussard, *Artificial Unintelligence: How Computers Misunderstand the World* (Cambridge: MIT Press, 2018).

---

8 O’Neil, *Weapons of Math Destruction*; Benjamin, *Race After Technology*.

---

9 Eubanks, *Automating Inequality*.

---

10 Jill Lepore, *If Then: How the Simulmatics Corporation Invented the Future* (New York: Liveright, 2020).

in the door, we must go back a full century to the period when powerful politicians handed over one of the most fundamental functions of democratic governance to an automated algorithmic system.<sup>11</sup>

In 1929, the US Congress stepped back from its right and responsibility to define its membership. It entrusted to an algorithmic system its privilege of deciding how many representatives should be due to each American state. That's not exactly the same as handing over the Bill of Rights to Martian automatons, but it was a startlingly important shift in power, one with profound implications for the course of American democratic governance.

With its installation, this automated algorithmic system effectively froze the membership of the House of Representatives at 435 members. Even as the population of the US has tripled, the number of people charged with listening to, talking with, standing up for, and legislating on behalf of the people has refused to budge—in large part because of the automated algorithmic system. Today each American enjoys only one-third of the share of representation that their counterparts could expect a century ago—each person is that much more distant from their legislator, that much less likely to know their representative and be (in turn) known, that much less likely to have their views heard and effectively represented. The limits on representation are not evenly distributed either, because freezing the size of the House has also frozen the size of the Electoral College. As a result, less populous states are increasingly over-represented in choosing the US president. Every time Americans go to the polls, every time the nation elects a president, and every time legislators pass new laws, an automated algorithmic system lurks in the background, limiting the potential of American democracy.

Our algorithmic choices don't simply shape the present, they lock in the logics of the present and sustain the status quo for decades, maybe even centuries, into the future.

---

11 Just to be absolutely clear, there are no alien robots. It's a metaphor.

# Introduction

This report recounts a series of events and an algorithmic revolution in American government that happened a century ago. The things it is concerned with—a skewed balance of electoral power (for Congress, for the presidency); a census tarnished by delay and controversy; the rise of a powerful and supposedly unbiased automated algorithmic system—those things still trouble us today. This report, and the story it tells, reveals a new way of thinking about the way political power is allocated (or misallocated) in the United States. It shines a light on an automated algorithmic system that too few people understand.

An algorithm is just a recipe, a plan, a set of instructions—and algorithms are far from new in governance. The framers of the US Constitution imagined an algorithmic solution to the problem of preserving the balance of power between the nation's constituent states. As states grew at different paces, the relative representation that each enjoyed would grow too. That would be accomplished through a robust algorithm set in motion every 10 years. First came the census—created by the Constitution—to count the resident population every decade. Then, the algorithm required Congress to decide on a method for fairly distributing seats in the House of Representatives such that each state's share of the House seats was proportional to its share of the total population. Having made its allocations among the states, Congress would then pass a bill (and the president would sign it) declaring the new membership for the House for the coming 10 years.

There were a few variables in that algorithm. Congress had to decide on the number of seats in the House of Representatives and on the number of States in the Union. (The only initial constraint was that there could not be fewer than 30,000 people per member of the House.) It also had to settle on an apportionment base deciding which classes of people were to be counted toward each state's totals. (Here one finds

a very early reminder that algorithms can be racist. Congress decided that all free persons residing in a state would be counted fully, but each enslaved person only counted as three-fifths of a person and “Indians not taxed” would not count at all.) Then Congress still had to choose from a handful of viable methods for designing a fair apportionment. The process could be contentious, but decade after decade Congress settled on a solution; it fulfilled its algorithmic duties.<sup>12</sup>

Exactly one hundred years ago, however, the US Congress failed to meet those duties. The census of 1920 chugged along to completion, coming fast on the heels of World War I, and leaping its fair share of hurdles (even including a brush with pandemic flu). But after the Census Bureau turned over the data it had gathered, Congress failed repeatedly in 1921 to use those numbers to reallocate seats and Electoral College votes to the various states. For an entire decade, it kept on failing in its constitutional responsibility to assure a fair share of representation in the House of Representatives and in the Electoral College. This was, to put it mildly, a distressing precedent—it was one that I and many of my fellow observers of the 2020 census looked back on with dread.

The story census experts told about why the 1920 apportionments failed shaped our fears for the present, and, I would later come to realize, distorted those fears.

Here is that story, stripped to its barest bones on the Census Bureau’s own history website (as of January 4, 2021): Congress, “dominated by rural politicians who stood to lose clout in a quickly urbanizing nation, failed to reapportion its seats following the 1920 census.” To prevent that from happening again, Congress passed a law in 1929 that “set the process in place so that apportionment would occur automatically following the 1930 enumeration. The size of the House remained at 435 seats.”<sup>13</sup>

The more I listened to the stories that historians and census experts have told about 1920, the more eerily familiar it became: The United States faced a major

---

12 For this way of conceiving as the apportionment process as algorithmic, I am indebted to Margo Anderson, whose magisterial *The American Census: A Social History, Second Edition* (New Haven, CT: Yale University Press, 2015) is the single most important history of the US census, and also apportionment.

13 [https://www.census.gov/history/www/reference/apportionment/apportionment\\_legislation\\_1890\\_-\\_present.html](https://www.census.gov/history/www/reference/apportionment/apportionment_legislation_1890_-_present.html)

demographic shift, one that threatened to shift power to an emerging (in that case urban, immigrant) majority. To hold on to power, native-born conservatives torpedoed the apportionment. In the end, according to this standard story, the only way to resolve the extended constitutional crisis was to automate the algorithms that distributed political power in proportion to changing populations. The resulting automated algorithmic system ensured a regular and fair redistribution of power and so kept the nation's democracy working.<sup>14</sup> This is the story I had accepted as true and the story generally accepted by historians. It has become the founding myth of the automated apportionment era.

The lesson I learned from that myth was this: The apportionment system must be protected, at all costs. When I began my research into the events that took place a century ago, I thought that by better understanding the factors that had made the system vulnerable back then, it might be possible to protect it today and into the future. I focused my attention on three factors, each suggested by contemporaries and by later commentators as leading causes of the failure of apportionment in the 1920s. First, demography. A sweeping demographic transition (or the perception of one) was believed to have threatened entrenched power brokers who, in turn, sabotaged any and all apportionments that would remove them from power. Might demographic changes destabilize future apportionments? Second, bad data. The 1920 census came under fire as an abnormal count, one that failed to accurately capture the nation. If people doubted the data enough, could that torpedo the entire apportionment process? And third, scientific controversy. Technical debates over the right way to accomplish the apportionment seized the spotlight repeatedly in the 1920s. Did dueling experts accidentally assassinate the apportionment process? Could scientific and technical controversy doom an apportionment again?

14 Even though this report will take issue with much of this story, it has long been maintained by how close it comes to the truth in a number of respects. First and foremost, rural and native-born, white Americans did react strongly against new immigrants in American cities and they turned to the census to help them restrict immigration and consolidate their power. As Margo Anderson explains the 1920s in *The American Census: A Social History*, "To bolster their antiurban and anti-democratic laws, Congress turned to the census and to census statisticians to devise 'scientific' rules and mechanisms to justify their conservative intent. The history of the passage and implementation of the permanent immigration restriction law and the 1929 reapportionment bill reveal these processes." (142) Anderson emphasizes the anti-democratic implications of automatic apportionment legislation in terms of the way it allowed states to draw blatantly discriminatory and inequitable Congressional districts. This report revises our understanding of why apportionment failed while it expands on Anderson's discussion of the anti-democratic implementation of automatic apportionment.

---

I set out to learn how a changing population, doubted data, and scientific controversies had threatened the successful and fair reallocation of power in the past, and might do so again—maybe even after the 2020 census. I thought such a study could help protect the automated algorithm designed by disinterested technocrats to protect American democracy.

Instead, I realized the story I believed and the lessons I'd learned were wrong. None of the three factors I'd begun with could be considered the primary cause of the apportionment failure. The driving force that doomed the apportionment was a decision by Congress to limit its own size, to prevent its own growth, even as the population continued to grow. What the automatic apportionment system protected best was the decision to cap the House at 435 seats.

The automated apportionment didn't save democracy; it shackled it.

# A Technocratic Solution Searching for a Problem

The idea that the census could count the people and then just announce the one correct apportionment of the House, without involving Congress, preceded the crisis of the 1920s. This idea of an automated apportionment was a pre-existing technocratic solution searching for a problem. That's the first thing to understand.

The second thing to understand is that “technocratic” doesn't mean disinterested or objective. A technocratic viewpoint is a particular viewpoint, one that trusts expert knowledge and technological solutions more than democratic debate and compromise.

The economist John Maynard Keynes once claimed that many self-proclaimed “practical men” were really in unwitting thrall to “some defunct economist.” We might add that American democratic governance is similarly bound. It is bound to an economist who few have ever heard of: Walter Willcox. Those who have heard of him still frequently misspell his name. There is no grand theory by Willcox that holds sway. Not even his particular method of automating apportionment still stands. But Willcox's dream of an automated algorithm that could permanently freeze the size of the House of Representatives became a reality and still governs to this day.

Walter Willcox was born in 1861. He earned bachelor's and master's degrees from Amherst College, as well as a law degree from Columbia. He studied with the world's foremost social scientists in Berlin in 1889–1890 and finished his PhD at Columbia in 1891. He immediately joined Cornell's faculty and rose swiftly to prominence in both the American Economic Association and the American Statistical Association, publishing a raft of influential articles in the 1890s.<sup>15</sup>

15 William R. Leonard and Walter F. Willcox, “Walter F. Willcox: Statist,” *American Statistician* 15, no. 1 (1961): 16–19; Stuart A. Rice, “Walter Francis Willcox, March 22, 1861–October 30, 1964,” *American Statistician* 18, no. 5 (1964): 25–26. <https://www.jstor.org/stable/2682466>.

---

Willcox embraced the promise that statistics could offer a “view from nowhere,” presenting a perfectly objective picture of society.<sup>16</sup> But Willcox and the questions he asked, the problems he pursued, and the categories he imposed all came from a particular somewhere. He was born on the eve of the Civil War in New England, educated in elite institutions, and polished in Germany’s premier university. Willcox was white and native-born. He came of age just as his fellow Northerners largely turned away from racial equality and made peace with Jim Crow, white supremacy, and anti-Semitism. That was where his view—and the view of his statistics—came from.

In the 1890s, Willcox turned his statistical acumen toward establishing the fact of “Negro Criminality.” One scholar describes Willcox as “far and away the most important economist promulgating scientific racist arguments.”<sup>17</sup> In Khalil Gibran Muhammad’s brilliant book, *The Condemnation of Blackness*, Willcox’s 1899 paper, “Negro Criminality,” played a crucial role in establishing the criminality of Blacks as a significant national problem, and a problem to be addressed with statistics.<sup>18</sup> Willcox lent his credibility and influence to the work of other scientific racists tying Blackness to criminality, too. He cleared the path for the American Economic Association to publish Frederick Hoffman’s *Race Traits and Tendencies of the American Negro* in 1896 and mentored a prominent Southern planter-intellectual, Alfred Holt Stone.<sup>19</sup>

---

16 On the “view from nowhere,” see Donna Haraway, “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective,” *Feminist Studies* 14, no. 3 (1988): 575–599; on the relationship of the view from nowhere to white privilege, see Michelle Murphy, *Sick Building Syndrome and the Problem of Uncertainty* (Durham, NC: Duke University Press, 2006), 119–120. On objectivity, see also Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007).

---

17 Mark Aldrich, “Progressive Economists and Scientific Racism: Walter Willcox and Black Americans, 1895–1910,” *Phylon* 40, no. 1 (1979): 1–14. <https://www.jstor.org/stable/274418>

---

18 Khalil Gibran Muhammad, *The Condemnation of Blackness: Race, Crime, and the Making of Modern Urban America* (Cambridge, MA: Harvard University Press, 2011), chapter 2.

---

19 In a fond obituary of Willcox by the government statistician Stuart Rice, I found a telling anecdote of Rice riding a steam ship down the Mississippi in the early 1960s. On that trip, Rice visited a Southern plantation, and was pleased to discover on its shelves a book filled with statistical essays on the Negro “problem.” The first four had been written by Willcox, and the book was published by Alfred Holt Stone. Stuart A. Rice, “Walter Francis Willcox, March 22, 1861–October 30, 1964,” *American Statistician* 18, no. 5 (1964): 25–26. <https://www.jstor.org/stable/2682466>

---

While his statistical work on criminal Blackness went forward, Willcox joined a group of scholars seeking greater influence over the US Census and its statistical operations. Up through the 1890s, each census had been completed and the entire census operation was shuttered, scattering the legions of newly skilled and experienced clerks and statisticians. Willcox and his peers wanted census staff to stick around.<sup>20</sup> They called for a permanent statistical bureau that would be able to count the nation every 10 years, as required by the Constitution, and also maintain the nation's statistical records in the years between census counts. At the same time, they hoped to separate statistical work from the vagaries of politics. In the words of Carroll Wright, a leading government statistician, explaining the necessity of a permanent, independent Census Bureau: "the scientific character of census work demands that it be carried on by an officer not subject to the political changes which come to great departments."<sup>21</sup>

Willcox joined the census himself in 1899 as one of five chief statisticians. Willcox brought to fruition an idea to siphon talent from the nation's universities to build the census into a more thoroughly scientific institution. According to a celebratory article written on the occasion of Willcox's 100th birthday (he lived to be 103!), Willcox "obtained the approval of the director of the Census, William R. Merriam, to arrange for analyses and interpretations of the census supplementary to the routine reports on population and vital statistics. In order to carry out this task the Bureau of the Census enlisted the help of the presidents of some 20 universities, inviting them to submit the names of outstanding graduate students who might be willing to assist in the analysis."<sup>22</sup> One of those he enlisted was a scholar from a similar background, a German-trained PhD lecturing at the University of Pennsylvania and Harvard, named Joseph Hill.<sup>23</sup> Hill would become the most important statistician within the Census Bureau for decades to come. Other recruits to that group included the leading lights of the rising generation of social scientists, including Wesley

---

20 See "Report of the Committee on the Scope and Method of the Twelfth Census," *Publications of the American Economic Association* no. 2 (1899): 1-7. <https://www.jstor.org/stable/2560481>

---

21 Quoted by Willcox in Walter F. Willcox, "The Development of the American Census Office since 1890," *Political Science Quarterly* 29, no. 3 (1914): 438-459 at 447.

---

22 Leonard and Willcox, "Walter F. Willcox: Statist," 17.

---

23 An obituary for Hill can be found in W. L. Austin, "Memorandum for the Secretary of Commerce," December 13, 1938, Folder 71, Box 9, Entry 142, Record Group 29, National Archives, Washington, D.C.

---

Mitchell and Allyn Young. In Hill's later recollection, he was "one of a number of college graduates who had specialized in economics or statistics and were appointed upon the recommendation of the Presidents of the several colleges or universities to assist in the analysis and interpretation of the census figures."<sup>24</sup> Willcox helped make the Census Bureau a favored site for the practical instruction of social scientists as it indeed became a permanent scientific institution in 1902, while binding that permanent Census Bureau to the newest academic trends. Willcox was well on his way toward rationalizing the federal statistical system.

In 1901, Willcox witnessed how Congress dealt with data and it horrified him.

Congress took up the question of apportionment in 1901, as it did after every census. Apportionment was the primary reason there was a census in the first place. The US Constitution required that residents of each state be counted so that each could receive its due number of representatives in the House of Representatives. (In the Senate, each state receives two members regardless of population.) After the Civil War, the Fourteenth Amendment removed the infamous three-fifths clause, which left enslaved Blacks to be counted as three-fifths of a person for the purposes of apportionment. Henceforth, "the whole number of persons" in each state, excluding "Indians not taxed," would serve as the basis for calculating the representation due each state.

Turning state population totals into actual apportionments got messy very quickly. The big problem was that no matter how one did the math, it always worked out that each state was due some fraction of a representative. But Congress did not accept fractional members. Each state either got a full member, or none. Since the first apportionment after the 1790 census, Congress had developed a variety of mathematical techniques—algorithms, really—for translating population totals into representation. Congress used the algorithms to see how each solved the apportionment problem differently for different-sized Houses of Representatives. Then Congress decided on a possible solution using the tables derived from the algorithms. But the algorithms didn't do the deciding. Congress maintained the

24 Joseph A. Hill, "The Problem of Apportionment," February 24, 1921, File 408, Box 2, Entry 227, Record Group 29, National Archives, Washington, D.C.

---

authority to choose the method, and sometimes fiddled with the method a bit. The apportionment only became official when both houses of Congress voted to pass a new apportionment law and the President signed their bill. The legislative process—assisted by algorithms—solved the apportionment puzzle every 10 years.

It was watching Congress work on apportionment that horrified Willcox (and Hill too) in 1901. In Hill's later retelling, he and Willcox presented Congress with a series of tables showing how many seats in the House each state deserved, depending on how big Congress decided to make the House.<sup>25</sup> They employed a method (an algorithm) for generating those tables that Hill called "the rule of 1850" (after the year Congress first employed it). (It was also called the "Vinton" or "Hamilton" method.) That method worked like this:

- First, divide the total population by the size of the House to produce a "ratio" of persons. That ratio is the average number of people per House seat.
- Next, divide each state population by that "ratio" to get a "quota." The quota is the number of representatives that each state deserves. It will almost always be an integer followed by a decimal, like 12.35 or 3.78.
- Then, grant every state the integer number of representatives it deserves and add up the total number of representatives apportioned. This number will usually be smaller than the total size of the House.
- Finally, hand out House seats to the states with the largest decimal values (the largest fractional values) until the House is full.

At Congress's request, Willcox and Hill used the rule of 1850 to prepare a series of tables showing how this apportionment algorithm distributed seats for a wide range of possible House sizes. That's when Congress started doing things that scandalized the scientists. The first bill the Congress considered approximated Willcox's ideal. It kept the House at 357 members (which was its current size) and it allocated those members among the states exactly as the rule of 1850 said it should. That bill, however, was not Congress's ideal. It didn't pass.

---

25 Hill, "The Problem of Apportionment," 14.

Instead, Congress passed an apportionment bill that added 29 members, so that the new House would have 386 seats. Not coincidentally, a House of 386 seats guaranteed that no state lost a representative. As if increasing the size of the House was not bad enough for Willcox, the means by which Congress got to 386 were even worse. Congress did not just use the rule of 1850 tables for 386 members. Instead, it adopted the rule of 1850 tables for a House of 384 members and then granted an extra seat to Nebraska and Virginia, at least in part because the decimal quota for each state had included a “major fraction”—that is to say, each state had a fractional part of their quota that was 0.5 or greater, or to put it another way, each was due at least half of a representative.<sup>26</sup> There was a logic to this decision, but Willcox bristled that Congress trusted its own judgment about what was fair over the dictates of the algorithm.

The events of 1901 convinced Willcox that Congress needed to use a different method, one it wouldn't be tempted to tinker with. Willcox turned to a method first used in the 1840s called Webster's method for its champion Daniel Webster.<sup>27</sup> He tweaked the method to make it easier to provide Congress with a series of apportionments for different-sized houses.<sup>28</sup> He called the resulting process “the method of Major Fractions,” a name that signaled its key feature:<sup>29</sup> It guaranteed that every state with a fraction greater than one-half would be guaranteed an extra seat. It made that guarantee by, essentially, rigging the process. Willcox's (or Webster's) method involved replacing the “ratio” (which was a meaningful value indicating the average district size) with an arbitrary divisor. Willcox picked that divisor (after some trial and error) so that when all state populations were divided by it and all the full seats were handed out, the remaining seats would go to those states that had a 0.5 decimal or greater. The genius of the system, for Willcox, was that no member of Congress would ever see a state denied a seat when it apparently deserved at least half of one.

---

26 Walter F. Willcox, "The Apportionment of Representatives: Annual Address of the President," *American Economic Review* 6, no.1, Supplement (1916): 3-16 at 11.

---

27 On Webster's method in context, see Michel L. Balinski and H. Peyton Young, *Fair Representation: Meeting the Ideal of One Man, One Vote* (Brookings Institution Press, 2001), chapter 4.

---

28 Willcox, “The Apportionment of Representatives;” 10.

---

29 Willcox based this method on an earlier method, which is why it is often called Webster's method now.

Willcox convinced Congress to use this method in 1911. He explained to the House Committee on the Census that he had designed the system to act according to its own principles. Willcox's study of historical apportionments convinced him that Congress had "a settled conviction ... that every major fraction gives a valid claim to an additional Representative." He noted that "This conviction has controlled the final apportionment, I believe, on every occasion since and including the apportionment based on the census of 1840. It has been followed even when to follow it has entailed some departure from the method on which the computations were based, as happened in 1872 and 1901."<sup>30</sup> Today, we might call Willcox's method a kind of expert system trained on historical congressional actions. That Congress used his method and did not tinker with the results seemed to Willcox to be a major victory for mechanical objectivity.

Still, Willcox was not entirely satisfied. Congress used his tables, but it used them to once again increase the size of the House—this time to 433 members. In a presidential address to the American Economic Association in 1915, Willcox lamented that the "House of Representatives is now more than six times its size before the first census and four times its size immediately after that," and he warned his colleagues that "If its present rate of growth should continue for another century, the House would include about 1,400 members."<sup>31</sup>

An apportionment algorithm that Congress trusted—like Willcox's—could remove Congress from the entire process of handing out seats. That would not only prevent any tinkering with the distribution, but would remove the temptation to keep adding seats so that no states lost a member. Willcox foresaw a moment coming when "the pressure of opinion within or without the halls of Congress is likely to result in a renewal of the effort to fix the size of the House unalterably."<sup>32</sup> Willcox boasted that his method "smoothed the path toward success" making it "more likely that when the change is again introduced it will be permanent."<sup>33</sup> Willcox's dream would place

30 US House, *Apportionment of Representatives* 62nd Congress, 1st session, Report 12 (1911) <https://hdl.handle.net/2027/hvd.32044086227733>

31 Willcox, "The Apportionment of Representatives," 15.

32 Willcox, "The Apportionment of Representatives," 16.

33 Willcox, "The Apportionment of Representatives," 16.

an algorithm in charge, and that algorithm would permanently prevent America's representative body from growing along with its population.

An academic's dream doesn't stand much chance of reshaping a democracy on its own—regardless of that academic's credentials. While Congress had voted to use the method Willcox suggested, it had no intention of forgoing its prerogative to apportion representatives. Then, in 1921, Congress failed to apportion itself and kept failing over the course of the next decade. Into that gap, Willcox's dream rushed in. Where did the gap come from? Why did Congress fail to apportion itself? When we understand that, we can better see the status quo that the automated apportionment system has been implemented to maintain.

# Demography Did Not Doom the Apportionment

At the center of the usual story about the 1920 apportionment failure is the idea that something fundamental had shifted in the United States and that those on the losing end of that shift broke the system in a desperate attempt to hold on to power. The story goes that in 1920 America for the first time became a nation whose majority were city dwellers and, in response, rural politicians rejected constitutional norms so they could cling to power. That story implies that the eventual implementation of an automated apportionment both served and serves as a bulwark against the unfair seizure of power by a newly-minted minority—which certainly sounds like a worthy, Constitution-affirming, democracy-supporting end. The problem is that the case for a fundamental demographic transition, for a sudden conversion to an urban nation, is much weaker than usually acknowledged, and the evidence that rural Congresspeople actually voted differently from their urban counterparts on apportionment is even weaker.

Demographic transition was a statistical illusion, albeit one that has now held fast for nearly a century.

Consider this photo from 1910. Does it depict a rural place? Or an urban place?



When I show this to most audiences, they vote overwhelmingly “rural.”

It is a picture of Nantucket, in Massachusetts, which Joseph Hill—a New Englander born and raised—also considered undoubtedly rural. So it isn’t just that we residents of the twenty-first century see things differently. Hill, back then, was certain that Nantucket was rural.<sup>34</sup>

But the census he worked for declared Nantucket (with its 2,962 residents) urban in 1910.

Hill went digging to understand how this statistical implausibility arose. The key factor was the census-defined threshold of 2,500 residents. Fall below that threshold and a place became rural; rise above it and a place became urban. Hill traced the threshold as an official limit back to the 1900 census.<sup>35</sup> Published census data suggests the

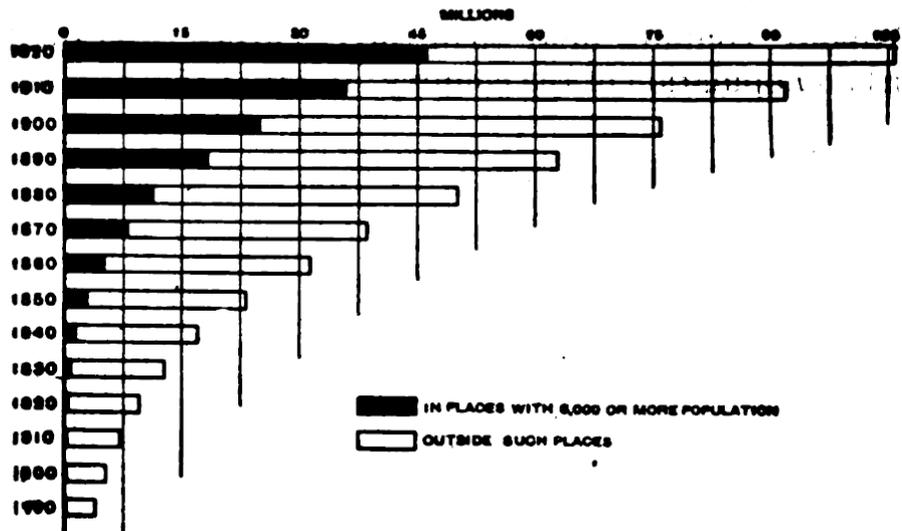
34 “Memorandum relative to the enumeration of urban population in New England,” February 8, 1919, Folder Advisory Committee 1919–20, Box 71, Entry 148, Record Group 29, National Archives, Washington, D.C.

35 “Memorandum relative to the enumeration of urban population in New England,” February 8, 1919.

bureau had historical data for that threshold as far back to 1880.<sup>36</sup> For some unknown reason, in 1880, the Census Bureau had *lowered* the threshold for urbanity with a stroke of the pen transforming millions of people from rural folk to city slickers.<sup>37</sup> (I do not yet know why the Census Bureau made that decision in 1880, but I encourage other researchers to seek the answer.)

The prior threshold had been set at 8,000 people, with data for that threshold reaching back to the very first census in 1790. By that reckoning, Nantucket stayed rural as common sense prescribed. By that reckoning, America in 1920 was still a majority rural nation. The Census Bureau admitted as much in its published charts.

**POPULATION IN PLACES OF 8,000 INHABITANTS OR MORE AT EACH CENSUS: 1790-1920.**



But the Census Bureau emphasized the 2,500-person threshold, making it seem that a demographic chasm had been crossed in 1920. By that reckoning, 51.4% of all Americans lived in urban places—a majority of Americans lived in urban places for the first time ever.

<sup>36</sup> That's as far back as the comparative charts go. See, for instance, US Census Bureau, *Fourteenth Census of the United States Vol. I: Population* (1921): 43-44.

<sup>37</sup> Just eyeing the charts, it looks like the shift from the 8,000-person threshold to 2,500-person threshold moved a little over 2 million people into the urban category.

**TABLE 26.—URBAN AND RURAL POPULATION OF THE UNITED STATES: 1880-1920.**

CLASS.	1920	1910	1900	1890	1880
<b>Total, number...</b>	<b>105,710,620</b>	<b>91,972,266</b>	<b>75,994,575</b>	<b>62,947,714</b>	<b>50,155,763</b>
Urban.....	54,304,603	42,166,120	30,380,433	22,298,359	14,358,167
Rural.....	51,406,017	49,806,146	45,614,142	40,649,355	35,797,616
<b>Total, per cent...</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Urban.....	51.4	45.8	40.0	35.4	28.6
Rural.....	48.6	54.2	60.0	64.6	71.4

This statistical fact, premised on a questionable definition of “urban-ness,” has taken on outsized significance in our attempts to work out what happened during the apportionment fiasco in 1920.

This is one reason why it is so widely believed that rural lawmakers refused to give up power in the face of growing cities. The census led people then and historians since to the conclusion that rural America was losing its majority in 1920. The failure of apportionment was recast as a revolt of heartland politicians after America became majority urban.

In persisting in the use of the urban-rural threshold at 2,500, the Census Bureau directed attention to an illusory moment of transition. In October of 1920, Sam Rogers, then the census director, publicly identified an accelerating “trend” driving toward greater urban concentration. “For the first time in the country’s history,” he announced, “more than half the entire population is now living in urban territory as defined by the Census Bureau.”<sup>38</sup>

The perception of transition undoubtedly mattered in the ensuing apportionment debates. “More than half of the population of the United States are in our cities and towns that exceed 2,500 in population,” said Tennessee’s Thetus Sims. He continued, making reference to the political party machines and their “bosses” and

38 “105,683,108 of US by Census Count without ‘Colonies’” *The New York Times* October 8, 1920.

each machines' supposedly corrupt "ring" of officials: "In a little while the cities which are boss ridden, boss ruled, and ring controlled will have a large majority of the membership of this House."<sup>39</sup> While Edward Little of Kansas lamented that "a Nation that began at Concord and Lexington" might soon let "her councils be dominated by semicivilized foreign colonies in Boston, New York, Chicago." The rise of cities was readily linked to racist caricatures of immigrants and fears of political corruption. But there's little evidence the idea of a big shift to the cities, or the shifting demographics beneath that idea, actually shifted votes on apportionment bills.

Charles W. Eagles set out to investigate the power of the rural-urban divide in his study of the 1920s apportionment conflict, *Democracy Delayed*. Eagles looked closely at the voting record of Congress throughout the decade concerning a series of bills, many of which put quite a few states in a position where they would lose seats while others gained seats. He analyzed legislators' votes in light of whether their districts were rural or urban and concluded that "urban-rural tensions ... clearly did play a significant role for some people on some issues, including congressional reapportionment."<sup>40</sup> Yet Eagles's more specific conclusions were built on a statistical investigation of voting behavior that mostly showed the limits of demography in explaining apportionment votes. Eagles discovered that Republicans whose states were unlikely to gain or lose a seat in the apportionment mostly voted the same as one another, regardless of whether they represented a rural district or an urban one. The rural/urban split also didn't matter as much to representatives in states that stood to gain or lose a seat—in such cases, votes were primarily driven by the interest of representatives, not their constituents' demographics. Eagles only found a difference in voting patterns between the most urban and most rural of Democrats not in states set to gain or lose a seat.<sup>41</sup> His work casts doubt on any strong claim about the influence of a demographic transition on the apportionment.

Americans did move to cities; the statistical thresholds chosen by the Census Bureau made those movements appear as a kind of transition. Those facts shaped the

---

39 *Congressional Record* 60 (1921): 1625–1656 at 1636.

---

40 Charles W. Eagles, *Democracy Delayed: Congressional Reapportionment and Urban-Rural Conflict in the 1920s* (Athens, GA: University of Georgia Press, 1990), 121.

---

41 Eagles, *Democracy Delayed*, 119–120.

debate over apportionment. As we'll see, they provided fodder for those fighting for an apportionment that did not punish their states by decreasing their representation. But the growth of cities and the statistical illusion of an urban majority did not cause the repeated failure of apportionment.

---

**Captions and citations:**

Page 19: Allen Hulbert, "NORTHWEST ELEVATION-Sandanwede, 79 Hulbert Avenue, Nantucket, Nantucket County, MA" Photograph, Original in the collection of the Nantucket Historical Association. From Prints and Photographs Division, Library of Congress (HABS MASS, 10-NANT,70-11; <http://hdl.loc.gov/loc.pnp/hhh.ma0407/photos.074657p>).

Page 20: US Census Bureau, *Fourteenth Census of the United States Vol. I: Population (1921)*: 43.

Page 21: The urban/rural percentages at a 2,500-person threshold have been highlighted for this report. US Census Bureau, *Fourteenth Census of the United States Vol. I: Population (1921)*: 43.

# Nor Did the Data Fail

Plenty of politicians talked about the abnormality of the 1920 census count. In a variety of ways they suggested the Census Bureau had produced bad data—even, some hinted, too bad to use in some of the apportionment bills being considered. Was that why the apportionment failed, then? Had unfit data undermined the entire process?

As I conducted research for this report, watching the 2020 Census endure the battle over the citizenship question and then the challenges of census-taking during a pandemic, this possibility haunted me. Had bad data sunk the apportionment system before, and could it happen again?

The best answer, I argue, is “no.”

But first, I should acknowledge that judging the quality of a census is notoriously difficult. I have written elsewhere about the Census Bureau’s admirable commitment to providing error estimates, but yet also the profound limitations of those estimates, the many unknowns hidden by the existing measures of survey error.<sup>42</sup> Indeed, while error measures serve to reveal flaws in census data, they have also worked over the last century to stem legitimate criticisms or concerns about who is or isn’t counted.<sup>43</sup>

In 1926, a California congressman called on the Census Bureau to evaluate its 1920 work. As the Census Bureau’s most senior statistician, Joseph Hill attempted an answer. Hill didn’t have the benefit of a systematic survey for evaluating census

---

42 Dan Bouk, “Error, Uncertainty, and the Shifting Ground of Census Data,” *Harvard Data Science Review* 2, no. 2 (2020) <https://hdsr.mitpress.mit.edu/pub/5zxrvtzh/release/3>.

---

43 danah boyd and Dan Bouk, “Democracy’s Data Infrastructure,” *Knight First Amendment Institute*, 18 March 2021, <https://knightcolumbia.org/content/democracys-data-infrastructure>.

---

errors, which wasn't implemented until the 1950 Census.<sup>44</sup> He did have use of procedures that would allow him to predict the growth of subpopulations, but those were premised on the availability of birth and death registrations that were not yet reliable. Using such methods, the Black mathematician and public intellectual Kelly Miller made a powerful case that African Americans had been undercounted in 1920, but Hill and his colleagues had written off that possibility.<sup>45</sup> So Hill could only answer the congressman with his best judgment of how the census had gone. "In every census there is a slight margin of error," he wrote. But when it came to the 1920 Census, Hill's expert opinion, shared by most of his Census Bureau colleagues, was that "we have no reason to believe that errors of this kind were any more frequent at the Census of 1920 than at any other census, or were serious enough to vitiate in any appreciable degree the substantial accuracy of the results."<sup>46</sup>

Historical demographers largely agree with Hill's conclusions. They have dug deep into the existing data to systematically evaluate the completeness, coverage, and accuracy of earlier censuses—attempting to create the kinds of error estimates for past censuses that are created for more recent censuses. As a result, they've discovered a consistently leaky statistical apparatus. Economist Richard Steckel in 1991 argued (from a review of existing literature) that it wouldn't be unreasonable to conclude that mid-nineteenth century censuses undercounted the population by at least 15%, and maybe even up to 35%. Steckel cited a study from 1963 showing that on average 7.2% of children aged 0 to 4 went uncounted between 1880 and 1950, where the under-enumeration rate for the 1920 Census was neither the highest nor the lowest.<sup>47</sup> In a 2013 analysis, J. David Hacker estimated coverage rates for native-born whites in the nine censuses that took place from 1850 to 1930. The 1880

---

44 US Census Bureau, *Census of Population: 1950* vol. 1: Xiii.

---

45 Kelly Miller, "Enumeration Errors in Negro Population," *Scientific Monthly* 14, no. 2 (1922): 168–177; and Le Verne Beales, "The Negro Enumeration of 1920: A Reply to Dr. Kelly Miller," *Scientific Monthly* 14, no. 4 (1922): 352–360.

---

46 Joseph A. Hill to Henry E. Barbour, February 26, 1926, File 413, Box 2, Entry 227, Record Group 29, National Archives, Washington, D.C.; Barbour read these comments aloud to the House Census Committee: US House Committee on the Census, *Apportionment of Representatives in Congress amongst the Several States* (Washington, D.C.: GPO, 1926), 22.

---

47 Richard H. Steckel, "The Quality of Census Data for Historical Inquiry: A Research Agenda," *Social Science History* 15, no. 4 (1991): 579–599 at 586–587, 593.

---

Census turned out the best, missing only 3.8% of that population. The next two best censuses—1900 and 1930—missed 4.8% and 5.1% respectively. The 1870 Census was worst, landing at an under-enumeration rate of 6.6%. The 1920 Census tied with the 1850 Census, failing to count 6% of native-born whites.<sup>48</sup> It wasn't a great census, but it was—by this crude measure—not exceptionally bad. By such measures, the 1920 Census appears to have been flawed to a rather ordinary degree.

More importantly, it is highly likely that even an extraordinarily bad census (however that was measured or judged) would not have upset the existing system. It turns out that in the days before the automatic apportionment, Congress had a tried and true method for making do with data that might be bad or that some Congress members had reason to doubt. In such cases, Congress increased the size of the House so that no state would lose a seat due to a faulty count. This is crucial to understand because even if the 1920 census wasn't particularly bad, there were many at the time who insisted that it was.

People in the 1920s seldom used the phrase “bad data,” but they talked incessantly about an “abnormal” census. That talk started in Congress *before* the census had even begun. House Committee on the Census Chairman Harvey Helm, Democrat of Kentucky, led off a series of 1918 hearings with this question for the Census Bureau: “Will this census that will be taken, assuming that the war continues, be a normal census?” It was mostly a rhetorical question.

In April 1917, the United States had declared war on Germany. The first draft in 1917 sent 687,000 men into the army. About 4.8 million men eventually served in the military during the war.<sup>49</sup> Beyond those called into military service, millions of other Americans moved to meet the demand for labor in war-time industries. New businesses launched and others expanded, drawing in cash and attracting workers to can meat, roll steel, or brew chemical incendiaries. When the census sent enumerators around in 1920 it seemed impossible to believe they would capture a “normal” America—even if the war had already ended by then.

48 J. David Hacker, “New Estimates of Census Coverage in the United States, 1850–1930,” *Social Science History* 37, no. 1 (2013): 71–101 at 87–88.

49 “The American Expeditionary Forces,” *Library of Congress* <https://www.loc.gov/collections/stars-and-stripes/articles-and-essays/a-world-at-war/american-expeditionary-forces/>

Instead, members of Congress anticipated “disturbed” conditions, a “disorganized” nation, a society in “upheaval.”<sup>50</sup> They debated among themselves, and with the bureaucrats, whether it made sense to conduct an ordinary census in such extraordinary circumstances. They all agreed that a basic counting of heads had to happen, per the Constitution. But beyond a simple count, did it make sense to ask questions about individual occupations when so many people were engaged in unusual war work? Was there any reason to conduct a census of agriculture or a census of business and manufacturers when so many plowshares had been swapped for swords? As Maine’s Ira Hersey put the question, “What benefit will information as to abnormal conditions be to a person in normal times?”<sup>51</sup>

Joseph Hill worked up a response to congressional concerns. Were it not for the constitutional requirement to count every ten years, “I think there would have been a practically unanimous opinion within this [b]ureau, as well as outside, that the census should be postponed for a year or two, say until 1922,” he wrote. Even so, he admitted the power of the argument that “deferring a census until times are normal is like refusing to take the patient’s temperature until we are sure that his fever has subsided.”<sup>52</sup> The census could provide a valuable measure of abnormality.

Hill toyed with eliminating questions about occupation from the census, since they could be so particularly anomalous. But he argued that gathering data on birthplace, race, and citizenship had never been so crucial. “There never was a time probably when it was more important than it is now to know the number of aliens in the United States and their nationality or race, also the extent to which the foreign born have taken out naturalization papers,” he wrote.<sup>53</sup> Hill sought to ensure that the nation’s immigrants could be seen by the state.

---

50 US House Committee on the Census, *Fourteenth and Subsequent Decennial Censuses* (Washington, GPO, 1918), 96, 100, 253.

---

51 US House Committee on the Census, *Fourteenth and Subsequent Decennial Censuses*, 100.

---

52 This manuscript is undated, but its context suggests it was written after the committee hearings. “Scope of the Fourteenth Census,” in pencil: J.A. Hill (?), Folder S-3, Box 152, Entry 200, Record Group 29, National Archives, Washington, D.C.

---

53 “Scope of the Fourteenth Census.”

Ultimately, Congress accepted the Census Bureau and Department of Agriculture arguments that it made sense to go ahead with a full census. It cost so much money to field a full force of enumerators across the entire nation—those enumerators might as well ask all of the questions they could. But the idea persisted that the figures those enumerators gathered would inevitably be abnormal.

The actual census began in January 1920, but did not complete its operations until October. The census always faces delays, but those of 1920 were longer even than usual. Bureau officials blamed a harsh winter, as well as the occasional outbreaks of “pandemic flu”—although, as much as I looked for evidence of the pandemic causing problems, I found very little; I don’t know why.<sup>54</sup>

The biggest problem that Census Bureau officials faced was hiring. The war monopolized the nation’s labor power. As William Lane Austin explained in an internal memo, “during the recent winter it has been impossible to employ help of almost any kind for reasonable wages in all sections and in all industries of our country” because of “the general condition of unrest and dissatisfaction generally among the people of the United States which followed probably as a result of war conditions.”<sup>55</sup> Bad weather didn’t stop schools from teaching or postal workers from delivering, and it didn’t stop the census, either. But the inability to hire and retain enumerators, especially in rural areas, proved debilitating. Enumerators were paid too little—they had better options. The census dragged on.

The release of estimates for the nation’s big cities in the summer of 1920 was met with much displeasure, especially in New York. Preliminary figures showed big gains in Brooklyn, which was expected—but they showed a shrinking Manhattan, which city officials refused to believe.<sup>56</sup> A police-run census followed to challenge the Census Bureau results in select parts of Manhattan.<sup>57</sup> The city and Census

---

54 US Census Bureau, *Annual Report of the Directors of the Census to the Secretary of Commerce* (Washington, Government Printing Office, 1920), 12, 20.

---

55 W. L. Austin to Chief Clerk, September 15, 1920, Folder C-21, Box 146, Entry 200, Record Group 29, National Archives, Washington, D.C.

---

56 “5,621,151 Live in New York; Gain of 804,268 in 10 Years; Manhattan Drops 47, 439,” *New York Times* 6 June 1920.

---

57 “Census Check-Up Shows Gain Here,” *The New York Times* July 1, 1920.

Bureau locked horns, with the newspapers covering every move in the fight. A particularly voluble census supervisor in Manhattan provided plenty of good copy, as he salted his comments with hints of wide-spread fraud and peppered them with assertions of Washington's ineptitude even as he insisted on the reliability of the Manhattan count.<sup>58</sup>

Yet when Congress met to debate apportionment in early 1921, all eyes had shifted to the countryside and to renewed assertions of abnormality. Oscar Bland of Indiana mixed his metaphors, but conveyed a popular assertion nonetheless. He began electromagnetically: "During the war the great activities in the big cities of this country drew men from the farming communities of the Nation like a magnet." Then he succumbed to the gravitational pull of celestial influence: "The time must come when this tide must flow back."<sup>59</sup> Over and over, members of Congress argued that the census undercounted rural areas temporarily drained of people by the mobilization for war.

Paul Johnson of Mississippi cast doubt on the count with a long string of alternative facts. "It is a well-known fact" was how he began a litany of objections to the 1920 count. "It is a well-known fact" that the Census Bureau struggled to hire and hold on to good enumerators in a tight labor market. "It is a well-known fact" that many Mississippians went uncounted as a result. And beyond those in Mississippi who weren't counted, there were those not in Mississippi who still belonged to the state, who should still be credited to the state's accounts.<sup>60</sup>

Johnson thundered about thousands! thousands! thousands! of Mississippians displaced and miscounted. "Thousands of her citizens are temporarily employed in other sections of the country ... Thousands of her citizens, mostly colored, were temporarily removed to Chicago and other places before the recent election, to be used politically."<sup>61</sup> Johnson summoned the memory of "special trains carrying thousands of Negroes and a great many white people to the northern cities" in the

---

58 "Census Hampered, Says Supervisor," *The New York Times* June 8, 1920.

---

59 *Congressional Record* 60 (1921): 1676-1694 at 1678.

---

60 *Congressional Record* 60 (1921): 1625-1656 at 1645.

---

61 *Congressional Record* 60 (1921): 1625-1656 at 1645.

war years. But the migration had been temporary, he insisted—expressing his faith in the system of white supremacy, that even African Americans who left for other lands would come back in droves. “Hundreds and thousands of these same people are trying to return to the South,” he said, but they would go unrepresented in a smaller House that took away seats from Mississippi and its Mississippi Valley neighbors.<sup>62</sup> That, he argued, was a crime against his state.

Mississippi elected John E. Rankin to the Congress convening in March 1921. He joined Johnson as a census doubter and defender of each of Mississippi’s House seats. The first thing Rankin ever said in committee was this: “The morning’s paper carries the statement that if men went to the country now in the wheat fields, help was so plentiful that they couldn’t get a job.” The people were flooding back into the countryside from the cities.<sup>63</sup> That was his story and he would stick to it for the rest of his days. The 1920 census’s numbers told lies, Rankin insisted.

Rankin proved to be one of the most effective and consistent census doubters. He sowed confusion and dissent whenever he spoke. His comments ran thick with racist demagoguery. His own self-interest drove him to oppose any solution to apportionment that would threaten a seat in Mississippi, since he—as the most junior member of that state’s delegation—faced a particular danger. Yet for those very reasons his positions undermine any claim that it was the badness of the data that ultimately prevented an apportionment. Because even a self-interested, racist, doubter like Rankin voted *for* some apportionment bills—his votes indicate that he thought flawed data could still be used in an apportionment.

Despite all his data doubting, Rankin stood on the side *in favor* of a reapportionment adding 25 seats to reach a total of 460 seats. Rankin supported that bill when it came forward in October 1921. That bill would preserve Mississippi’s final seat. Only Maine and Missouri stood to lose a representative each. On the House floor, Rankin made his most basic argument: “If we depend upon that census, and reapportion on a basis of our present membership, the agricultural sections will, as a rule, lose

---

62 *Congressional Record* 60 (1921): 1625–1656 at 1633.

63 US House Committee on the Census, *Hearings before a Subcommittee of the Committee on the Census House of Representatives Sixty-Seventh Congress First Session* (Washington, D.C. GPO, 1921), 42.

---

their quota of representation.” Two factors combined to malapportion the Mississippi Valley and disenfranchise its farmers: “that census” and “our present membership.” If either were removed, an apportionment was possible.<sup>64</sup> That’s why Rankin supported an apportionment of 460 seats, even based on what he insisted was a fundamentally flawed census. (That bill just barely lost by only four votes, after a debate that ran past midnight. In the end, the voices demanding the house stay the same size, in the name of efficiency, won.<sup>65</sup>)

Rankin’s vote—and the votes and arguments of many of his peers—followed a logic that went like this: Sure, the data deserved to be doubted. But taking away a state’s representative was a very great punishment. Even though adding more representatives to other states might dilute a state’s voting power, taking away a seat threatened a particular individual, one who might have been a power broker in D.C., a person with connections or chairmanships who could direct funds home or see to the needs of constituents. Finally, since the data were doubtful and taking away a seat was a very great punishment, any apportionment should avoid taking seats away from a state.

The data were too uncertain to take away a congressional seat, but not too uncertain for any apportionment. Increasing the size of the House, according to this logic, served as a mechanism for dealing with imperfect data.

---

64 *Congressional Record* 61 (1921): 6307–6349 at 6316.

65 US House Committee on the Census, *Apportionment of Representatives in Congress amongst the Several States* (Washington, D.C.: GPO, 1926), 47; *Congressional Record* 61 (1921): 6307–6349 at 6348.

---

# The Fight Over Which Technical Method to Use Served as a Useful Distraction

There remains one more conventional theory that could explain Congress’s failure to accomplish its crucial, constitutional duties: Did debate among scientists over the right method to use in the apportionment ultimately undermine the system? The answer, again, is no—or not directly. A controversy among scientific experts played an important role in the failure—it served as a useful excuse for inaction; it had to be (temporarily) silenced in order for Congress to act—but that controversy did not cause the failure.

Back in 1915, when Willcox first broached the idea of automating the process of allocating representation, he thought that the first necessary step would be to establish a single algorithm as “the correct and constitutional method of apportionment.”<sup>66</sup> He felt confident his “method of major of fractions” had achieved that. Then in 1920, a Harvard engineer named Edward V. Huntington challenged Willcox’s claim, announcing instead a new method—he called it the method of the Geometric Mean or the method of Equal Proportions—that he insisted was the real, true, correct, and constitutional method. As Huntington put it in a letter to the editor published in *The New York Times*, “It should be remembered, that what is really involved is a mathematical principle which admits of no gradation between truth and falsity.”<sup>67</sup> For the ensuing two decades, Willcox and Huntington sparred over whose method was in fact the only right and proper method.

Each side in the fight over method believed that a fair, unbiased, objective measurement was possible, as historian Alma Steingart has argued. For Steingart, the methods controversy sheds light on “the possibility of objectively measuring

---

66 Willcox, “The Apportionment of Representatives,” 15.

---

67 Edward V. Huntington, “House Reapportionment,” *The New York Times* January 16, 1921.

fairness” and can help us better understand similar efforts to bind fairness to science, such as in 21<sup>st</sup> century efforts to combat gerrymandering with computers.<sup>68</sup> The methods controversy could even inform how we think about every new promise of an unbiased algorithmic solution to a complex social problem.

The alternative method that Huntington championed could be interpreted as a “divisor” method, just like Willcox’s own major fraction method. Recall that in a Major Fractions calculation, the analyst chose a “divisor” to divide into each state population total. Then the analyst gave a seat to each state according to the integer value after the division and also gave a seat to each state with a major fraction remainder of 0.5 (the arithmetic mean between one integer and the next) or greater. Huntington’s method of the Geometric Mean would pick a different divisor that by a similar procedure handed out exactly the right number of seats by giving each state its integer value worth of seats plus a seat for each state with a fraction greater than the “geometric mean” between the integer value and the integer plus one. The geometric mean is a strange kind of average, one that represents the number that, if multiplied by itself (squared) would give the same result as the multiplication of the numbers being averaged. Which is to say that you get a geometric mean by taking the square root of whatever you get by multiplying together the original numbers. So the geometric mean between 1 and 2 is  $\sqrt{1 \times 2} = \sqrt{2} = 1.414$ . The geometric mean is always less than the arithmetic mean, but the bigger the integer value, gets the closer the two means get to one another. That meant that the “bar” a state had to cross to deserve an extra seat was lower for small states and got bigger as the state’s integer number of representatives got bigger.

For example, the letter Huntington sent to *The New York Times* in 1921 noted that Willcox’s major fractions method gave Missouri 16 seats and Montana 2, while his method of the geometric mean gave Montana a third seat instead, leaving Missouri with 15. By Willcox’s apportionment, Missouri got eight times the representation, despite having only 6.28622 times larger a population. Huntington’s algorithm gave Missouri five times the representation of Montana, which was still far from perfect—but Huntington argued it was better to under-represent Missouri by 25.7% (using his

68 Alma Steingart, “Democracy by Numbers,” *LA Review of Books*. August 10, 2018. <https://lareviewofbooks.org/article/democracy-by-numbers/>

---

method) than to over-represent it by 27.3% as the Major Fractions calculations did.<sup>69</sup> In that instance, the methods differed only on that single pair of seats—they seldom differed by more than a few seats. They really were not that different.

Huntington didn't invent this method. It had actually been designed by Joseph Hill around the same time Willcox had worked on Major Fractions. Hill, with the 1921 apportionment approaching, dusted off his idea and sent it to Harvard, where it was passed around until it landed on Huntington's desk. Huntington revised the technical implementation of the method and gussied it up with a formal mathematical apparatus.<sup>70</sup> Hill put it this way: "Huntington's method rests on the same principle and is, as I look at it, my method perfected and mathematically demonstrated."<sup>71</sup> Today, the method is usually called Huntington-Hill (instead of "Equal Proportions" or "method of the geometric mean") in recognition of both men's contributions.

Huntington's mathematical principles led him to reject the interpretation of his method as a "divisor" method.<sup>72</sup> In other words, he wouldn't have liked my explanation for how his method worked. He never tired of pointing out that the divisors used in working out the apportionments didn't really mean anything—they were just numbers that made the rest of the algorithm work out. Huntington much preferred to distinguish methods in terms of the various "tests" each could pass. As Steingart has shown, their approach owed a great deal to Huntington's commitments to a mathematical subfield called "postulational analysis."<sup>73</sup> A test of an equal-proportions apportionment showed that shifting a seat from one state to another would increase the *proportional* difference in each person's share of representation. A similar test

---

69 Huntington, "House Reapportionment," *The New York Times*. January 16, 1921.

---

70 Hill, "The Problem of Apportionment," 16-17.

---

71 J.A. Hill to W. S. Rossiter, 5 February 1921, File 408, Box 2, Entry 227, Record Group 29, National Archives, Washington, D.C.

---

72 Elbertie Foudray first asserted the similarity between the methods, interpreting both as divisor methods. Elbertie Foudray, "Memorandum for the Director" June 18, 1928, File 409, Box 2, Entry 227, Record Group 29, National Archives, Washington, D.C.. Huntington rejected that claim. See Edward V. Huntington to Joseph A. Hill, June 21, 1928, File 409, Box 2, Entry 227, Record Group 29, National Archives, Washington, D.C.. Balinski and Young argue that Huntington's method is most certainly a divisor method. See *Fair Representation*, chapter 7.

---

73 Alma Steingart, "Statecraft by Algorithms," *Osiris* (forthcoming).

for Willcox's method of Major Fractions showed that it produced an outcome where shifting a seat from any one state to any other state would result in increasing the *absolute* difference between each individual's share of representation. Huntington thought it was fairer to minimize the proportional difference, rather than the absolute difference. And he also thought his method was fairer because it passed a second test too: It also minimized the proportional differences in the size of each state's average congressional district.

Huntington barged in on the debates in 1921 declaring his method right and all other methods wrong. Some politicians at that very moment had been advocating an apportionment bill increasing the size of the House to 483 seats (such that no state lost a seat), but their prospects suddenly looked dim. So they seized on Huntington's letter.<sup>74</sup> They hoped it would justify postponing debate, giving them time to regroup. That gambit failed and the House passed an apportionment bill at 435 seats using Willcox's method.<sup>75</sup> Huntington persisted, though, sending a letter to the Senate this time, pleading for his method to be adopted.<sup>76</sup> Huntington exhausted every audience he ever encountered with a storm of words and an unshakable certainty that he was right. But Huntington's letter served best as an excuse for the Senate to quietly let the apportionment bill die under the guise of allowing time for an investigation of methods.

Hill sided with Huntington on questions of method, but believed in precedent and procedure. He could also smell a trap. When the Senate asked the Census Bureau's Scientific Advisory Committee to investigate the methods, Hill argued that "the only thing to do is adhere to precedent, enacting the bill in the form which it has passed the House and reserving for future consideration the question of whether the method of apportionment is the best one or the correct one."<sup>77</sup> Hill was willing to give in on the question of method if it saved the

---

74 *Congressional Record* 60 (1921): 1676-1694 at 1678.

---

75 *Congressional Record* 60 (1921): 1676-1694 at 1694.

---

76 Edward V. Huntington to Howard Sutherland, January 22, 1921, File 412, Box 2, Entry 227, Record Group 29, National Archives, Washington, D.C.

---

77 Joseph A. Hill to W.S. Rossiter, February 14, 1921, File 408, Box 2, Entry 227, Record Group 29, National Archives, Washington, D.C.

---

apportionment. But the Senate killed the apportionment bill anyway, using the methods controversy as a pretext.

Willcox, meanwhile, worked toward a revolution. The failures of Congress to pass an apportionment bill in 1921 and 1922 and 1923 and 1924 and 1925 opened the door to automatic apportionment. Willcox stepped through and brought Congress with him. Willcox won the ear of the House Census Committee Chair, E. Hart Fenn, and convinced him that a “ministerial apportionment,” an automated apportionment, could end the brewing constitutional crisis.<sup>78</sup> Instead of trying to reapportion using the 1920 census—which Congress had repeatedly failed to do—it should pass right now a law setting the size of the House at 435 seats and indicating the algorithm to use in apportionment (Major Fractions, naturally) after the Census of 1930 had been completed. Congress could still intervene and pass a new apportionment bill, but if it didn’t, the ministerial apportionment bill would kick in. The Census Bureau would count the people in each state and give those numbers and the apportionment results to the Secretary of Commerce, who would send those to Congress. (Later versions of this legislation inserted the president into the chain of transmission.)

The methods question seldom won much attention, despite the best efforts of the scientific combatants. Hill lamented to Huntington in 1928: “At present hardly anybody knows that there is any question of method, and even Congress looks upon it as more or less academic.”<sup>79</sup> When methods did come to the center of the debate, they were often used to score political points, or to stymie further action. Opponents of the automatic apportionment hoped that the controversy over methods would sow the confusion and dissent they needed to prevail.

Senator Arthur Vandenberg finally got the automatic apportionment bill passed in the Senate—and then in the House—in 1929 by silencing the controversy. To

---

78 Joseph Hill wrote: “The movement to have Congress provide for the ministerial apportionment of Representatives was fostered by Willcox, who aided the House Committee on the Census in drafting a bill which provided for an apportionment by the method of Major Fractions.” In Joseph A. Hill, “Events leading up to the present situation in Congress as regards Apportionment and the Census,” March 30, 1929, Folder Advisory Committee April 1929, Box 72, Entry 148, RG 29, National Archives, Washington, D.C.

---

79 J.A. Hill to Edward V. Huntington, March 14, 1928, File 409, Box 2, Entry 227, Record Group 29, National Archives, Washington, D.C.

---

Vandenberg’s mind, the methods fight was pure distraction. “The more I study this problem,” he wrote, “and the more I correspond with the rival mathematicians,... the surer I am that this need for permanent legislation will never be answered if we permit the contemporary problem to be clouded by this incidental quarrel over ‘methods.’”<sup>80</sup> Throughout 1929, Vandenberg begged and pleaded with the combatants to pause their conflict and stand together on the principle of apportionment. (Vandenberg’s bill used Major Fractions, but required the Census Bureau to report the results for both competing methods.) Not surprisingly, Hill—who had stood for that principle back in 1921—went along. Hill even agreed to corral Huntington.<sup>81</sup> That worked, and the bill passed.

Methods controversies provided justifications for not apportioning, but they alone did not cause the apportionment system to fail. Similarly, the existence of reliable algorithms made possible an automatic apportionment law, but that could only be enacted by hushing up the battle over methods.

In 1941, Major Fractions and Equal Proportions faced off again, this time within the automatic apportionment system. They differed on one set of states. The default Major Fractions apportionment gave a seat to republican Michigan that Equal Proportions awarded to democratic Alabama—Roosevelt and his democratic allies suddenly had a good reason to vote for Equal Proportions, and they did.<sup>82</sup> Public Law 77-291 made “the method of Equal Proportions” (Huntington-Hill) the official algorithm for apportioning seats and it has stayed that way ever since.

---

80 A.H. Vandenberg to William M. Steuart, March 21, 1929, File 406, Box 1, Entry 227, Record Group 29, National Archives, Washington, D.C.

---

81 A.H. Vandenberg to Joseph A. Hill, April 1, 1929, File 406, Box 1, Entry 227, Record Group 29, National Archives, Washington, D.C.

---

82 “Senate Backs House on New Congress Set-Up” *The New York Times*. October 22, 1941.

# Capping the House Doomed the Apportionment

The apportionments of the 1920s weren't done in by a demographic transition, by a nation suddenly realizing it was urban. They didn't fail because the census of 1920 had failed, even though the data it produced offered plenty of grounds for doubt. The apportionment bills weren't killed because a handful of academics couldn't agree on the best way to take an average or round some fractions. These explanations were all used as excuses, but they did not capture the primary cause of the failure.

Congress failed to apportion itself in the 1920s because Congress abandoned one of its oldest traditions. As we will see, it tied its own hands: It set an artificial limit on the size of the House. And then, when that binding prevented it from functioning, it turned over its responsibilities to an algorithmic system, to a machine. The machine that Congress legislated into existence has successfully accomplished two ends for nearly a century. It has ensured a timely and fair apportionment among the states. It has also locked the House at 435 seats. That pair of accomplishments would not have been possible without the automated algorithmic system. Congress was no good at apportioning itself in a capped House—that was the lesson of 1920.

In 1921, the chair of the House Committee on the Census, Isaac Siegel, thought the old traditions would hold sway. A Republican from New York City, Siegel had support within his committee from both sides of the aisle for a bill that would increase the size of the House to 483 members—crucially, the committee could report that “Under this apportionment, no State will lose a Member.”<sup>83</sup> In early January, Siegel ushered H.R. 14498 out of committee and onto the floor of the US House of Representatives.<sup>84</sup>

---

83 US House Committee on the Census, *Apportionment of Representatives*. January 8, 1921, 66th Congress, 3rd session, report 1173, 2.

---

84 US House Committee on the Census, *Apportionment of Representatives*.

But not everyone was convinced. Adding 48 new seats to the House was no big deal in terms of representation—in fact, that number did not even keep pace with the growth of the US population, meaning that in a House of 483 members, the average size of each member’s district would increase by 7,111 constituents.<sup>85</sup>

But dissenters from within Siegel’s own party objected that adding seats—actual, physical seats—in the already crowded hall of government was a big deal, a deal breaker even. It would cost money—millions of dollars—to accommodate new representatives, and their addition would likely make the House less efficient as a deliberative, governing body. The dissenters talked a lot about “efficiency,” efficiency hampered by expansion, efficiency gained if the 435 members just did their jobs representing more people more efficiently.<sup>86</sup> Siegel tried and failed to fend off the critics by promising a constitutional amendment limiting the size of the House to 500 seats.<sup>87</sup>

The Republican leadership decided a few days later that efficiency should win the day—the House would not be allowed to add seats.<sup>88</sup> Siegel scrambled to save his bill and a bigger House. Henry Ellsworth Barbour, a Republican, introduced an amendment to the bill that would hold the membership at 435.<sup>89</sup> It was going to pass, which was why Siegel seized on the opportunity opened by Edward Huntington’s letter and the idea of a methodological controversy. Doubt—“grave doubt”—had been cast on the apportionment calculations, said Siegel.<sup>90</sup> He hoped to negotiate a delay, a chance to regroup. But the bill for a House at 435 apportioned by the method of Major Fractions passed despite his efforts. That bill caused 11 states to lose a representative, even though many agreed the census had captured the American people at an “abnormal” moment. Twenty-two Senators from those 11 states had a good self-interested reason to resist the apportionment bill—and the methods controversy offered ready-

---

85 US House Committee on the Census, *Apportionment of Representatives*, 2.

---

86 US House Committee on the Census, *Apportionment of Representatives*, 29–30.

---

87 US House Committee on the Census, *Apportionment of Representatives*, 4.

---

88 "To Defeat House Increase. Republican Leaders Decide against Reapportionment Bill." *The New York Times*. January 17, 1921.

---

89 *Congressional Record* 60 (1921): 1625–1656 at 1635.

---

90 *Congressional Record* 60 (1921): 1676–1694 at 1678.

made cover for congressional inaction. The apportionment never even came up for a vote in the Senate.

Siegel tried again in October with a compromise bill at 460 members.<sup>91</sup> The data doubters—even Rankin, the fiercest among them—would go along with that apportionment. But Republican leaders and the spirit of efficiency held fast. It was 435 or bust. And so, bust it was. The whole apportionment, the entire tradition of apportionment, the Congress’s credibility—all bust.

When Congress had still failed to pass an apportionment eight years later, the situation appeared dire. Some, like Rankin, wondered aloud if it was really necessary to keep reapportioning every 10 years. That’s why Senator Arthur Vandenberg compared automatic apportionment to “life insurance for the Constitution of the United States.”<sup>92</sup> The law was both a stop-gap for 1930 and a “permanent” protection for the idea that representation should be proportional to population. Vandenberg emphasized that the proposed law worked by “paralleling and authenticating the Constitution.” As a form of legislative insurance, its term endured “not only for one but for all subsequent crises in the event of subsequent defaults.”<sup>93</sup>

Many members of Congress objected on the basic principle that Congress appeared to be giving up its privileges, forgoing its privilege to review the coming census and apportion accordingly, granting that privilege instead to the executive branch (where the automated system resided, in the actions of the Census Bureau, Department of Commerce, and the president). Vandenberg insisted the point wasn’t to give up any congressional rights. It was to “take away only [Congress’s] anticonstitutional inertia.”<sup>94</sup> One opponent of the system saw in it the danger of a coming “time when bureaucratic government will supplant representative government.”<sup>95</sup> But advocates insisted that “there is no discretion delegated” either to the Secretary of Commerce

---

91 US House Committee on the Census. *Apportionment of Representatives*. July 29, 1921 67<sup>th</sup> Congress, 1<sup>st</sup> Session, Report no. 312; *Congressional Record* 61 (1921): 6307–6349.

---

92 *Congressional Record* 71 (1929): 107–109 at 108.

---

93 *Congressional Record* 71 (1929): 107–109 at 108.

---

94 *Congressional Record* 71 (1929): 107–109 at 108.

---

95 *Congressional Record* 70 (1929): 1583–1605 at 1591.

or the president of the United States. The executive only “works out a mathematical problem according to directions and reports the result to Congress.”<sup>96</sup>

The automatic apportionment law made explicit a supposed preference, or at least deference, to overt congressional action. The president would transmit the state population totals and apportionment results to Congress in early January. Then the 1929 law said the automatic apportionment would only go forward if the receiving Congress in its remaining short session “fails to enact a law apportioning representatives among the several States.”<sup>97</sup> A 1940 amendment changed the window of opportunity to 60 calendar days.<sup>98</sup> The 1941 revision which installed Huntington’s method as the default algorithm removed any explicit mention of congressional prerogatives. In barely a decade, the automatic apportionment law had transformed from an insurance policy to be employed against accidental defaults into the primary method of apportioning the House.

Representative Arthur H. Greenwood of Indiana put his finger on the often unspoken assumption lurking behind the automatic apportionment: that it was linked to a possibly permanent cap on the size of the House. “I am not willing to say that 435 Members shall at all times in the future be the sacred number upon which this House shall be organized,” he explained in a 1929 debate.<sup>99</sup> Others were, and 435 has become a nearly sacred number, like its Electoral College complement, 538. It’s now nearly impossible to imagine either number changing—even though a simple act of Congress could increase the size of the House at any moment and change both, just like that.

---

96 *Congressional Record* 70 (1929): 1485–1517 at 1485; Vandenberg said: “There is absolutely no discretion in name or nature reposed in the President in connection with the administration of this proposed act.” *Congressional Record* 71 (1929): 1840–1865 at 1846.

---

97 PL 71-13.

---

98 PL 76-481. This change was necessary because of the Twentieth Amendment to the Constitution, which shortened the lame-duck period and moved up the time when the new Congress met. As a result the president was submitting the figures to the new Congress and not to the prior Congress during a short session.

---

99 *Congressional Record* 70 (1929): 1485–1517 at 1495.

# The Data Made the System Seem Inevitable

Congress still has choices. It can, within limits, choose a different method. It can, within even stricter constitutional limits, choose to tweak the “apportionment base,” for deciding who counts for each state. It can, with only one effectively meaningless limit<sup>100</sup>, choose to change the size of the House. The automated apportionment made it harder over time to recall those choices. Over time, the insurance policy become a permanent, automatic machine that made itself seem natural. How did that happen?

The automated apportionment system depends on a series of data transmissions. The Census Bureau produces counts of state populations, runs them through the apportionment method to generate a fair distribution of the 435 seats and sends that to the Secretary of Commerce, who sends it to the president, who sends it to Congress. Those data transmissions—in what they show, and just as importantly in what they do not show—make it harder to see any alternative to the automated system and its 435-seat House.

Back in 1920, after the census had been completed, but before Congress made any of its initial attempts to pass an apportionment bill, the statistician Joseph Hill appeared before the House Census Committee and brought a set of printed tables with him. Those tables presented not one, but 49 possible apportionments. Each had been calculated according to Willcox’s method of Major Fractions and they laid out a set of possibilities for a House beginning at the existing 435 seats and extending as high as 483 seats.

100 The Constitution requires that there be at least 30,000 persons per representative. To get to that threshold—assuming the 2020 census returns a count of more than 300 million people, as it assuredly will—there would have to be a House with more than 10,000 members, a 20-fold increase in the current size of the House.

---

The tables Hill brought to Congress were what it expected and what it needed to do its work. The Census Committee had no interest in shrinking the size of the House, so Hill did not bother to include tables below 435 seats. He stopped at 483 because that was the first apportionment where no state lost even a single seat, a key threshold for Congress members who wanted to ensure no state was punished.

The columns of the table spoke plainly to Congress's interests. For each possible House size, the tables gave the "ratio" of persons to each representative that would result. They then showed the number of representatives allocated to each state, followed by two columns that indicated how many seats each state has gained or how many seats each state had lost, compared with the existing apportionment. These were the factors that mattered most: How big would districts be under any given apportionment, and more importantly, which states won and which states lost? Hill knew to stop his tabulations once the "Loss" column was finally empty—Congress was unlikely to enlarge itself beyond that point.

Hill's tables reflected Congress's will. They also made possible Congress's action. Those tables created a set of possibilities that Congress could use. The tables assumed a stable apportionment base, a stable conception of who counted, and assumed a stable apportionment method. They left the size of the House as the key variable.

State.	Ratio: 242,267.			Ratio: 228,819.			Ratio: 218,979.		
	435			460			483		
	Number of Representatives.	Compared with present House.		Number of Representatives.	Compared with present House.		Number of Representatives.	Compared with present House.	
Gain.		Loss.	Gain.		Loss.	Gain.		Loss.	
United States..	435	12	12	460	27	2	483	48	-----
Alabama.....	10			10			11	1	-----
Arizona.....	1			1			1		-----
Arkansas.....	7			8	1		8	1	-----
California.....	14	3		15	4		16	5	-----
Colorado.....	4			4			4		-----
Connecticut.....	6	1		6	1		6	1	-----
Delaware.....	1			1			1		-----
Florida.....	4			4			4		-----
Georgia.....	12			13	1		13	1	-----
Idaho.....	2			2			2		-----
Illinois.....	27			28	1		30	3	-----
Indiana.....	12		1	13			13		-----
Iowa.....	10		1	11			11		-----
Kansas.....	7		1	8			8		-----
Kentucky.....	10		1	11			11		-----
Louisiana.....	7		1	8			8		-----
Maine.....	3		1	3		1	4		-----
Maryland.....	6			6			7	1	-----
Massachusetts.....	16			17	1		18	2	-----
Michigan.....	15	2		16	3		17	4	-----
Minnesota.....	10			10			11	1	-----
Mississippi.....	7		1	8			8		-----
Missouri.....	14		2	15		1	16		-----
Montana.....	2			2			2		-----
Nebraska.....	5		1	6			6		-----
Nevada.....	1			1			1		-----
New Hampshire.....	2			2			2		-----
New Jersey.....	13	1		14	2		14	2	-----
New Mexico.....	1			2	1		2		-----
New York.....	43			45	2		47	4	-----
North Carolina.....	11	1		11	1		12	2	-----
North Dakota.....	3			3			3		-----
Ohio.....	24	2		25	3		26	4	-----
Oklahoma.....	8			9	1		9	1	-----
Oregon.....	3			3			4	1	-----
Pennsylvania.....	36			38	2		40	4	-----
Rhode Island.....	2		1	3			3		-----
South Carolina.....	7			7			8	1	-----
South Dakota.....	3			3			3		-----
Tennessee.....	10			10			11	1	-----
Texas.....	19	1		20	2		21	3	-----
Utah.....	2			2			2		-----
Vermont.....	1		1	2			2		-----
Virginia.....	10			10			11	1	-----
Washington.....	6	1		6	1		6	1	-----
West Virginia.....	6			6			7	1	-----
Wisconsin.....	11			11			12	1	-----
Wyoming.....	1			1			1		-----

(Above: I have excerpted three of the 49 sets of apportionments tabulated. These three were the three debated most closely in the 1920s apportionment fights.)

The tables in 1921 constrained the possible choices to a set of House sizes, but they still clearly invited a debate. They invited an active choice. There was no default. Nothing was automatic. That changed with the new apportionment system.

Through the automatic apportionment law of 1929, legislators attempted to constrain future Congresses by constraining the data that would frame future debates. The Census Bureau henceforth had to present a formal statement of population totals and apportionment figures as calculated by the dueling methods of Major Fractions and Equal Proportions. Instead of the sort of tables Hill had always prepared—a long series of apportionments for multiple House sizes—Congress now received one statement for a House of 435 seats and was given about three months (until the end of the short lame-duck session of Congress that followed the elections) to debate it and pass an alternate apportionment bill, if it wanted to. Theoretically, that bill could be any kind of apportionment, but the new data transmission (limited to a House at only 435 seats) implied a much more limited range of alternative bills. (Below is a draft of the new form that Census Bureau officials designed to meet the statutory requirements.)<sup>101</sup>

State	Population as enumerated April 1, 1930	Indians not taxed	Population Basis of Apportionment	Apportionment of 435 Representatives by the method of -	
				Major Fractions, used in the last preceding apportionment	Equal Proportions
<b>Total</b>				<b>435</b>	<b>435</b>
Alabama					
Arizona					
Arkansas					
California					
Colorado					
Etc.					

While a Congress cannot, normally, constrain future Congresses, it can certainly make it more difficult for future legislators to undo what it has done. These new tables implied a debate limited to methods, to a choice limited to two methods. The new tables made any change to the size of the House unthinkable, treating that size as a fixed figure, a given instead of a variable, frozen at 435. The set-up worked.

101 Stuart to Huntington, October 28, 1930, Box 1, File 402 Entry 227, Record Group 29, National Archives, Washington, D.C.

In 1930, the apportionment dictated by the Major Fractions method happened to match exactly that dictated by the Equal Proportion methods. Congress responded to this good fortune by doing nothing. It allowed the automatic apportionment to proceed, unaltered. The House remained at 435 seats.

By the time the 1940 census rolled around, even the original architects of the 1929 law leaned away from seeing it as an insurance policy against Congressional inaction and toward the idea that the automatic apportionment should be the default and final apportionment. This shift first became evident during debates in 1940 occasioned by a 1933 constitutional amendment (the 20<sup>th</sup>) that eliminated the short lame-duck session of Congress. The new schedule threw off the timing for the automatic apportionment, threatening to void it. When Congress met to fix the timing of the law to allow it to continue, members debated establishing an eight-month window, or even a two-year window (an entire Congress period), for congressional action before the automatic law kicked in.<sup>102</sup> Instead, they passed a law that shortened the window for review to only 60 days.<sup>103</sup> The shortened window allowed the results to get to the states while their state legislatures were still in session. But by agreeing to the shortened schedule, members admitted that they did not expect a robust or extended debate about apportionment. They expected, at most, a tweak.

In 1941, the apportionment tables revealed a choice to be made. The two methods delivered nearly identical results, again, but with one difference. The tables revealed that Equal Proportions would preserve for Arkansas its seventh seat, rather than giving it away to the faster-growing Michigan—which was the course prescribed by the default method of Major Fractions. The Democrat-controlled House voted on February 18, 1941, to give the seat to reliably Democratic Arkansas; the bill they passed simply made “Equal Proportions” the default method henceforth.<sup>104</sup> (Congressman Rankin proposed an alternate bill to increase the size of the House to 450 seats, but it was never brought to the floor, and Rankin, the one-time opponent of automatic apportionment, voted instead to maintain the automatic law with Equal Proportions.)

---

102 US House Committee on the Census, *Apportionment of Representatives in Congress*, 76<sup>th</sup> Congress, Third Session, February 27, 28, 29, March 1, 5, 1940, at 81.

---

103 *Congressional Record* 86 (1940): 4366–4386 at 4386.

---

104 *Congressional Record* 87 (1941): 1123–1130.

The Senate failed to act in the 60-day window—it was tied up in debates over the “Lend-Lease Act” and its provisions for aiding the Allies in the war against Hitler’s Axis. As a result, the automatic apportionment chugged along according to the existing law, with a Major Fractions apportionment: Michigan was informed it would get its extra seat. But that did not last. The Senate turned attention away from preparing for war long enough to pass a bill in the autumn of 1941 establishing Equal Proportions as the one and only method to be reported in coming years. It had to explicitly contradict the results of the earlier automatic apportionment, replacing them with the Equal Proportions results. Through this new bill, Michigan would be stripped of the seat it had just been awarded.

Vandenberg (a Republican from Michigan who had plenty of reasons to object to taking a seat away from Michigan) assailed this solution as a rejection of the principle of automatic apportionment—how dare Congress go back and change the apportionment after the window had closed. He called it cheating the automatic decision.<sup>105</sup> The proponents of the bill in the Senate praised it for simplifying matters. As one explained, the existing automatic law “contained in it two alternatives” while the new law proposed to “complete the work begun in 1929 by eliminating one of those alternatives. Thereafter we shall have a completely automatic procedure every 10 years.”<sup>106</sup> Aside from eliminating any mention of an alternative, the new bill (which became the new law) also removed any mention of an explicit window during which Congress might act to install an alternative. The insurance policy had simply become policy.

Every step in the evolution of the automated apportionment system made it more difficult to defy the algorithm. The 1929 law narrowed the question to a question of methods. Any effort to expand the House would now require overturning existing legislation, and since the automatic apportionment bill provided for the needs of most states, it left the losers to fight alone without allies for a repeal and replacement—and there are seldom enough losers in an apportionment for such a course to be successful. This was how the automated system froze the House at 435. Then in 1940 and 1941, Congress shrunk the window for Congressional action and finally

---

105 *Congressional Record* 87 (1941): 8050–8059 at 8053.

---

106 Senator Burton in *Congressional Record* 87 (1941): 8050–8059 at 8054.

---

slammed it shut. The 1941 law removed any obvious choice from the system—the House stood at 435 members, apportioned by a fixed method of Equal Proportions. Congress could of course still pass an entirely different apportionment law, but it would have to contradict the already-in-effect automatic bill to do so. And the statement that the Census Bureau sent to the secretary, which would be sent to the president, and then transmitted to the Congress, offered no hints of any possible action. It arrived appearing to be a deed done, not as data for debate.

---

**Captions and citations:**

Page 44: The states that would lose seats in a 435-seat House, but not in a 483-seat House have been highlighted for this report. US House of Representatives, *Apportionment of Each Number of Representatives from 435 to 483, Inclusive by the Method of Major Fractions*, 66<sup>th</sup> Congress, Third Session, Document 918 (Washington, D.C.: GPO, 1920).

# The Data Sidelined the Anti-Racists, and the Nativists, Too

The data transmitted by the automated apportionment system had nothing to say about anti-Black racism or nativist attacks on immigration to the United States. But that silence does not mean the system had nothing to do with racism or nativism. On the contrary, that silence enacted policies. Automated algorithms do work that is racist or anti-racist, xenophobic or cosmopolitan, whether they say so explicitly or not. The work often happens through the mechanisms by which a system makes a problem or a people visible to legislators or activists.

As Michelle Murphy explains in her magnificent 2006 book, *Sick Building Syndrome and the Problem of Uncertainty*, scientific investigations make some things newly visible but they also make it impossible to see other things, things defined out of existence, things placed outside the focus of the microscope.<sup>107</sup> Every investigation obscures even as it also reveals, and the census was no exception.

In the late nineteenth and early twentieth centuries, many of the census's "regimes of invisibility" accommodated the work of Jim Crow segregation and white supremacy. Take, for example, the work that Walter Willcox did to put in place statistical practices that kept lynching out of official view. In the 1890s, the Census Bureau refused to gather lynching statistics, leaving that work instead to the private efforts of investigators like Ida B. Wells, who aggregated records of lynchings reported in

---

107 Murphy, *Sick Building Syndrome and the Problem of Uncertainty*.

newspapers for her 1895 statistical indictment, *A Red Record*.<sup>108</sup> A different “regime of invisibility” allowed Congress to overlook, deny, and leave in place the mass disfranchisement of African Americans in those same years and in the decades to come—that regime inspired the fierce resistance of activists unwilling to let the data be complicit in a racist political theft of power.

In December 1920, the day after Hill delivered his tables showing Congress 49 possible Houses that could be created, James Weldon Johnson, then the field secretary of the National Association for the Advancement of Colored People (NAACP), appeared before the same House Census Committee and with his own set of tables. Johnson wasn’t there to talk about the size of the House. He turned the committee’s attention instead to another possible variable: the “apportionment base”—the population to be used apportioning representatives. Johnson aimed to penalize Southern states for their mass disfranchisement of Black citizens by reducing the size of their populations for apportionment purposes. This wasn’t just some crazy idea—it was a mechanism written into the Constitution by the Fourteenth Amendment.

Throughout the South, African Americans were denied the right to vote—denied by unfair rules, by the discriminatory application of those rules, and by outright violence and intimidation. Johnson, who was one of the country’s most talented poets, novelists, and a song-writer too, implored Congress to rise to the moment: “We are standing on the crater of a volcano. How long can that situation go on?... It is a fact and the white light of truth beating on it is bound to reveal it. You have got to meet it with wisdom.”<sup>109</sup> He urged Congress to investigate disfranchisement in the South and to withhold representation from states in apportionment. Johnson brought his own data to make visible the extent to which potential voters in the South did not vote.

108 “This and several other incidents such as his introduction to Tillinghast’s work and the role which he played in the Census Bureau’s decision not to collect lynching statistics undercut Willcox’s claim to a statistical middle ground between Blacks and white extremists. The result was to alienate Black leaders such as Bruce, Du Bois, and others, as they accurately came to perceive that Willcox was in fact providing scientific support for the emerging Southern caste system.” (11-12) Mark Aldrich, “Progressive Economists and Scientific Racism: Walter Willcox and Black Americans, 1895-1910,” *Phylon* 40, no. 1 (1979): 1-14. <https://www.jstor.org/stable/274418>; Ida B. Wells-Barnett, *A Red Record: Tabulated Statistics and Alleged Causes of Lynching in the United States* (1895).

109 US House Committee on the Census, *Apportionment of Representatives H.R. 14498, H.R. 15021, H.R. 15158 and H.R. 15217* (Washington, GPO, 1921), 76.

1	2	3	4	5	6	7	8	9	10
State.	Total population, 1920.	Population, 21 years old or more.	Foreign born, un- naturalized, 21 years old.	Potential voters.	Actual voters.	Per cent voting of potential voters.	Per cent voting of population.	Representatives in Congress.	Votes per Repre- sentative.
Alabama.....	2,348,174	1,314,977	9,643	1,305,334	241,070	18.40	10.0	11	21,915
Arizona.....	333,903	186,985	24,382	162,382	66,562	41.00	19.0	2	33,281
Arkansas.....	1,752,204	981,234	8,523	972,711	183,637	18.80	10.0	8	22,954
California.....	3,426,861	1,919,042	293,216	1,625,826	943,463	58.00	27.0	16	58,966
Colorado.....	939,629	526,192	64,793	461,399	352,237	76.40	37.0	4	88,039
Connecticut.....	1,380,631	773,153	164,987	608,166	365,523	60.10	26.0	6	60,920
Delaware.....	290,003	112,001	8,746	103,255	94,756	92.00	47.0	1	94,756
Florida.....	968,470	542,343	20,316	522,027	149,397	28.60	15.0	4	37,349
Georgia.....	2,895,832	1,621,665	7,738	1,613,927	148,716	9.20	5.1	13	11,439
Idaho.....	431,866	241,844	21,289	220,555	135,592	61.30	31.0	2	67,796
Illinois.....	6,485,280	3,631,756	602,657	3,029,099	2,094,702	69.10	30.0	29	72,231
Indiana.....	2,930,390	1,641,018	79,831	1,561,187	1,262,964	80.90	43.0	13	97,151
Iowa.....	2,404,021	1,346,251	136,882	1,209,369	895,076	74.00	37.0	11	81,370
Kansas.....	1,769,257	990,783	67,725	923,058	570,152	61.70	32.0	8	71,299
Kentucky.....	2,416,630	1,353,312	20,081	1,333,231	912,978	68.40	37.0	11	82,998
Louisiana.....	1,798,509	1,007,165	26,383	980,782	117,084	11.90	6.3	8	14,635
Maine.....	768,014	430,087	55,281	374,806	197,845	52.70	25.0	4	49,461
Maryland.....	1,449,661	811,810	52,474	759,338	428,442	56.40	28.0	7	61,296
Massachusetts.....	3,852,356	2,157,319	244,622	2,157,319	993,694	46.00	25.0	18	55,205
Michigan.....	3,668,412	2,054,310	298,775	1,755,535	1,047,819	58.90	28.0	17	61,636
Minnesota.....	2,387,125	1,336,790	271,797	1,064,993	735,838	69.00	30.0	11	66,894
Mississippi.....	1,790,618	1,002,746	4,885	997,861	82,479	8.20	4.6	8	10,311
Missouri.....	3,404,055	1,906,270	114,889	1,891,381	1,332,800	70.40	39.0	16	83,300
Montana.....	548,889	307,377	47,356	260,021	179,006	68.80	30.0	3	59,668
Nebraska.....	1,296,372	725,968	88,331	637,637	475,153	77.40	36.0	6	79,192
Nevada.....	77,407	43,347	9,845	33,502	27,093	79.60	35.0	1	27,093
New Hampshire.....	443,083	248,126	48,333	199,793	159,092	79.50	35.0	2	79,546
New Jersey.....	3,155,900	1,767,304	330,394	1,436,910	903,947	62.80	28.0	14	64,557
New Mexico.....	330,350	201,796	11,573	190,223	104,305	54.90	28.0	1	104,305
New York.....	10,384,829	5,815,504	1,374,005	4,441,499	2,882,500	64.90	27.0	47	61,331
North Carolina.....	2,559,123	1,433,108	3,046	1,430,062	548,741	38.30	21.0	12	45,728
North Dakota.....	645,680	361,580	78,327	283,253	200,778	70.90	31.0	3	66,926
Ohio.....	5,759,394	3,225,260	299,187	2,926,073	2,019,166	69.00	31.0	26	77,660
Oklahoma.....	2,028,283	1,135,838	20,221	1,115,617	486,405	43.50	23.0	9	54,045
Oregon.....	783,380	438,692	55,568	382,124	238,572	64.40	30.0	4	59,643
Pennsylvania.....	2,720,017	1,523,209	721,187	802,122	1,851,248	23.08	64.0	40	46,281
Rhode Island.....	674,397	338,462	89,570	248,892	167,987	67.40	27.0	3	55,995
South Carolina.....	1,683,724	942,885	3,085	939,800	66,150	7.00	3.9	8	8,268
South Dakota.....	636,547	356,466	50,395	306,071	181,747	59.30	28.0	3	60,582
Tennessee.....	2,337,885	1,309,215	9,303	1,299,912	423,392	32.70	18.0	11	38,762
Texas.....	4,663,228	2,611,407	120,969	2,490,438	441,037	17.70	9.2	21	21,001
Utah.....	440,396	246,621	32,911	213,710	193,497	90.40	43.0	2	96,748
Vermont.....	352,428	197,359	24,960	172,399	89,905	52.20	25.0	2	44,932
Virginia.....	2,309,187	1,293,144	13,528	1,279,616	231,029	18.00	10.0	11	21,002
Washington.....	1,356,621	759,707	128,120	631,587	394,195	62.30	35.0	6	65,699
West Virginia.....	1,463,701	819,672	28,609	791,063	599,942	64.40	34.0	7	72,848
Wisconsin.....	2,632,067	1,473,957	206,432	1,267,525	701,301	55.30	26.0	12	58,441
Wyoming.....	194,402	108,865	14,510	94,355	53,120	56.50	27.0	1	53,120

Johnson had to bring his own data because the Census Bureau did not ask or collect voting information. The 1870 census had included a question asking male citizens, 21 years or older, if their “right to vote is denied or abridged on other grounds than rebellion or other crime.” But post-Reconstruction Congresses, less and less committed to protecting the voting rights of southern Blacks, let the question slip from subsequent censuses. In those 1920 hearings, members of the committee from the South did their best to obscure the entire issue. A Louisiana representative argued against printing Johnson’s table in the official hearing records. He insisted he was motivated by a desire to trim costs, not by racism: “This Congress is very strong on economy... We ought not to print all of this. It is extravagant.”<sup>110</sup>

Economy could not be used as a pretext for the refusal of Southern members to have the hearings photographed that day (as had been scheduled) because they did not want to be recorded with Black men testifying in the chamber.<sup>111</sup> They tried to suppress any and all documentation of the disfranchisement charges. And when that didn’t work, they took offense. They treated Johnson’s reasoned indictments as if they were personal attacks, and the white press played along, featuring the lamentations of the wounded Congressmen, while neglecting the voices of the Black activists and avoiding the actual problem of disfranchisement.

Congress and the statisticians kept disfranchisement invisible in the statistics, and so excused Congress for ignoring it. Massachusetts’s Representative George Tinkham proposed an amendment to a 1921 apportionment bill that would have added a clause affirming the responsibility of Congress to decrease the representation of states that disfranchised their citizens—this was already a responsibility laid out in the Fourteenth Amendment to the Constitution. But the Republican majority leader explained that Tinkham’s request couldn’t go through: “My understanding is that there is no information available on which we could now act intelligently, and that is no doubt the reason why the gentleman from Massachusetts has presented no plan or provision for the carrying out of the provisions of the Fourteenth Amendment.” To succeed, an amendment punishing states that suppressed the vote needed hard,

---

110 US House Committee on the Census, *Apportionment of Representatives H.R. 14498, H.R. 15021, H.R. 15158 and H.R. 15217* (Washington, GPO, 1921), 73.

---

111 “Negroes Charge Discrimination,” *Los Angeles Times*. December 31, 1920.

official numbers, but Congress and the Census Bureau had seen to it that such hard, official numbers did not exist.

Johnson tried to dismantle a “regime of invisibility” that allowed Congress to say: “We have no numbers, no evidence to use in decreasing the representation of Southern states, even if we were inclined to do so.” Congress was not inclined to punish the South, though, which was one reason that the regime of invisibility persisted, one reason that Johnson and his colleagues had worked extra hard to puncture the wall of knowing ignorance. But it was all to no avail against such intentionally engineered silence.

Later in 1921, a very different group tried to alter the apportionment base. As in the disfranchisement case, it depended on the availability of census data. This time, it was xenophobic members of Congress taking the initiative, and rather than claiming they wanted to uphold the Constitution, they sought to change or ignore it. The members began talking about excluding noncitizens from the apportionment counts in the second round of apportionment wrangling in 1921. Not coincidentally, that report published by the House Census Committee in July 1921 included (following Hill’s tables) another set of tables showing totals of the foreign-born white population in 1920, 1910, and 1900 and figures on the citizenship status of foreign-born white males 21 years of age in 1920 in each state.<sup>112</sup> Such figures could be used to subtract noncitizens from the apportionment base, although even the proponents of that course admitted it was almost certainly unconstitutional.<sup>113</sup>

Nothing much came of the talk of removing immigrants from the apportionment base in 1921 (especially because it was generally accepted that to do so would require a constitutional amendment). But census data played a major role in debates over immigration restriction throughout the 1920s. Those debates culminated in the 1924 Reed-Johnson Act, which depended on the Census Bureau (and Joseph Hill

---

112 US House Committee on the Census, *Apportionment of Representatives* H.R. 7882 (Washington, GPO, 1921), 29–34.

---

113 In 1929, Homer Hoch and another conservative representative named Henry St. George Tucker III began convincing themselves that excluding noncitizens could be done without amending the Constitution. Still, Hoch kept up his efforts into the 1930s, unsuccessfully, to pass a constitutional amendment excluding aliens from the apportionment base.

---

in particular) to generate objective facts capable of justifying racist and nativist policy. The 1924 law sought to stem the influx of Italians, Russian Jews, and other immigrants from southern and eastern Europe. It also extended and strengthened already existing strictures that severely limited immigration from Asia. Congress instructed Hill to determine the ethnicities or “national origins” of the white population and to use his findings to set quotas for the future. The leading historian of this effort, Mae Ngai, has noted that “the national origins quotas was arguably the most difficult challenge of Hill’s career: Congress would reject reports submitted by the Quota Board and postpone implementation of the quotas twice before finally approving a third report in 1929.”<sup>114</sup> The entire tortured, convoluted, and controversial process of calculating national origins had been designed to generate quotas that discriminated in favor of northern Europe without appearing to have discriminatory intent, while naturalizing the exclusion of Asians and Africans.<sup>115</sup>

Having succeeded in restricting entry to the United States, some in Congress turned back to the idea of excluding noncitizens from the apportionment base. They were once again hungry for census data. In late 1928, Kansas Representative Homer Hoch began preparing a Constitutional amendment that would remove all “aliens” from apportionment calculations. He started writing letters to Director Steuart in the Census Bureau to get as much data about alien populations and apportionments as he could. In December 1928 and January 1929, Steuart sent tables for 1920 and 1910, demonstrating the effect of reapportioning by removing noncitizens (called “aliens” in legal parlance) or by excluding “aliens 21 years of age and over.” He refused to send estimates of aliens in each state in 1930 because he said the Census Bureau had not made them and that it was dangerous to use estimates “especially in relation to an apportionment in which a slight variation in population may make a difference of one representative more or less.”<sup>116</sup> Hoch, and Rankin too, kept pressing for more

---

114 Mae M. Ngai, *Impossible Subjects: Illegal Aliens and the Making of Modern America* (Princeton, NJ: Princeton University Press, 2014), 25.

---

115 Immigration restriction limited some immigration and also created a new status—the undocumented or illegal immigrant—whose numbers became and remain subject to much investigation and speculation. See Ngai, *Impossible Subjects*; Libby Garland, *After They Closed the Gates: Jewish Illegal Immigration to the United States, 1921-1965* (Chicago: University of Chicago Press, 2014).

---

116 W. M. Steuart to Homer Hoch, December 31, 1928, File 405, Box 1, Entry 227, Record Group 29, National Archives, Washington, D.C.

---

and more up-to-date citizenship data as 1930 approached—although they never succeeded in their efforts to exclude some or all noncitizens from the apportionment.

In the conventional story, the automated apportionment served as a safeguard against the brash seizure of power by rural legislators with racist and xenophobic intent. That story stumbles on multiple fronts. The automated apportionment resulted from the capping of the House, rather than from efforts to stem the shift of representative power in the face of inexorable demographic trends. Just as importantly, the automated apportionment didn't avoid racist policy—it locked in a devastating silence on the question of disfranchisement, one that would not be overturned for decades. At the same time, the automated apportionment did fend off the most aggressive of xenophobic demands, preserving the Constitution's commitment to counting all immigrants.

---

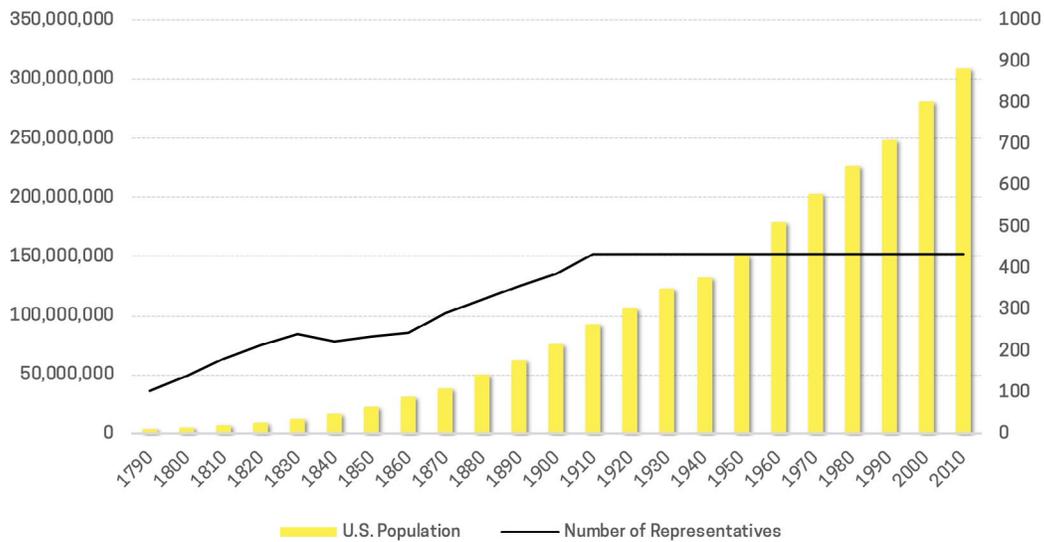
**Captions and citations:**

Page 51: The column showing the percent of potential voters who actually voted in each state has been highlighted for this report. So too are the states with the lowest percentages. US House Committee on the Census, *Apportionment of Representatives H.R. 14498, H.R. 15021, H.R. 15158 and H.R. 15217* (Washington, GPO, 1921), 74.

# Conclusion

The automatic apportionment system has operated for nearly a century. It has successfully apportioned the House nine times thus far. We will soon see if it can manage a tenth. Over the course of that century, the system has locked the House at 435 members, even as the population of the US has tripled.

**US Population Grows, Households**



Congress entrusted its authority to an automated algorithm in 1929 and so made possible this extraordinary, extended limitation on our democratic system.

The story of the automatic apportionment invites a rethinking of the way the US deals with census data and apportions representatives. That is the first thread to follow in this conclusion. The decision of Congress to turn over its powers to an automated algorithmic system also invites more abstract, theoretical considerations about what it means to trust in numbers. That is the second thread to follow here.

To pull on our first thread, consider the implications of the automated system and of capping the House’s membership.

The framers of the US Constitution dictated one limit on representation. They said that the ratio of people to representatives could never be smaller than 30,000 to 1. On average, Congressional districts could not dip below 30,000 people. But the framers imposed no limit in the other direction. The average hovered in the 30,000s for the first few censuses, broke the 100,000-person threshold during the Civil War, and rose past 200,000 in 1911.<sup>117</sup> In 2010, the average stood over 700,000 people.

A 2020 report by the American Academy of Arts and Sciences entitled *Our Common Purpose* points out that constraints on the size of the House have also made presidential elections less democratic. “The vote of a Wyoming resident weights 3.6 times more heavily in the Electoral College than that of a Californian,” explains the report.<sup>118</sup> Since the Electoral College is linked to the size of the Congress, expanding the House would also expand the Electoral College and more fairly represent larger states. The report calls for a repeal of the 1929 act to “make the House more representative of the nation.”<sup>119</sup>

The failures of the 1920s opened the door to the algorithm. Were this a novel or a conspiracy theory, we might imagine that this was a planned coup by the technocrats. Walter Willcox dreamed up the algorithm as a means of restraining the growth of the House—this much is true. Next, he convinced the House leadership that an automated apportionment was worth passing—still true. Meanwhile the Republican Party so embraced technocracy that it nominated a prominent engineer—Herbert Hoover—to run for president (successfully) in 1928—also true. Yet for all that is true in this story, the idea that the whole thing could have been planned or coordinated is absurd. Willcox wanted an automatic apportionment, and Republican leadership embraced efficiency and even a limited amount of technocracy. But no individual orchestrated,

---

117 US House, Committee on the Census, *Apportionment of Representatives*. January 8, 1921, 66th Congress, 3rd session, report 1173, 4.

---

118 American Academy of Arts and Sciences, *Our Common Purpose: Reinventing American Democracy for the 21<sup>st</sup> Century* (Cambridge, MA: American Academy of Arts and Sciences, 2020), 24.

---

119 American Academy of Arts and Sciences, *Our Common Purpose*, 23.

or even imagined, the set of events that ended in the automatic apportionment. A desire to hold the House at 435 seats in 1921 caused a series of fights—over flaws in the count, the fate of the nation, the fairness of the methods involved—which came in tandem with fights to do something about the disfranchisement of Blacks or to strip representation from immigrants. These fights ended in failures, in a string of failed apportionment bills, which in turn created an unexpected opportunity for Willcox’s dream to come true.

Today, the memory of the failures of the 1920s secures the algorithm’s future. Sure, the system locks in a deeply undemocratic rule, but what would happen if it were gone? Wouldn’t the system again become vulnerable to failure the next time a declining elite finds itself on the losing end of shifting demographic tides? Couldn’t we end up, again, stuck with the same representation for 10 years too long, or 20, or 30? Wouldn’t representational democracy be in peril? Well—maybe. But it’s useful to remember that the native-born white politicians who sought to hold on to their power in the name of protecting agricultural America weren’t solely, or even primarily, responsible for sinking the apportionment in the 1920s. Absent the constraint that the House stay the same size, there is every reason to believe that an apportionment at 460 or 483 seats would have sailed through in 1921—it came very close, twice. The threat to democracy posed by racialized, xenophobic demagogues is real, then and now. (In 2019 and 2020, President Trump signed an executive order and then issued a memorandum intended to gather and reveal data on citizenship status that could have been used to exclude certain noncitizens from the apportionment base, despite the almost assured unconstitutionality of such action.<sup>120</sup>) But there’s little reason to believe that such demagogues would hold the apportionment hostage. It is a perverse irony that this fear that democracy might be kidnapped (by a future failure of apportionment) has justified a century-long suppression of democracy (by the automated apportionment system).

120 Donald J. Trump, “Executive Order on Collecting Information about Citizenship Status in Connection with the Decennial Census,” July 11, 2019. <https://www.whitehouse.gov/presidential-actions/executive-order-collecting-information-citizenship-status-connection-decennial-census/>; and Donald J. Trump, “Memorandum on Excluding Illegal Aliens from the Apportionment Base following the 2020 Census,” July 21, 2020. <https://www.whitehouse.gov/presidential-actions/memorandum-excluding-illegal-aliens-apportionment-base-following-2020-census/>.

Two experts who appeared before Congress in 1940—both veterans of the 1920s fights—disagreed about the lesson to be learned from the failure of apportionment. A former New York congressman who had pushed for the automatic apportionment bill warned that allowing it to lapse threatened there being any apportionment. “You will have logrolling in an effort to stop reapportionment,” he predicted.<sup>121</sup> But Walter Willcox, also an automatic apportionment supporter, predicted a different consequence of inaction: “If you want to increase the size of the House beyond 435 Members, provide 35 or 40 more, which has been about the average increase, you should do nothing.” He explained further: “The great advantage of the automatic provision is that it takes away from those who want to increase the House the main weapon they have to hold up reapportionment.”<sup>122</sup>

I think Willcox was right. Eliminating the automatic apportionment would not doom apportionment, would not assure its failure. Instead, it would free the House to grow. But for those who believe instead the alternate claim, that removing automatic apportionment would endanger future apportionments, would make possible some future theft of power, there is another solution. The automatic apportionment could remain in effect and Congress could act separately in a stand-alone bill to substantially increase the size of the House. This would be a compromise move, but it would mitigate some of the anti-democratic implications of the existing automated algorithmic system.

Legislators might also reconsider the method behind the algorithm. The reigning method—Equal Proportions (Huntington-Hill)—favors smaller states, further amplifying the political influences of states already advantaged by the Senate and the Electoral College. As the political scientists Michel Balinski and Peyton Young have argued, it is long past time to adopt another method, such as Major Fractions (which they call “Webster’s”), that gives more weight to larger populations.<sup>123</sup>

---

121 US House Committee on the Census, *Apportionment of Representatives in Congress*, 76<sup>th</sup> Congress, Third Session, February 27, 28, 29, March 1, 5, 1940 at 42.

---

122 US House Committee on the Census, *Apportionment of Representatives in Congress*, 76<sup>th</sup> Congress, Third Session, February 27, 28, 29, March 1, 5, 1940 at 42–43.

---

123 Balinski and H Young, *Fair Representation*, 4.

Pulling now on our second thread, consider how the people in power came to hand over some of that power, more or less willingly, to an automated algorithmic system and what that story says about the relation of algorithms to governance.

A distaste for too much democracy, and for democratic politics, runs through the history of automated apportionment. Willcox and Hill both turned up their noses at the way Congress in 1901 rolled logs and made deals around the apportionment figures, increasing the size of the House to win votes and satisfy colleagues. As professional scientists in a newly permanent and professional Census Bureau, they sought to make apportionment as objective as the data they collected. Yet Willcox and Hill too seldom admitted the politics in their own approaches—a politics that did not particularly favor one party or the other, but one shaped by anti-Black racism and xenophobia, a politics that favored efficiency over participation, a politics of distrust in politics.

The Congressional leadership in the 1920s shared the statisticians' enthusiasm for efficiency and many of their biases, and they demonstrated a less than overwhelming faith in democratic governance. Republican leaders and their caucus drove hard to limit the growth of the House. Over the course of the decade they lost faith that their colleagues could ever do it. So they tied their own legislative hands, ushering the alien robots into the Capitol. The move came with severe costs. It laid aside a key tool by which Congress could exercise judgment about the fitness of any particular census. Certainly, most members of Congress were incapable of accurately evaluating the accuracy of any particular census—and yet for this the most political of data, next to electoral results, Congress had developed tried and true methods for dealing with imperfect data. And every census, to some degree, deals in imperfect data.

Going forward, Congress could hold hearings, exercise oversight, but the apportionment was left to the algorithm and any messes fell to the Supreme Court, which has over the course of the century been called on time and again to adjudicate the algorithmic system's allocations—and each time has sided with that system.

A century ago, Congress itself pioneered a politics of distrust in politics, one that looked for technical, objective, mechanical solutions to knotty social problems, one rigged in favor of the status quo. In his influential book *Trust in Numbers*, Theodore

Porter argues that bureaucracies turn to mechanical decision criteria out of their political weakness—they let numbers do the talking so they don't have to do the talking themselves.<sup>124</sup> It's possible to read the automated apportionment with this theory: Legislators committed to freezing the House but unsure they could turned to a mechanical system to justify the decision.

But that isn't the heart of this story, an odd story where those with the most power—Congress itself—turned over authority to the data and an algorithm. Trust in the numbers in this case did not stem from the actions of the politically vulnerable (at least not as we would usually understand the vulnerable). The decision to invest power directly in the numbers instead grew from Congress's distrust of future Congresses.

In recent years, the algorithmic systems have become more sophisticated. Not content to sort and decide based on what has actually been counted, on what has been observed to have happened, they predict what will happen, what will be observed, what should count. Algorithmic systems decide who should be watched, who hired, who released. They place faith in objective systems too often blind to the holes in their objectivity, while disparaging the idea that deliberative, electoral politics can or should be allowed to interpret and make judgments from data. They're everywhere, binding democracy, following the path blazed after a troubled census and the algorithm that was supposed to have saved it.

124 Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995).

---

# Acknowledgments

This report began with danah boyd's questions and vision, sending us down an unexpected road. Kevin Ackermann provided invaluable research, for which I am deeply grateful. I owe thanks as well to the History Lab: Andrea de Hoyos, Emily Karavitch, and Ethan So, supported by grants from the Colgate University Research Council, for their research and their willingness to become experts in reading manuscript census records. We could not have completed this report without the archival expertise of the staff of the National Archives in Washington, D.C., and the help and guidance of Leigh McWhite at the University of Mississippi libraries. The research led by Denice Ross and Taylor Savell with the Census Quality Reinforcement Taskforce informed and improved this report. Danielle Allen, Meredith Broussard, and Alma Steingart reviewed this report and offered very helpful comments. Margo Anderson read multiple drafts with great sagacity and generosity. The report benefited from comments by Corinna Schlombs and Michael McGovern.

At Data & Society, Cristina López G. and Matt Goerzen read early drafts and the entire Disinformation Action Lab team, led by Charley Johnson, supported this work. Janet Haven supported the project from the start. Sareeta Amrute and Siera Dissmore carved out a welcoming space for careful research, and Patrick Davison's editing made it clearer and sharper. My thanks to Yichi Liu for designing the report and to Sam Hinds, Chris Redwood, and Natalie Kerby for bringing it into the world. The ideas in this report were shaped by events expertly organized in person and virtually by CJ Brody Landow and Rigoberto Lara Guzmán. Josh Greenberg offered advice and encouragement starting early on and made this report possible through generous support from the Alfred P. Sloan Foundation.

Data & Society is an independent nonprofit research institute that advances new frames for understanding the implications of data-centric and automated technology. We conduct research and build the field of actors to ensure that knowledge guides debate, decision-making, and technical choices.

[www.datasociety.net](http://www.datasociety.net)  
[@datasociety](https://twitter.com/datasociety)

Cover art by [Mike McQuade](#) | Designed by [Yichi Liu](#)

April 2021