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No Accountability Without Transparency and Consistency: Evaluating Mexico's Redistricting-by-Formula

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ABSTRACT

Since 1996, an independent bureaucracy in Mexico has carried out a redistricting process purportedly founded in machine optimization of plans based on open and objective criteria. However, the process of "fine-tuning" the plans that are initially produced by formula is conducted behind closed doors where parties and experts are allowed to offer counter-proposals. This raises questions about the necessary conditions required for a bureaucracy to operate in a transparent, consistent, and accountable manner. Our research examines this question through the analysis of private records that trace the bargaining process that takes place between parties and bureaucrats. Analysis uncovers substantial gaps in *transparency* and *consistency*. Accountability in the Mexican redistricting process remains wanting without these.

Keywords: electoral management, electoral independence, electoral integrity, redistricting, optimization, transparency, accountability.

INTRODUCTION

"Bureaucracy develops more perfectly, the more it is dehumanized."

Max Weber, *Economy and Society* (p. 975)

Redistricting, the periodic redrawing of electoral boundaries, can become politicized when incumbents and their political parties seek to distort electoral outcomes by how votes are aggregated within legislative districts. To mitigate these abuses, reformers often prescribe delegating redistricting

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We describe contributions to the paper using a standard taxonomy (Allen, Brand, Scott, Altman and Hlava 2014). A. Trelles (AT) and M. Altman (MA) were lead authors, having taken primary responsibility for writing. AT prepared the original draft and is the corresponding author. E. Magar (EM) and M. McDonald (MM) contributed to writing through editing and review. All authors contributed equally to conceptualization. AT lead methodology, with contributions from MA. AT lead data curation, with contributions from EM and MA.
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to independent electoral commissions. In the United States, for instance, eleven states removed congressional and state district boundary delimitation from the standard legislative process and placed this authority in the hands of advisory or independent commissions (McDonald 2004; Bickerstaff 2014). Worldwide, many countries delegate authority to an electoral management body (EMB) that is bureaucratic and operates in an ostensibly neutral manner (Handley and Grofman 2008).

Mexico's EMB has been lauded as exemplary by international standards and a role model (Mozaffar and Schedler 2002; Estévez, et al. 2008; Woldenberg 2012). When re-drawing district delimitations, the National Electoral Institute (known as INE since 2014, formerly the Federal Electoral Institute known as IFE) employs expert cartographers who rely on an automated redistricting algorithm to generate congressional map blueprints. Once the preliminary map is drawn, parties have authority to formulate counter-proposals to the computer-generated district lines, which may be adopted if they objectively improve upon the computer-generated solutions.

INE claims Mexico's redistricting process is transparent and objective. We disagree, to some extent. There remains room for opaque, closed-door bargaining between the political parties and bureaucratic experts. While this dynamic alone is insufficient to produce biased plans, external observers cannot verify whether or not formal rules are followed, assess how outcomes conform to expectations, or analyze how bureaucrats convert formal rules into observable outcomes.

Mexico's redistricting process raises important questions related to bureaucratic accountability in election administration, a notion of worldwide interest. In this article we uncover and analyze the closed-door process to assess the accountability of the system in terms of transparency and consistency. Specifically, we address the following questions: Is publicly available information sufficient to understand Mexico's process, reproduce the outcome, and verify that the process conformed to election law and bureaucratic rules? Are Mexico's redistricting rules complete, exhaustive, and unambiguous enough to support widespread claims of objectivity? Have rules been applied consistently within and across processes? Are observed outputs consistent with how the process was officially portrayed? Were recent redistricting processes compliant with the law? In case of rule deviations, might they have favored a political party?

We analyze a novel dataset comprising the entire set of map blueprints and party counter-proposals made in the 2013 and 2017 redistricting cycles. We obtained these data well after the redistricting concluded. A fortunate set of circumstances underpins our analysis. While experts completed redistricting in the year 2013, INE never adopted the map, asserting they acted with prudence in a time when congressional parties were finalizing broader electoral reform. Then in 2017, INE redrew again the federal map, using the same census inputs but a slightly different optimization algorithm.[1] We exploit these circumstances to evaluate these two separate redistricting cycles on nearly identical terms.

Our analysis reveals a sharp discrepancy between the purportedly objective choices of the automated algorithm and the maps produced, and between the claims of a transparent process and the actual closed-door negotiations between parties and the bureaucracy. We argue closing this accountability gap requires increasing transparency by fully opening the closed-door interactions. We clarify our meaning of "fully opening" by specifying necessary and sufficient conditions for direct external auditing of the process and the departures from the algorithmic objectives. The ensuing public deliberation should reveal whether redistricting is truly objective or needs adjustments.

THE ROLE OF TRANSPARENCY AND CONSISTENCY IN REDISTRICTING

Defining transparency and consistency

Scholars argue transparency and consistency within bureaucratic organizations are critical requirements for accountability in democratic governance (Rourke 1961, Moffitt 2010, Gailmard and Patty 2012), and specifically for electoral processes (Fung 2007; Hollyer et al., 2011, Norris and Nai 2017). We define these concepts as follows:

> **Transparency**: The steps of a process are publicly available before, during, and after a decision is made. This includes preparation, planning, discussions, and execution. Rules are clearly explained, justified, and made publicly available prior to

[1]See Supplementary Materials, Appendix 1 for more details.

their enforcement, including relevant constitutional articles, statutory codes, regulations, administrative agreements, and even informal practices. Evidence relevant to the operation of the process is made publicly available in a timely fashion, including inputs (e.g., data), actions (e.g., proposals and evaluations), and outputs (e.g., winning plans).[2]

Consistency: Decision-making rules are unambiguous with each other. That is, rules do not contradict one another, and the rationale for subordinate rules is consistent with the goals of higher-order rules. Rules and evidence are consistent. All observed actions should fall within the limits of clearly defined rules. And the overall pattern of results should be broadly consistent with the declared goals.[3]

A process that is simultaneously transparent and consistent provides the foundation for accountability. These attributes also allow any external agency to identify if a deviation has occurred. For example, a citizen, interest group, or judge who wants to assess the system, compare outcomes, evaluate whether or not goals were met, or if the decision was politically neutral, would need access to a wide variety of information in accessible formats.

Alvarez and Hall (2008) note these principles are closely aligned with legal theories of evidence—e.g., chains of custody—and public administration theories of standard operating procedures (SOPs) that are key for electoral integrity. A process that is transparent and consistent avoids a bureaucratic "abuse of discretion" and ensures that there is no bad faith of the bureaucratic actors responsible for implementing a policy procedure (Park et al., 2004). A clear SOP furthermore reduces uncertainty in complex bureaucratic interactions because it creates operating environments and routines that generate credible, predictable, and verifiable outcomes (Johnson 1990, Guy 1990, LaPorte and Consolini 1991, Rijpma 1997, Norris 2017).

A redistricting process characterized by transparency and consistency allows external agents—e.g., an independent citizen or candidate, a minority group, or a court—interested in understanding how it works—e.g., its different phases, the actors involved, and decision-making process—to evaluate the process simply by looking at the information that is made publicly available. With this information, external agents can verify if goals are met and if decisions are consistently applied based on a public operational and normative framework.

For a complete evaluation in Mexico's context, which uses automated redistricting as a component of the process, external observers require access to all material related to algorithmic decisions, such as the definition of the scoring cost function, algorithm, executable software used by parties, source code, and input data. Furthermore, they would require all the information related to the bureaucratic and partisan interaction to be available, such as all the plans that were generated by machines, bureaucrats, and parties, as well as the record of decisions and justifications for selecting plans.

Mexico's national redistricting process

Mexico's electoral management board is responsible for drawing the three-hundred single-member lower chamber federal districts apportioned among the thirty-two Mexican states. INE is charged with implementing Mexico's constitutional mandate for "maximum transparency and objectivity."[4] The institution's guiding principle of "máxima publicidad (maximum transparency)" states that INE will guarantee that "all actions and information—unless it is restricted by law—will be made publicly available."[5]

One mechanism INE employs to achieve objectivity and transparency is technology. Objectivity is achieved through a mathematical scoring of redistricting plans on *a priori* determined metrics. Transparency is, in part, achieved through the dissemination of data used to compute the scoring metric components that together comprise a cost function and creation of an automated redistricting algorithm programmed to minimize this function.

Combining these principles, the INE asserts, "The Institute took irreversible steps regarding transparency by using computing resources and up-to-date geographical information that allow a very small margin, if any, for manipulation. It guarantees to

[2]Our definition of transparency is based on the public information perspective and the degree to which information is made available in accessible formats to actors outside of the bureaucracy for accountability purposes (Young 2000, Jaeger and Bertot 2010, and Erkkilä 2020).

[3]We define consistency based on the principles of rational coherence—applied to rules—described in the work of Schick (1966), Hage (2000), and Bossert and Suzumura (2010).

[4]Article 41, Section V, Subsection A of the Mexican Constitution. Also see, INE's guiding principles: <https://www.ine.mx/sobre-el-ine/cultura-institucional/>.

[5]See INE's definition of guiding principles: <https://www.ine.mx/sobre-el-ine/cultura-institucional/>.

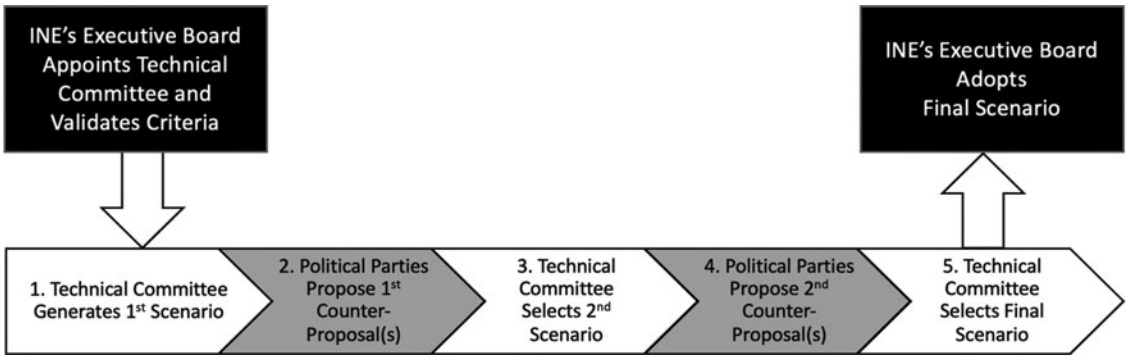

FIG. 1. Phases of the redistricting process in Mexico.

all citizens that this was a reliable process" (IFE 2005:40). Another mechanism INE employs to facilitate transparency is participation, "At all times, the districting process is distinguished by its transparency and broad participation of all individuals involved and committed to electoral democracy" (IFE 2005:17). INE facilitates participation by incorporating national and local political parties into redistricting.

Mexico's redistricting process begins with INE's Executive Board definition of criteria and appointing a Technical Committee (TC) composed of external experts in areas such as demography, cartography, statistics, optimization, and indigenous populations.[6] The TC is responsible for producing plans for every state according to a computer algorithm using an explicit scoring function. It ends with the Executive Board's approval of the final scenario suggested by the TC (Trelles 2017).[7]

Figure 1 summarizes Mexico's mapping process in five stages. First, the TC produces the "first scenario" map for each state using an in-house optimization process. The committee defines the type of optimization algorithm to be used, the number and type of restrictions included in the cost function, and assigns the weight that each measure will receive (with a cost function, lowest-scoring plans are considered "best"). Then, political parties represented within INE's national and local oversight commissions, respectively known as Comisión Nacional de Vigilancia (CNV) and Comisiones Locales de Vigilancia (CLVs, one for each of 32 states), can propose alternative plans.[8]

As the parties formulate counter-proposals to the machine-generated map, they are constrained by the scoring function—the TC is ostensibly bound to adopt the plan that scores best.[9] Third, the TC then evaluates all suggested plans and selects a "second scenario" from among the first scenario and the parties' counter-proposals. Fourth, the parties are invited a second time to present counter-proposals. Finally, the committee then evaluates all suggested plans—from among the set of plans that includes the second scenario and second-round counter-proposals, selects a final scenario, and recommends it to the board for adoption.[10]

This process resembles, in some respects, an informal New Jersey's state legislative Apportionment Board norm. Since the 1980s, the eleventh member of the New Jersey commission (appointed by the State Supreme Court) has selected the best

[6]Although redistricting criteria are derived from Article 53 of Mexico's Constitution, INE's executive board (the *Consejo General*) approves the type, number, and hierarchy of the criteria that will be used, as well as the timeline and stages involved in the process. Historically, the most important restriction has been population balance across districts, allowing for a considerable deviation oscillating between +/- 10 and 15 percent, followed by additional criteria such as geometric compactness, preserving municipal boundaries, traveling time, and inclusion of minority groups. The TC is chaired by the Executive Director of the Federal Registry of Voters and serves as a connection point between the technical experts and the different bureaucratic areas (e.g., the census bureau, the registry of voters, or INE's cartography and information technology departments).

[7]For a detailed account of the history and rules governing the process see Supplementary Materials, Appendices 1 and 2.

[8]All parties are aware of the cost associated with their plan, as well as of the cost associated with all other plans in all stages (bureaucratic and partisan).

[9]See redistricting rules for formulating counter-proposals and evaluation criteria. *Dirección Ejecutiva del Registro Federal de Electores (DERFE)*. May 18, 2016.

[10]For the 2017 redistricting process, INE adopted a rule—*criterion 8*—that opened the possibility for the bureaucracy to validate higher-scoring partisan plans as long as no other party vetoed that plan.

scoring plan from those submitted by the two major political parties, according to an explicit scoring function the eleventh member adopts that prioritizes the criterion of partisan fairness (Stokes 1993).

Like New Jersey, Mexico's electoral commission uses an explicit scoring function and political parties are encouraged to submit proposals for consideration by a "judge," here, the TC. Mexico's redistricting process, however, departs from New Jersey because rather than relying on a single-shot "divide the dollar" game where in a one-round game the two political parties are encouraged to out-bid each other by proposing the most politically fair plan, INE uses an automated algorithm to set a benchmark score that any national party may attempt to beat by presenting a lower-scoring counter-proposal during two consecutive rounds of play. The use of a benchmark theoretically restricts the choice set of plans that political parties may offer as credible counter-proposals.

Expectations and research hypotheses

Transparency in Mexico is defined broadly as supporting accountability, participation, and better public understanding (Trelles, et al. 2016). Here we focus on the information necessary for accountability. Specifically, we evaluate the extent to which the necessary information to evaluate the consistency of the rules, process, and outcomes is available for independent evaluation.

C1. Information transparency conditions for accountability. To evaluate the consistency of rules and outcomes, redistricting information must be:

(a) made available without undue restriction to the general public;
(b) readily discoverable (e.g., it can be found in a single public repository or is locatable through a well-known public index or search facility);
(c) made available in a timely fashion;
(d) made available in accessible formats.

We assert that C1 is a necessary and sufficient condition to access redistricting data needed to independently reproduce the outputs from Mexico's process. A key in Mexico's context is that INE adopts quantifiable metrics comprising a well-defined scoring metric applicable to any proposed redistricting plan. It is through reproducibility of each plan's scoring that independent observers can verify compliance with laws and bureaucratic regulations, thereby ensuring transparency.

We hypothesize Mexico's exceptional use of automation, mathematical scoring metrics, and adoption of the best scoring plan achieves the administrative goals of transparency and consistency. However, there is some cause for us to be sanguine about the applicability of this mechanical process. As stated by INE's former Councilor President Luis Carlos Ugalde, "the participation of party representatives during the whole [redistricting] process was fundamental, from contributing to the analysis of districting to designing and directly handling the computing systems."[11]

In 2017, INE's Council General introduced and adopted a "unanimity rule"—known as *criterion 8*—instructing the bureaucracy to consider accepting as valid suboptimal scoring plans proposed by the political parties, provided all parties unanimously endorsed them.[12] Unanimity, which could be achieved through bargaining among the actors involved in the process, thus creating the possibility of exceptions to the rule favoring adoption of the best-scored plan.

In principle, governmental consistency requires that (i) process rules are rationally aligned with government goals, and do not contradict each other, (ii) that official processes and actions are compliant with the rules, (iii) and that the outcomes of processes generally align with publicly stated expectations. Of course, no government system is perfectly consistent—however, in cases where there are notable exceptions to (i)-(iii) accountability requires that (iv) that deviations from consistency be made publicly visible, the rationale provided, and that they do not systematically favor a political actor.

Applying the framework of consistency (detailed in Defining Transparency and Consistency section) to the specific mission, design, law, and official policy that frames Mexico's electoral system, we evaluate if the redistricting institution as a whole is consistent and if the bureaucracy can be held to

[11] *IFE's Redistricting Memoir* (IFE 2005:17).

[12] Miguel Rojano, INE's cartography director, explained that the Executive Board adopted this rule "in order to consider socio-economic characteristics that were left out of the optimization process as long as all parties decided to endorse that solution." Interview of the leading author with Miguel Rojano, INE's Director of Cartography. Mexico City, June 2019.

account when a deviation occurs. Specifically, we evaluate the extent to which the rules, process, and outcomes are consistent with the rules that were made publicly available and if deviations favored a political party. We consider all of them necessary and sufficient conditions for consistency.

C2. Rules consistency.

(a) INE's redistricting rules and regulations are rationally aligned with election law and constitutional requirements.
(b) In practice, redistricting rules seldom contradict each other.

C3. Process consistency.

(a) Manual consistency: individual bureaucratic decisions and party actions during the process are compliant with the official rules.
(b) Automated consistency: algorithmically generated plans are near-optimal with respect to the stated formal criteria.

C4. Outcome consistency.

(a) Final outcomes are generally a result of the strict application of publicly advertised rules and quantitative criteria.
(b) Final outcomes are either algorithmically generated or have a minor deviation from the machine-generated plans.

C5. Rationale for consistency deviations.

(a) Where deviations from consistency occurred, this was ascertainable to the public.
(b) Rationale for deviations are provided.
(c) Where deviations occurred, no party was systematically favored by these deviations.

In sum, INE's mission since its foundation has been to guarantee the transparency, objectivity, legality, neutrality, and independence of all administrative procedures surrounding elections. Based on how redistricting has been publicly depicted by INE, we analyze transparency and consistency in the 2013 and 2017 redistricting rounds. We evaluate the extent to which information has been made available to the public and verify if the Technical Committee has deviated from its rules to select scenarios that score worse than the algorithmically generated first scenario. We analyze if, in fact, the empirical evidence corroborates if the observed actions adhered to official criteria, if the rules were applied consistently, and if rule deviations favored any specific party.

RESEARCH DESIGN AND DATA COLLECTION

Technical experts laud Mexico's redistricting both as a transparent and objective process.[13] However, until now, INE has made public only the Technical Committee's final scenario recommendations to the Executive Board. Without further transparency, external observers cannot determine if the process worked in a consistent manner. The existence of the unanimity rule raises the possibility that socio-political considerations can override technical goals. Political parties, for instance, may agree to give more weight to informal and unmeasurable socioeconomic or political considerations than to the quantifiable metrics of population balance, geometric compactness, or municipal integrity that are components of the objective scoring function.

To evaluate the transparency of the information INE provided to us about redistricting we compile all publicly available information necessary to understand Mexico's process. INE did not provide redistricting data to the public in real-time, creating a transparency gap. We expand on this lack of transparency to evaluate if these data are sufficient to understand the behavior of bureaucratic and political actors. We supplement the data provided to us by INE with all the publicly available information related to the rules, criteria, and the evaluation methods used by the electoral bureaucracy to create redistricting plans during this period

We evaluate redistricting plans using Mexico's redistricting tool and cartographic data provided to us by INE, only after the 2013 and 2017

[13]In the 2004 redistricting memoir, for instance, the Technical Committee states that, "i) the creation of the new cartography follows with precision and transparency the criteria established by the General Council, ii) the use of the mathematical model allowed an objective and transparent application of the criteria, iii) the computing system developed by the EMB allowed the validation of the districting scenarios in numbers and graphics in a fast and efficient way, as well as the comparison of the scenarios proposed by the political parties, vi) the final districting proposal, is exclusively conformed by districts following the strict application of the whole of the criteria established by the EMB's Executive Board." (IFE 2005).

redistricting rounds were concluded.[14] Redistricting software was otherwise available only to political parties and the Technical Committee during the redistricting process. To compare and evaluate redistricting plans with a standardized metric, the TC computes each plan's cost function score. INE provided us with cartographic data necessary to compute these scores at the state, district, and *sección* (Mexico's census tract equivalent) levels, along with the assignments of districts to these geographic units.[15] In our analyses, we aggregate multiple plans into a single plan in cases where two or more political parties submitted identical plans for consideration, which we determined by comparing plans' scores and cartography.

With these quantities we compare the three stages of Mexico's redistricting process to evaluate if policy objectives are met and if formal rules are followed. Our analysis provides insights into how criteria selected by INE achieve the TC's operationalization decisions affect outputs. Additionally, focusing on each stage evaluates the bureau's role when adopting or changing rules, as well as the role of the TC when adopting scenarios.

To analyze the degree to which INE and the TCs actions followed *a priori* established rules we examine the impact that the technical decision-making process had on the first scenario, as well as how the technical evaluation of plans affected the selection of the second and final redistricting plans. For example, micro-level data—such as the number of counter-proposals each party submitted—enables identification of cases in which a state's final plan is not the best plan proposed by the formal rules; or cases in which new plans were introduced outside of the formal rules.

EVALUATING THE PROCESS, CONDUCT, AND OUTCOMES

Transparency and information availability

Here we evaluate condition C1, namely if the necessary information to understand how the process works is sufficient to understand the behavior of bureaucratic and political actors. We describe the limitations we found—as external agents—to understand how redistricting works simply by looking at the information that is made publicly available.[16] Overall, we find that: (i) the core information necessary to evaluate the consistency of rules and outcomes is not available to the public, (ii) the information that is made available is not readily discoverable in a single repository, (iii) the necessary information to understand the decision-making within the process is—partially—made available only *ex-post,* and (iv) not all core information is available in accessible formats facilitating the evaluation of the consistency between rules and outcomes.

In order to analyze the availability of the core information to the general public, which is related to C1(a), we identified the necessary categories of information that an external observer would need to assess the types of consistency of redistricting (i.e., consistency of rules, processes, outcomes, and rationale for deviations as detailed in C2-C5), namely the regulatory framework (e.g., rules governing the process), the databases (e.g., related to the criteria being considered), the cartography (e.g., administrative, political, and geographic features), the mathematical formulas (e.g., optimization and model components), the software (e.g., optimization engine, indicator and mapping platform), and the algorithmically generated maps and counterproposals considered by INE's Technical Committee (e.g., plans with their respective score and justification).

We find the publicly available information supports only a partial evaluation of rules consistency and is totally inadequate for even a minimal evaluation of the consistency of processes, outcomes, and

[14]In contrast to the 1996 and 2004 redistricting processes, the EMB enabled strategic interaction between parties in 2013 by allowing them to observe counter-proposals (and their associated score) formulated by other parties through a web-based platform. The development of this online mapping technology facilitated the generation of a relatively larger number of partisan plans. In 2004, for instance, parties formulated 200 observations. In 2013 parties formulated 544 counter-proposals, and 463 in 2017 alternative plans.

[15]All information (data and code) used in this research is publicly available and can be found in the following Harvard Dataverse repository: https://doi.org/10.7910/DVN/PYRXGE. This includes all the automated plans we collected and archived for both of these processes and the full set of plans proposed by political parties using INE's redistricting tool (Trelles et al., 2023).

[16]Given the complexity of the process, we understand it is normal that some information is left out (e.g., information used to construct a quantitative metric such as traveling time within a specific district). Our analysis focuses on the availability of the "core information" that is required to evaluate if the process complied with the rules and if it met the objectives that were publicly advertised.

the rationale for deviations. For example, neither the software used for optimization, the online indicator platform, nor the mapping tool used by parties can be accessed by someone outside of the bureaucracy. None of the plans considered by the INE/TC, except the final map approved by INE's executive board, were available to the public in accessible formats (e.g., shapefiles available for download on INE's website).

Lastly, after conducting a documentary analysis of the rules governing the process (i.e., the constitution, secondary law, procedural agreements, and administrative decisions), we found that most of the rules governing the process have been made available to the public before redistricting begins. However, our inspection of the 2017 TC's Final Report reveals that there have been important informal rules governing the process and that they have not been properly explained or justified at any level of the governing documents.[17]

During the two rounds of partisan interaction, for instance, the institutional records reveal that the arguments presented by parties and the rationale used by the TC to weigh socioeconomic, cultural, security, or geographic considerations against the cost function are unclear and inconsistent. We find ambiguity in the communication between electoral officials and political parties (e.g., while some parties formulate counter-proposals arguing a socioeconomic divide should be preserved, others endorse plans attempting to reduce the INE's administrative costs), that actors do not always communicate their interests formally (e.g., preserving an electoral stronghold), and that it is unclear how the authority systematically evaluates plans based on the arguments presented by the parties.[18]

Second, we find that not all "core information" related to the process is made readily discoverable in a single public repository or is locatable through a well-known public search facility—we interpret this as evidence against C1(b). For example, the information needed to assess interactions between bureaucrats and political parties—the software, the algorithmically generated maps, and partisan counter proposals—is not in the public record. An external actor is unable to replicate the process or evaluate if the objectives are met with publicly available information. Even if a group of scholars or electoral experts gains access to such information, it is not possible to verify or interpret the decision-making process of INEs bureaucracy and the TC because the final outputs do not align with the adopted formal rules.

Despite that most of the formal rules governing the process are made publicly available (e.g., any person can access an online version of the constitution, the electoral law, or INE's regulations and agreements), all relevant information cannot be found in a single public index—for a single or multiple redistricting processes. INE's website, for instance, disseminates only the shapefiles of the final plans of the 2017 process.[19] The 1996, 2004,

[17]See INE (2017). For a detailed analysis of the four levels of rules governing the process see Supplementary Materials, Appendices 2 and 3.

[18]During the 2017 process in the state of Nuevo León, for instance, the algorithmic plan had the lowest score (4.83) among all the plans that were considered. A single party, the local PRI, and a coalition of parties (the local PRD, PVEM, and ES, along with the national PRD) endorsed higher-scoring plans during the first round (4.87 and 4.91, respectively). The PRI's representative, for instance, argued that their plan would "form a natural corridor with better socioeconomic and traveling times within the district if 8 municipalities were added to the district formed by Juárez, Caderyta, Persquería, and Marín." The TC selected the algorithmic solution (4.83) arguing "that the party alternatives had a higher cost than the algorithmic solution." During the second round of counter-proposals, parties suggested four alternatives. The national PRI, PVEM, NA, and ES endorsed the algorithmic plan (4.83), which had been adopted as the second scenario; The local PRD suggested a plan with a higher cost (4.94); The national PAN suggested a plan with an even higher cost (5.11); Finally, the national PT suggested a plan with the highest score (5.81). The TC concluded that it would recommend the algorithmic plan (4.83) as the final scenario "given it had the lowest score." Surprisingly, a different winning plan was imposed by the bureaucracy, which had the highest score (5.86) compared to all plans that had been considered by the INE/TC. This decision cannot be justified with the rules that are publicly available and the rationale of this decision is not explained in the TC's final report. See INE (2017).
Another example is the case of Yucatán in 2017. In this southern state we identified a universal lower-scoring *algorithmic* solution, higher-scoring partisan alternative solutions in the second round, and a *unanimity* solution that was adopted and that was not lower than all of the partisan alternatives considered in the previous stage. When looking at the TC's report and the justifications that were formally presented by parties, we identified that despite the TC's recommendation to adopt the lower-scoring plan, INE adopted a higher-scoring solution based on political reasons, not technical ones. In our conversations with party representatives in that state, we identified a substantial difference between official explanations and real motives. While official explanations include an allegedly altruistic interest of parties to facilitate certain EMB's administrative procedures (i.e., poll worker recruitment), the interviews with party actors of the PRI and the PAN are consistent with the rationale that parties were interested in seat/vote maximization when engaging in the process.

[19]See <https://cartografia.ife.org.mx/sige7/?distritacion=federal>.

and 2013 partisan or final plans are not public. It would be a daunting task for an external actor to collect and understand the redistricting process in a single year or how it has changed—and why—over time.

Analyzing the timeliness of information availability—related to C1(c), we find that when information is available, it is available only after the conclusion of the process. To their credit, INE has progressively made more information available to the public over the years (i.e., formal rules and final cartographic output), but this has only been done *ex-post*—usually months after the new electoral cartography has been approved by INE's executive board. That is, it would be practically impossible for an external actor to access, replicate, evaluate, or comment on any of the stages of the process in real-time with publicly available information. Furthermore, the public consultation made to indigenous communities is made only after the algorithmic plan has been generated but these groups do not have access to the partisan plans—or to the same software used by parties to formulate counter-proposals—during the different stages of the process.

Finally, when evaluating if information is made public in accessible formats, we find none of the key data to evaluate the redistricting process is made available in machine-readable formats, contradicting C1(d). While the shapefiles of the final plans are available on INE's website, none contain the cost function score breakdown, nor the observations formulated by parties, experts, or indigenous communities. There is no systematic classification of the rationale that was used by INE to accept or reject higher-scoring partisan plans.

When we observe externally INE's redistricting process, disregarding the internal data provided to us by INE, we find evidence against C1(a) through (d). Mexico's redistricting process cannot be readily understood with the information that is made publicly available. Even when an external actor to the bureaucracy accesses information about the plans considered by the TC, we identify inconsistencies that cannot be explained with the publicly advertised rules. Major categories of core information, such as the partisan plans and their respective scores, are not available publicly.

An observer must have expertise and expend effort to transform plan information into a machine-readable format, limiting the external replicability of the process. These limitations constrain the capacity of an external agent to evaluate if the main objectives are fulfilled, to validate if the conduct of the process is compliant with rules, meaningfully comment on any plans suggested by parties, or to analyze the political implications of redistricting.

Table 1. Undocumented Proposals

	2013		*2017*	
	Missing plans	*Nonscored*	*Missing plans*	*Nonscored*
INE	44	0	1	0
MC	10	42	1	0
PAN	4	46	5	3
PNA	4	81	3	1
PRD	15	40	5	1
PRI	9	44	2	0
PT	8	65	3	2
PVEM	8	63	3	2
ES	0	0	2	1
MORENA	0	0	3	1
Total (per year)	102	381	28	11

Note: Does not include INE interventions to modify plans during decision phase.

When we evaluate the internal plan data provided to us, we encounter further substantial accountability gaps. Among the internal documents INE provided is an index purportedly listing every plan.[20] Cross-referencing the internal database of plans INE provided to us with this index, we can evaluate if there were any plans that were created, but not scored, and *vice versa*. Table 1 shows the undocumented plans by actor that we identified within the data that we could access once the 2013 and 2017 processes had concluded. In this table, "Missing" plans are those that appear in the index, but INE did not provide associated data for; while "Nonscored" plans are those that do not appear in the index, but INE provided data.

Our analysis reveals transparency gaps within INE's plan data. Out of 2,369 proposals that INE provided us, we identify 5.5 percent missing plans with no associated data (102 in 2013 and 28 in 2017, totaling 130), and 16.5 percent unscored in the index (381 in 2013 and 11 in 2017, 392 in total). There is improvement in these discrepancies as there were significantly fewer missing and unscored plans in 2017 compared with 2013, but

[20]This index is part of the TC's Final Report (See IFE 2013 and INE 2017).

the presence of any such plans in 2017 indicates continued struggles with transparency. Some of these issues appear to be incomplete or duplicate plans.[21] Further, in analyzing these data, the index describes 44 plans created by the electoral bureaucracy in 2013. This is at odds with the process since INE is not described in the formal rules as an actor with the capacity of engaging at different levels (national vs. local) or stages (first or second rounds).[22]

Overall, our investigation shows that although cartographic output was available for the vast majority of plans that registered a score, there were several missing plans for political parties in both 2013 and 2017. In 2013, for instance, we identified 15 proposals that were scored for PRD but no cartographic plan was made available.[23] In 2017, the number of missing partisan plans decreased from 58 to 28.

Consistency of the rules

We perform a detailed documentary analysis to evaluate the degree to which the consistency of the rules is complete, exhaustive, and unambiguous, which fulfill conditions C2(a) and C2(b). We collected the rules governing redistricting expressed in four levels of law (constitutional, statutory, regulatory, and administrative agreements), and used these to identify inconsistencies and gaps.[24] Overall, we find that:

i. Administrative agreements are technically consistent with regulation by stipulation—which we consider evidence supporting C2(a);
ii. The processes dictated by these agreements, however, provide no clear operational mechanism for ensuring consistency. We identify inconsistencies in the way in which criteria are used in practice. For example, population balance has the highest priority in constitutional law, statutes, and in regulation. In operation, however, population equality has the potential to be subordinated to other criteria during the proposal negotiating phase (e.g., the number of municipal splits or not explicitly documented attributes that are considered by the TC during the evaluation phase). We consider this partial evidence against C2(b);
iii. Redistricting regulations and administrative agreements have changed over time although neither the constitution nor statutes have changed. Many of these changes might have a substantial impact (and possibly differential partisan impact) and lack a detailed rationale. For example, the inclusion of *criterion 8* in the regulation agreement approved by INE's executive board in 2017, allowing parties to endorse plans with a higher cost function, was used to justify decisions that had been classified as "rule violations" in the 2013 process. We consider this partial evidence against C2(b).

Consistency of manual and automated processes

Here, we analyze if individual bureaucratic decisions and party actions during the process are compliant with the official rules—C3(a)—and if algorithmically generated plans were near-optimal with respect to the stated formal criteria—C3(b)—during the 2013 and 2017 redistricting processes.

[21]An incomplete plan could not be scored, and it is likely these plans were never submitted by political parties for formal evaluation. Still, we regard these plans as indicative of transparency gaps since the work on these plans, even if incomplete, was not disclosed publicly. As for duplicates, their existence provides information that completing political parties explored alternatives, but were unable (or for whatever reason, unwilling) to improve upon the plan logged into the index.

[22]In 2013, we identified 44 plans formulated by INE. Twenty-six out of these 44 proposals originated from INE's local surveillance commissions (CLVs), which are a mixed partisan and bureaucratic oversight boards, and 18 from INE's Juntas Locales Ejecutivas (JLEs), which represent INE's main bureaucratic areas at the state level. In all of these 44 cases, we registered the scores, but no plan was recorded or made available to us by INE upon request. In the case of 2017, we identified only one scored plan submitted by INE's bureaucracy—through the Executive Office of the Registry of Voters, known as "DERFE"—but we were unable to locate the plan.

[23]In 2013, we identified an actor register as "PRD51," which formulated 7 plans. We consider them as an administrative correction. All of these proposals were registered exclusively in the second round of partisan interaction (stage 5 of Figure 1). The counter-proposals presented by the left-wing party (PRD) at the CNV level in 2013, for instance, were registered as "PRD1" and "PRD2" (IFE 2013). *Evaluación de los trabajos de redistritación que realiza el Comité Técnico para el Seguimiento y Evaluación de los Trabajos de Redistritación*. Appendix 4 (74). According to the formal rules, however, only parties—not the bureaucracy—could present counter-proposals by stage and level. In case parties submitted plans with different scores (through both the CNV and CLV), the TC should have considered the lower scoring plan.

[24]The details of this analysis are presented in the Supplementary Materials, Appendices 2 and 3. For reasons of space, we reserve the remainder of the article for an analysis of the empirical data collected from the conduct of the process itself.

We evaluate if, in fact, the electoral bureaucracy fulfilled its claim of framing the redistricting process as open, mechanical, and impartial. That is, if counter-proposals were evaluated by the TC according to the official rules and if automated plans were more likely to be adopted after the INE/TC's intervention.

Consistency of manual processes. To evaluate manual consistency—C3(a)—we analyze if the process followed the general operating rules that were made publicly available. That is, if individual bureaucratic decisions and party actions were compliant with the official rules, at least, we would expect to observe the following patterns (in relation to

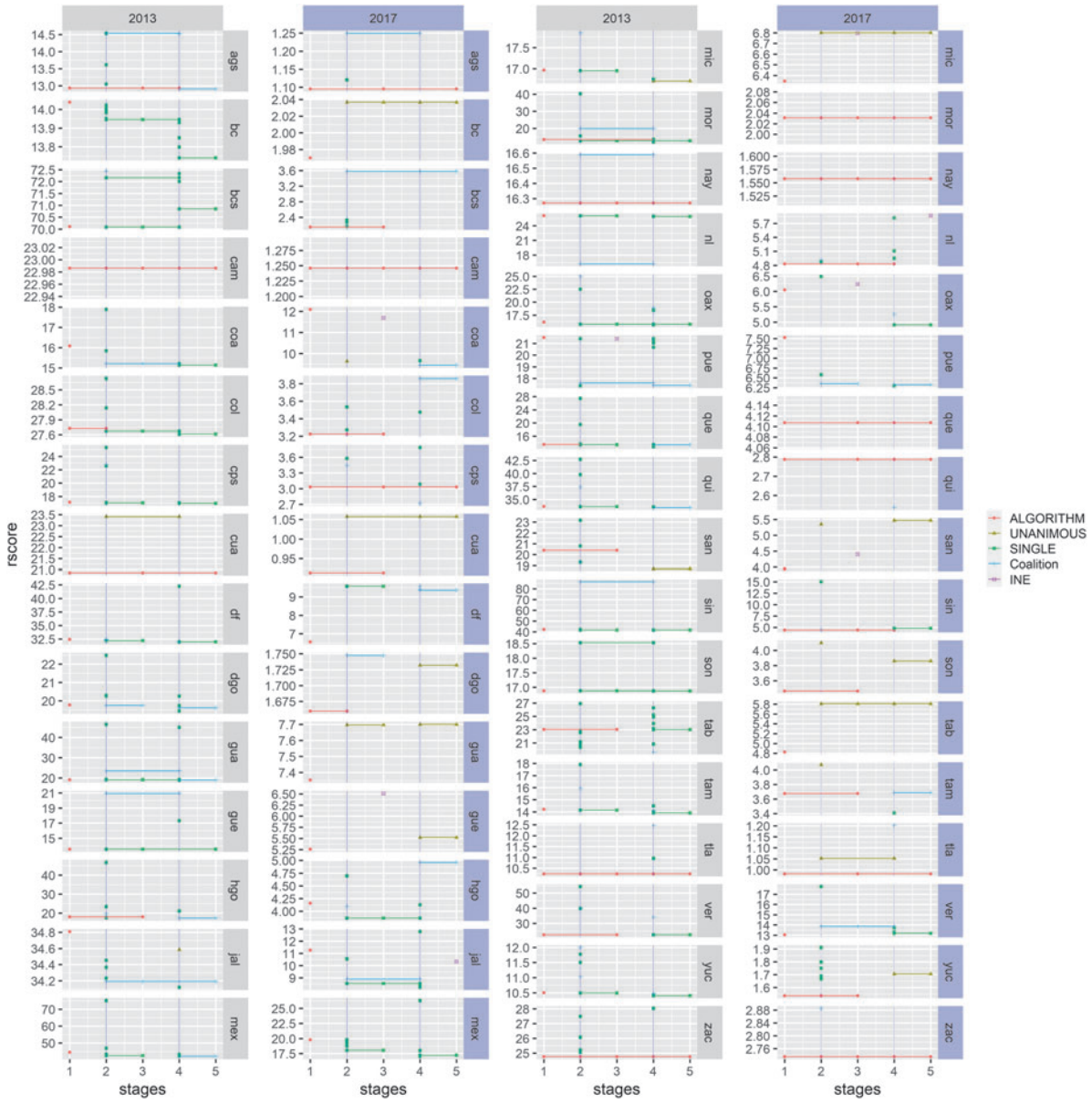

FIG. 2. Redistricting process stages and winners.
Note: Figure created by the authors. Source: IFE/INE reported scores during the 2013 and 2017 redistricting processes. The outcomes (shown as dots, connected by lines when a proposal was formulated by the same actor in consecutive stages) reported on this visualization describe the score of the plans that were adopted by the TC on stages 3 and 5 (considered winning plans) and have one of the following five origins: (i) plans produced algorithmically in the first stage (red), (ii) plans that were proposed by a single party (blue), (iii) plans that were endorsed by multiple—at least two—parties and that competed with alternative partisan plans (pale/olive green); (iv) plans that were endorsed by all proposing parties (fuchsia), and (v) plans formulated by INE (green).

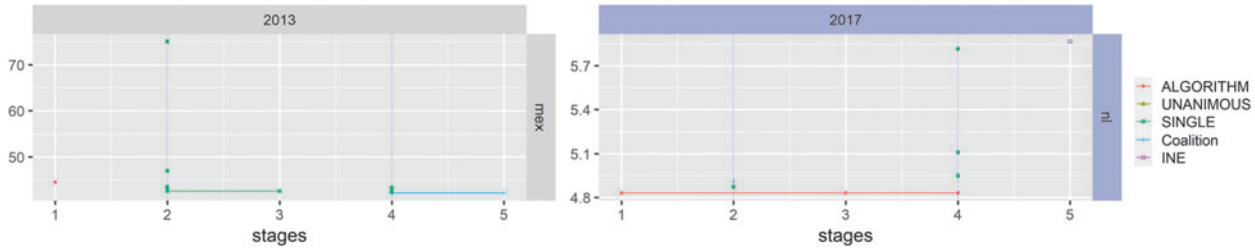

FIG. 3. Redistricting Process Stages and Winners (example).

the evaluation phase depicted in stages 3 and 5 of Figure 1):

i. The partisan counterproposal with the lowest cost function is always adopted by INE;
ii. The TC selects a plan from the universe of partisan counter-proposals or the algorithmically generated maps;
iii. If parties unanimously support a plan associated with a higher cost (*criterion 8* rule in 2017), that counterproposal is adopted.

Figure 2 offers a visualization of all the scores associated with each plan considered by INE during the 2013 and 2017 redistricting exercises. Each block represents a state and the columns represent the year in which redistricting took place. The vertical axis represents the scale reported in each state associated with the optimization function.[25] The horizontal axis represents the five stages indicated in Figure 1, representing: (1) the first scenario produced by the algorithm; (2) the *first round* of partisan interaction (vertical axis highlighted in blue)*;* (3) the second scenario selected by the TC; (4) the second round of partisan interaction (vertical axis highlighted in blue)*;* and (5) the third scenario submitted to INE's executive board for its final approval.[26]

As a probative example against C3(a), and to help interpret Figure 2, Figure 3 illustrates how the redistricting process evolved in two cases: the State of Mexico in 2013 (left) and Nuevo Leon in 2017 (right).

In the State of Mexico, the process worked out in a way that conforms relatively well with the public portrayal: the algorithm proposed a score that was incrementally improved upon in subsequent rounds, the final plan scored best, and was supported by a coalition. In contrast, the process in Nuevo Leon evolved very differently. Although the algorithm's score was best, it was not adopted. Instead, the adopted plan was the worst scoring map.[27] Further, this plan was never proposed by a party but introduced by INE at the very end of the process—after the submission phase for plans was formally concluded.[28] From our perspective, these unjustified changes can be considered partial evidence showing that discretionality of the process was present.

We summarize discrepancies, like the one that occurred in Nuevo Leon, in Table 2. Here we systematically aggregate by year the cases where the TC decided to make an exception to the rule when adopting a plan. The first row depicts cases where INE, regardless of the score, decided to invalidate partisan counter-proposals because they identified a violation of a pre-established rule (e.g., splitting a minority municipality)—although this rule was not implemented in the submission system provided to the parties.[29] The second row counts the number

[25]The scale on the vertical axis differs in 2013 and 2017 because of differences in the optimization process (number of restrictions, weighting, and algorithm). Despite the fact that the primary and secondary laws did not change, INE decided to modify the optimization phase by using two (*population* and *compactness*), instead of four (*population, municipal integrity, traveling time*, and *compactness*) restrictions in 2017. Comparisons in Figure 2 should be made within each process.

[26]Figure 2 displays competitions in all thirty-two states in both years. The figure reveals that actors—both partisan and bureaucratic—engaged differently in 2013 and 2017. Lowest-scoring plans are considered "best" in the cost function.

[27]See supra n. 18.

[28]In 2017, we identified two cases—in states 14 and 19—where a higher-scoring final plan was introduced by INE despite partisan or automated lower-scoring plans being documented. Lowest-scoring plans are considered "best" in the cost function.

[29]INE explained to us that after completing the 2013 optimization, the software used by the parties to edit plans allowed them to submit proposals that did not properly respect certain rules (i.e., the municipal integrity criterion)—leading parties to submit proposals that would be considered invalid under the complete set of rules. In response, INE invalidated these proposals from consideration. Our data includes these invalidations, so we summarize these as exceptions to the process.

Table 2. Process Exceptions

	2013		2017	
INE Invalidated Proposed Plan	9	13.04%	0	0.00%
Unanimous Higher Score Proposal Accepted	1	1.45%	15	42.86%
INE Modified proposals	1	1.45%	7	20.00%
INE Added proposals	47	68.12%	0	0.00%
INE Accepted Higher Score Plan Without Unanimity	11	15.94%	13	37.14%
Total exceptions (per year)	69		35	

Sums the number of exception events by category.

of cases where higher-scoring plans were adopted after being supported unanimously by all parties engaging in the process.[30]

The third row captures the exceptions where the INE modified a proposal and suggested an alternative plan during stages 3 and 5. The fourth row depicts the number of times the bureaucracy formulated a plan of its own (despite its role not being clearly defined or accounted for in the formal rules), which differed from the first scenario or partisan alternatives.[31] Lastly, the fifth row counts the number of cases where the INE adopted a higher-scoring plan without being unanimously endorsed by all parties engaging in the process.

We show in Table 2 *prima facie* evidence of rule violations in 2013 and 2017, and that the INE actively intervened in the process. Although some exceptionalism can be justified by the adoption of *criterion 8* in 2017, it is concerning to observe that the number of cases where the INE or the Technical Committee adopted higher-scoring plans without unanimity was almost as high in 2013 (11) as in 2017 (13), which signals that the bureaucracy bowed to party pressures against their own tailored mechanical process. It is also concerning that despite that INE is not formally described as an actor that engages in the process, the number of unilateral interventions by INE to adopt a plan of its own increased from 1 to 7.

Consistency of automated processes. We evaluate automated consistency—C3(b)—by investigating if the algorithmically generated plans are near-optimal with respect to the stated formal criteria. That is, we evaluate how well the algorithm did in terms of optimization efficiency.[32] Overall, we find the algorithmic process was generally consistent with the stated criteria—as defined in the bureaucratic technical interpretation. In support of C3(b), we observe that automated plans in 2017 produced lower-scoring plans than in 2013.

Figure 4 below illustrates the algorithmic score efficiency of the two cycles by state and year. When analyzing *algorithmic performance*—overall score efficiency defined as the score of the algorithmic plan relative to the best scoring plan, we see that it was high and consistent across 2013 and 2017, with respectively a 94% and 95% mean level of efficiency.

The algorithm performed quite well in the vast majority of states and that in the 2017 process there was a slight improvement in performance. Figure 2, for instance, reveals that in 2017 INE adopted 9 unchanged automated plans (Aguascalientes, Campeche, Chiapas, Morelos, Nayarit, Querétaro, Quintana Roo, Tlaxcala, and Zacatecas), while in 2013 it only adopted 5 (Campeche, Coahuila, Nayarit,

[30]In 2013, the acceptance of higher-scoring plans supported by all parties was in violation of the rules. In 2017, however, the public rules were changed to allow the adoption of a higher-scoring plan with unanimous agreement of the parties—we summarize these exceptions as well.

[31]An examination of the internal data made available to us revealed a number of instances where INE modified or adopted a plan that had not been previously introduced in stages 3 or 5. We code these as exceptions and summarize their frequency as they represent evidence of a difference in interpretation of the rules across actors. This authority may be within INE's purview—but neither the authority nor the process is generally documented. Further, no information was made available regarding the rationale for the individual plans added / modified by INE. We speculate that the 47 plans added in 2013 were alternatives provided for experimentation and comparison; we suspect the 8 modified proposals were the result of a "behind the scenes" compromise. We code these as exceptions and summarize their frequency as they highlight ambiguities in the authority of INE.

[32]In 2017 the INE/TC decided to modify the type of algorithm, as well as the number of restrictions and the weights assigned to the criteria used in the optimization process in order to find "better solutions." As a consequence, some parties claimed that it became harder for them to propose lower-scoring plans. Interview of the leading author with Miguel Rojano, INE's Director of Cartography and with Florencio González, former PAN's representative at IFE's CNV. Mexico City, June 2019. See Appendix 3 for a detailed description.

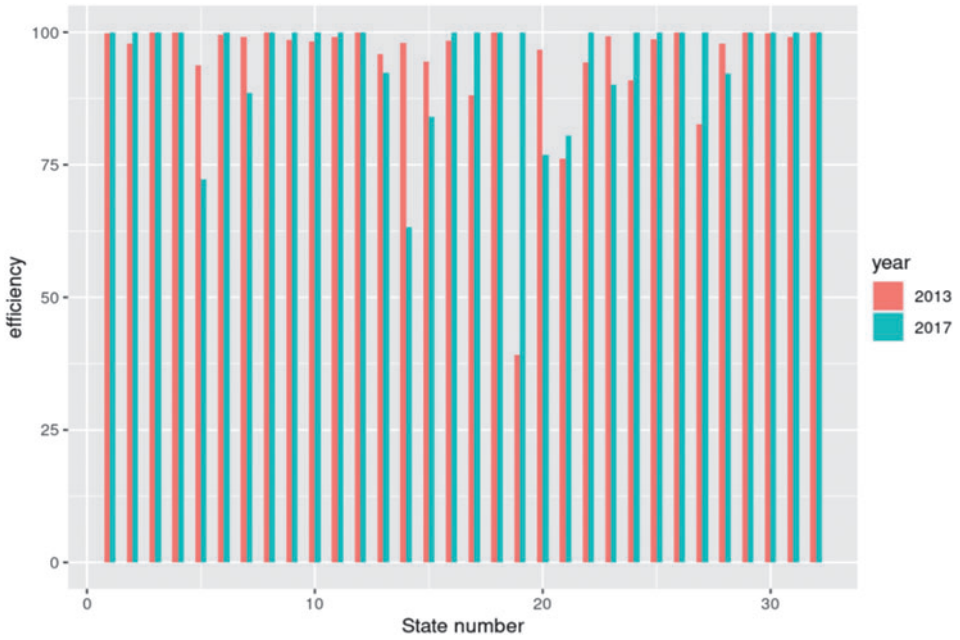

FIG. 4. Algorithmic score efficiency by state and year.

Tlaxcala, and Zacatecas).[33] This provides partial evidence that the changes introduced by the TC to the algorithm translated into better performance.

Table 3 displays the performance, best scoring plan, by the creator in both years. They reveal that the algorithm used in 2017 significantly improved the formulation of lower-scoring plans.[34] While in 2013 the algorithm produced only 5 (15.62%) best scoring plans, in 2017 it formulated 23 (71.88%). This level of performance is substantially more consistent with the public depiction of the algorithm. However, this improvement in consistency is undermined by an emerging tendency to reject the best scoring plan, as shown in the next section.

TABLE 3. BEST SCORING PLAN BY CREATOR

	2013		*2017*	
Admin				
Algorithm	5	15.62%	23	71.88%
INE	1	3.12%	0	0.00%
Multiple				
Coalition	7	21.8%	3	9.38%
Unanimous	2	6.25%	0	0.00%
Major Party				
PAN	11	34.38%	0	0.00%
PRD	4	12.50%	5	15.62%
PRI	0	0.00%	1	3.12%
Total (per year)	30	–	32	–

Best-scoring state plans created by each actor.
Note: Creators refers to initial plan creators, others may have joined in later rounds.

Consistency of the outcomes with respect to the rules

We next investigate if the final outcomes were the result of the strict application of publicly advertised rules and quantitative criteria or if they deviate from the algorithmically generated solution—i.e., condition C4. In order to evaluate adherence to the established rules, we identify the proportion of plans where: (i) the best-scoring plan lost; (ii) the algorithmic solution lost; (iii) a higher-scoring plan was adopted invoking unanimous partisan support; and (iv) a higher-scoring plan that was not endorsed by all parties was adopted. Table 4 below shows the proportion of "unexpected winners" in these four categories during the 2013 and 2017 cycles.

Overall, these results reveal that the "best plan" did not always win, and INE/TC exhibited more exceptionalism—based on unanimous solutions—in 2017 (23) than in 2013 (9). The statistics depicted in Table 4 reveal that a substantial share of the best-scoring plans lost both in 2013 and 2017. Furthermore, best scoring plans lost a higher number of times in 2017 compared to 2013, either because a rule was violated or because of administrative

[33]We interpret that the deviations from machine standards are clearly political and not technical.
[34]Lowest-scoring plans are considered "best" in the cost function.

Table 4. Unexpected Winners

	States with Exceptions	(% of States)	Exception types: Best Score Lost	Algorithm Lost	Unanimous – Not Best	No Agreement & Not Best
2013	9	28.12%	9	27	1	6
2017	23	71.88%	23	23	7	10

Best-scoring state plans created by each actor.
Note: A single state can count in multiple exception types.

discretionality (e.g., a socioeconomic consideration was made by the TC)—71.88% versus 28.12%. This confirms that the patterns of interaction and evaluation of plans significantly deviated from the application of quantitative criteria yielding to different outcomes. We consider this evidence against C4(a), that the outcomes follow from the publicly stated rules.

In relation to C4(b), that adopted plan did not deviate from the algorithm, we observe algorithmically generated plans were rejected in more than two-thirds of the cases in both years—71.88 and 84.38 percent, respectively. While in 2013 the algorithmic solution was adopted only in 15.62% of the cases, *algorithmic* success increased to 28.12% in 2017. We also found that the number of unanimous endorsed plans was disproportionately higher in 2017 (22% vs. 3%)—due to the adoption of criterion 8, but also that the INE/TC adopted a significantly higher number of plans in 2017 that were not the "best-scoring plan" and that were not endorsed unanimously by all actors (31% vs. 19%). This evidence shows that despite an improvement across processes in terms of algorithmic efficiency, the best solutions were either rejected because parties were able to beat the algorithm in 2013 or because the TC or political parties (via criterion 8) rejected the algorithmic solution.[35]

Consistency of deviations

The high rejection rate of the number of valid plans with the lowest scores naturally leads to our fifth condition, which evaluates if deviations were visible to the public—i.e., C5(a)—and if any party was systematically favored by the TC's invalidation of plans or acceptance of higher-score alternatives—i.e., C5(b). Presumably, none of the deviations we identified during the 2013 and 2017 processes were ascertainable to the public. At least, none of the process exceptions could have been identified by an external actor with the information that is made publicly available, which is evidence against C5(a).

Table 5 shows the number of exceptions by individual creators in 2013 and 2017.[36] For each actor, it aggregates the number of cases where: (i) actors sponsored a plan collectively, (ii) the number of times where an actor won despite a rule violation was identified, and (iii) the number of cases where the plans were invalidated by INE.

For C5(b) to hold, we expect that no party would be advantaged in their interaction with the INE/TC.[37] However, our analysis in Table 5 shows political parties experienced different rates of plan invalidation and the acceptance of higher-scoring plans. For example, in 2013 the TC invalidated 4 plans from the PRD (12.5%) but only 2 plans from the PAN (6.25%). In the case of smaller parties, only 1 plan was invalidated for MC and PVEM.[38] In terms of the actors that won despite an apparent rule violation taking place, the INE/TC adopted 4 plans of PAN in 2013 and 2 in 2017. The INE/TC also accepted twice as many plans in 2017 (4 *versus*

[35]Our conversations with local and national party representatives reveal that a closed-door bargaining conversation took place in those cases where parties unanimously imposed a higher-scoring solution over the technocratic plan.
[36]We recognize that larger parties (PRI, PAN, PRD, and MORENA in 2017) were better positioned to engage in the process because of their known voting distribution support across multiple states. Based on state-level coalitions established between major and minor parties the year prior to the redistricting process, we assume minor parties aligned with their respective larger coalition mate (Olmeda and Devoto 2019).
[37]We assume all parties had a similar level of information and understanding of the rules of engagement and evaluation of the process.
[38]In 2017, the values reported are 0 for all parties because the data source we had access to does not show if partisan plans were invalidated by INE because they violated an *a priori* or higher hierarchical criteria (e.g., splitting an indigenous municipality that should have been preserved intact).

Table 5. Exceptions by Individual Creator

	Won in Violation of Rules				*Invalidated Plans*	
	2013		*2017*		*2013*	*2017*
Multiple						
Coalition	2	6.25%	4	12.50%	2	0
Minor Party						
MC	0	0.00%	0	0.00%	1	0
PT	0	0.00%	0	0.00%	1	0
PVEM	0	0.00%	0	0.00%	1	0
Major Party						
PAN	4	12.50%	2	6.25%	2	0
PRD	0	0.00%	0	0.00%	6	0
Admin						
Algorithm	0	0.00%	2	6.25%	0	0
INE	0	0.00%	2	6.25%	0	0
Total states won by exception	6	–	10	–	–	–

Number of states in which exceptions to rules were made for plans, by actor.
Note: Creators refers to initial plan creators, others may have joined in later rounds.

2) that were endorsed by a non-unanimous coalition of parties. In 2017, we also identified 4 cases (2 related to the algorithm and 2 proposed by INE) where the INE/TC adopted plans that violated the rules. We consider this evidence of violations of C5(b).[39]

Lastly, we analyze the capacity of parties to influence the final outcome—also related to C5(b). Assuming that all parties had the same information and bureaucratic capacity (i.e., technical expertise) to engage in the process, we would expect them to have a similar influence on the final outcome. Furthermore, we would expect collective solutions (coalition or unanimous plans) to decrease over time because major parties are unlikely to benefit proportionally from this type of outcome. Consequently, we would expect (i) parties to be equally successful in sponsoring a winning plan; (ii) coalition plans supported by a non-unanimous group of parties to be less likely to occur in 2017, and (iii) that unanimous partisan plans were only adopted in 2017.

Table 6 groups the number of winning plans by the creator. Despite the algorithm becoming more successful in 2017 (winning 28% vs. 15% of the time), results reveal important partisan differences—which we consider evidence against C5(b). In 2013, for instance, the right-wing PAN was, by far, the most successful party to single-handedly present 13 winning plans (40.62%). The only other party that was able to single-handedly present winning scenarios was the PRD with 2 plans (6.25%) in 2013 and 1 (3.12%) in 2017.

We observed that successful partisan coalitions were formed in both 2013 and 2017, and that they were more successful in the former (28% vs. 21%). Although the unanimity rule was only adopted for the 2017 process, results show that higher-scoring unanimous plans were present in 2013.

Table 6. Winning Plans by Creator

	2013		*2017*	
Admin				
Algorithm	5	15.62%	9	28.12%
INE	1	3.12%	2	6.25%
Multiple				
Coalition	9	28.12%	7	21.88%
Unanimous	2	6.25%	10	31.25%
Major Party				
PAN	13	40.62%	2	6.25%
PRD	2	6.25%	1	3.12%
Minor Party				
PVEM	0	0.00%	1	3.12%
Total (per year)	32	–	32	–

Winning state plans created by each actor.
Note: Creators refers to initial plan creators, others may have joined in later rounds.

[39]Although the number of invalidations (13) and partisan plans adopted despite rule violations (16) is relatively low compared to the total number of plans that were presented in both processes, the variation across parties reveals that they either had different levels of information enabling them to formulate more valid proposals or that, even when they knew the rules of engagement and evaluation, they made an effort to push their plan forward. We consider this as preliminary evidence showing that parties were following different strategies when engaging in the redistricting process and that some parties were more successful than others in doing so.

However, there was a substantial increase in this type of winning plans in 2017 (increasing from 2 to 10). Based on the unanimity rule established by INE in 2017, MC and PT successfully endorsed unanimous plans with higher scores that were accepted by the INE/TC on 7 occasions, PAN, PRD, PRI, PVEM, PNA, and ES in 6, MORENA in 5.[40]

We expect that as institutional and political actors gain more experience and learn how to operate in the redistricting process after participating in multiple cycles, some procedural rules are likely to be modified or adapted. The adoption of criterion 8 by INE in 2017, however, strongly suggests that the bureaucracy was interested in legitimizing the process by appeasing parties *ex-ante*—at the expense of its technical experts. In our view, this administrative deviation makes the decision-making process opaque and inconsistent.

CONCLUDING REMARKS

Our analysis of Mexico's redistricting process reveals a substantial accountability gap. In terms of transparency, we find that the absence of key information would make it extremely difficult, if not impossible, for an external actor to participate or comment on the process while it is ongoing, or to evaluate or audit it after completion. From the public information, citizens are incapable of understanding how the decision-making process works, how the authorities weigh some plans over others, or how experts justified selecting specific exceptional outcomes. The barriers make it difficult for anyone outside of the bureaucracy to comment upon, verify, replicate, or evaluate redistricting or understand how these processes have changed over time.

The Mexican government portrays redistricting as an objective and mechanical process. The common conception is that redistricting (i) rule-bound, (ii) that the outcomes are primarily a result of an algorithmically driven score that is automatically maximizing non-partisan restrictions, and (iii) that the most important decision affecting outcomes is the choice and hierarchization of statutory and constitutional criteria. Our investigations show, however, that the internal process differs substantially from its neutral, formulaic public depiction. We find that (a) rules are often broken, (b) outcomes are rarely a result of algorithmic driven criteria, and (c) most of the final outcomes that emerge are the result of partisan bargaining rather than the strict application of the quantitative criteria that are publicly advertised. Furthermore, we find that the most important administrative rule governing the process is the one allowing parties to unanimously adopt exceptions to the overall process.

Our investigation confirms how the adoption of criterion 8 in 2017 made the adoption of "masked violations"—i.e., consensus and unanimous plans—a more frequent solution over time. These political solutions clearly resulted in the rejection of more efficient lower-scoring plans. The adoption of criterion 8, a rule accommodating parties, served to justify the rule deviations observed in 2013 and validate the adoption of higher-scoring plans in 2017.

We do not necessarily suggest wrongdoing in the application of this rule, as the bureaucracy could have implemented it in a good-faith attempt to legitimize the process by expanding participation and consideration of factors not encompassed by the algorithm. However, this decision had a negative downside on the overall efficiency and consistency of the process. As practiced, criterion 8 served not as a technical restriction but instead it enabled the adoption of plans solely through political decision: thus working against consistency of outcomes with the formal criteria INE used and publicized during the redistricting process.

We find that the delegation of the process to technical experts operates in ways that strongly contrast—or are nearly opposite to—the way in which redistricting is publicly depicted by INE. Our research shows that administrative inconsistencies—along with the opaqueness described here—substantially limit the accountability of the process to citizens outside of the bureaucracy. We believe that these agency deficiencies are not significant because in Mexico's electoral management system political parties are well served by playing an active monitoring role in redistricting. That is, the inclusion of parties as oversight agents seems to be working quite well within Mexico's electoral bureaucracy.

[40]Unanimity is defined as a circumstance where multiple actors (more than one) endorse a plan and no other political party formulates a different solution.

This partisan accountability system, however, is restricted to parties and bureaucrats in a closed-door environment. There is no way for the public to find out about the deviations we identify and assess their importance. Our results show that INE's decisions do not necessarily align with what is publicly advertised. An accountable redistricting process ensuring the neutrality of the new electoral cartography requires the EMB to guarantee full disclosure of information. The inclusion of parties in Mexico's redistricting has worked as an effective monitoring system but the endorsement and credibility of the process—beyond partisan recognition—still require that rules are transparently and consistently applied.

While we find no corruption, malfeasance, nor anything approaching the pathologies of redistricting in the U.S., the Mexican public should still be concerned by the substantial gaps between the public perception of the process, the challenges to audit it, the difficulties to verify the application of formal rules, and the limitations to monitoring the actual operation of redistricting. That is, the accountability system for redistricting can only become fully effective—and prevent future politicization—when rulemaking is explicit and expanded access to government records is available. With these improvements, Mexico's process has the potential to live up to its reputation as a model of best practices for redistricting across the world.

We argue that greater transparency can inoculate against some of the issues we raise. Mexico's electoral management board has made important technological advancements. Moreover, we conjecture that technology and information could be used to go beyond transparency and as the first step towards a more open and inclusive process. Not only can map-sharing tools be made available online, but also software applications that would allow the public to become a partner in the process Increasing participation in the redistricting problem may yield more solutions that beat the optimization algorithm—further reducing opportunities for manipulation, enable a more thorough examination of the political implications of technical criteria, and increase the opportunities for meaningful participation by indigenous populations and other communities of interest.

Finally, Mexico is perhaps unique among democracies in the use of automated redistricting and partisan strategic interaction to draw new district boundaries. A strain of redistricting reform in the United States is "let the computer do it" (McDonald 2004). Theoretically, an independent board can adopt objectively neutral criteria that can be operationalized, a cost function that weights these criteria can be computed, and a computer optimization algorithm that attempts to minimize the cost function.

Mexico's experience illuminates potential pitfalls with the automated redistricting approach. The redistricting problem is sufficiently complex that humans may find optimal solutions where computers fail. Even when an optimum is identified, an automated solution may have negative consequences on values that cannot be easily coded into a computer algorithm. However, the incorporation of algorithms into a truly transparent process offers room for improvement over the highly politicized and opaque processes in the United States. Algorithmically generated redistricting plans may serve as focal points for discussion and negotiations and force actors to explain departures from the baseline set by an algorithm. We thus believe Mexico's experience with directly incorporating automation as a step of the redistricting process can provide useful insights to the promises and perils of computer-aided design of district boundaries.

SUPPLEMENTARY MATERIAL

Supplementary Appendix

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