

TURNING COMMUNITIES OF INTEREST INTO A RIGOROUS STANDARD FOR FAIR
DISTRICTING

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ABSTRACT

Recent technological advances make possible a practical, rigorous application of communities of interest (“COIs”) to redistricting measures. Geographers, political scientists, and legal scholars have suggested that keeping communities together can enhance representational fairness. As other paths for redressing gerrymandering have closed in recent years, communities of interest provide a key legal criterion to guard against partisan and racial motives in redistricting. However, the existing literature on communities of interest is fractured between differing conceptions of the term as well as concerns of subjectivity in the identification of communities. We advocate for a novel approach that encompasses a theory of community-based political representation as well as practical, technologically innovative methodology for documenting communities of interest. Specifically, two quantifiable standards—the Effective Splits Index and the Uncertainty of District Membership—can be leveraged to judge the degree to which a community of interest has been split. By equipping citizens with these new tools, technology can provide a workable and rigorous standard for use of communities of interest as a criterion for fair districting.

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INTRODUCTION

Flushing, Bayside, and Bay Terrace are three equidistant neighborhoods in the borough of Queens in New York City. By car, it takes less than 20 minutes to get from any one of them to the others. Yet, as they sing in Sesame Street, one of these things is not like the others. In Flushing and Bayside, Asian Americans represent the most populous racial group, consisting mostly of recently arriving Chinese American immigrants, as well as a substantial number of Korean Americans.¹ These residents share many common concerns and needs, including language assistance, access to social services, affordable housing, and public safety, particularly concerning the perceived targeting of Asian crime victims.² Bay Terrace, on the other hand, is more affluent and residential, with a majority white population. It has a low crime rate, an independent express bus system, and concerns about excessive new development.³ In short, Flushing and Bayside

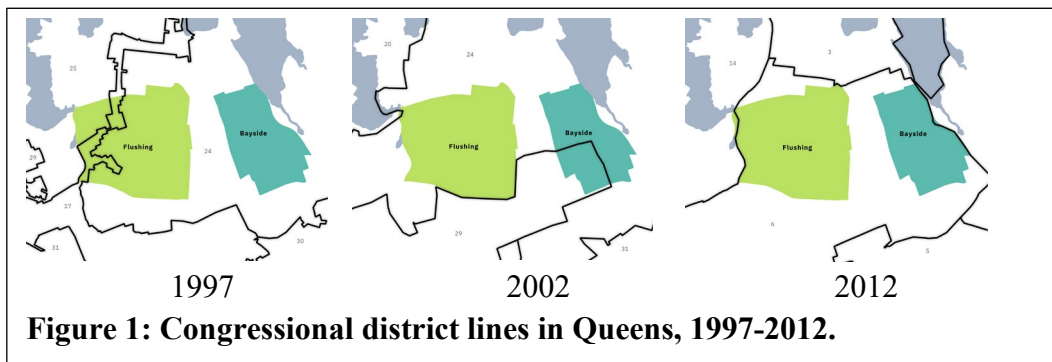
¹ ASIAN AMERICAN LEGAL DEFENSE AND EDUCATION FUND, ASIAN AMERICAN NEIGHBORHOOD BOUNDARIES (2011), <https://www.aaldef.org/uploads/pdf/intervenor-lee-attachment%20a.pdf>.

² ASIAN AMERICAN LEGAL DEFENSE AND EDUCATION FUND, ASIAN AMERICAN COMMUNITIES OF INTEREST SURVEY IN NEW YORK CITY (2011), <https://www.aaldef.org/uploads/pdf/intervenor-lee-attachment%20b.pdf>

³ NEW YORK STATE LEGISLATIVE TASK FORCE ON DEMOGRAPHIC RESEARCH AND REAPPORTIONMENT, PUBLIC HEARING CONGRESSIONAL AND STATE LEGISLATIVE REDISTRICTING 56-57 (2012), https://nystateassembly.granicus.com/DocumentViewer.php?file=nystateassembly_c0871737c09079cbe76ebe0a8d2b49a6.pdf&view=1. Ryan Brady, *Bay Terrace blasts 215 St. development plan*, QUEENS CHRONICLE (July 20, 2018), https://www.qchron.com/editions/north/bay-terrace-blasts-215th-st-development-plan/article_4c75dc64-8c59-11e8-bd33-c3a1aafc29b6.html.

constitute a community of interest (“COI”), with shared priorities and interests that are distinct from those of Bay Terrace.

Despite their shared interests, Flushing and Bayside have historically been divided among multiple electoral districts, thus diluting the minority voting strength of Asian American communities (**Figure 1**). From 1997 to 2002, these neighborhoods were split between three congressional districts—and following the 2002 redistricting cycle, between two.⁴ In the state legislature, Flushing and Bayside were collectively divided between four Assembly districts.⁵ The New York City Council district map after the 2000 Census likewise split Bayside and Flushing, placing Bayside in District 19 with Bay Terrace.⁶ Potential voters and candidates faced racial intimidation: In the 2009 race for Council District 19, Korean American candidate Kevin Kim and his supporters were subjected to anti-Asian slurs and property vandalization.⁷ Early in the campaign, the New York City Police Department investigated a hate crime in which a group of white male teenagers verbally harassed two Korean American volunteers with chants of “White Power!” and launched a physical assault that resulted in injury. Ultimately, Kim lost the election.⁸ In essence, by being split into multiple districts, Asian American



voters in Flushing and Bayside had no plausible route to electing their candidates of choice.

Such lack of representation can be remediated. At the congressional level, New York state’s 2012 map, imposed by a federal court, was drawn to preserve Flushing and Bayside as a COI within one district, District 6. That November, District 6 elected Grace Meng, New York state’s first Asian American member of

⁴ Lee Intervenor’s Submission to Magistrate Judge Roann Mann with Respect to Congressional Redistricting Pursuant to Order Dated Feb. 28, 2012, *Favors v. Cuomo*, No. 11 C.V. 5632 (E.D.N.Y. Feb. 29, 2012), <https://www.aaldef.org/uploads/pdf/intervenor-lee-memorandum.pdf>.

⁵ *Id.*

⁶ ASIAN AMERICAN COMMUNITIES OF INTEREST SURVEY IN NEW YORK CITY, *supra* note 2.

⁷ AALDEF Complaint to DOJ: Voting Rights Violations in Queens City Council District, ASIAN AMERICAN LEGAL DEFENSE AND EDUCATION FUND (July 7, 2010), <https://www.aaldef.org/press-release/aaldef-complaint-to-doj-voting-rights-violations-in-queens-city-council-district>.

⁸ *Id.*

Congress.⁹ Representative Meng has advocated for issues of importance to her constituents. In March 2020, she introduced a resolution to denounce anti-Asian sentiment caused by the coronavirus pandemic, which ultimately passed the House of Representatives.¹⁰ In October 2020, she introduced the Teaching Asian Pacific American History Act, aimed at including Asian Pacific American history in K-12 education through testing standards and programming.¹¹ Representative Meng exemplifies the positive political representation that results from drawing electoral districts to respect communities.

This Article seeks to advance the scholarship on defining and incorporating COIs in the redistricting process in order to push for fair representation nationwide. COIs are not a new concept: geographers,¹² political scientists,¹³ and legal scholars¹⁴ have theorized in past decades about the representational value of keeping communities together. More recently, amidst growing concerns around gerrymandering given demographic shifts and legal changes, academics are increasingly interested in using COIs as a pivotal mechanism to prevent political manipulation of the redistricting process.¹⁵ Additionally, as federal courts appear increasingly hostile to the Voting Rights Act—suggesting that racial gerrymandering claims under Section 2 may become harder to satisfy—the legal criterion of COIs is a particularly important alternative means to protecting communities of color.¹⁶

Despite their growing importance, however, COIs remain an under-researched area in redistricting law. The existing scholarly literature is often divided on questions of defining and identifying COIs, particularly in terms of objective and quantitative versus subjective and qualitative measures. We present a novel approach to COIs, uniting a theory of community-based political representation with a practical, technologically innovative methodology.

⁹ GRACE MENG, *About Grace Meng*, <https://meng.house.gov/about> (last visited Mar. 5, 2021).

¹⁰ H.R. Res. 908, 116th Cong. (2020).

¹¹ Teaching Asian Pacific American History Act, H.R. 8519, 116th Cong. (introduced Oct. 20, 2020).

¹² See, e.g., Richard L. Morrill, *Redistricting, Region and Representation*, 6 POL. GEOGRAPHY Q. 241, 251–53 (1987).

¹³ See, e.g., Bernard Grofman, *Criteria for Districting: A Social Science Perspective*, 33 U.C.L.A. L. REV. 77, 90 (1985).

¹⁴ See, e.g., James A. Gardner, *One Person, One Vote and the Possibility of Political Community*, 80 N.C. L. REV. 1237, 1241–46 (2002).

¹⁵ See, e.g., Samuel S.-H. Wang, Richard F. Ober Jr. & Ben Williams, *Laboratories of Democracy Reform: State Constitutions and Partisan Gerrymandering*, 22 U. PA. J. CONST. L. 203, 244–46 n.195; Michael Li & Yuriy Rudensky, *Rethinking the Redistricting Toolbox*, 62 HOW. L.J. 713, 732–34 (2019).

¹⁶ See Rick Hasen, *Thoughts on Brnovich Oral Argument: Few Surprises, and Voting Rights Plaintiffs Are Likely to Lose (But Exactly How Remains Unclear)*, ELEC. L. BLOG (March 2, 2021), <https://electionlawblog.org/?p=121033> (commenting that the six conservative Justices appear ready to adopt a stringent test that would significantly weaken Section 2 of the Voting Rights Act during the oral argument of *Brnovich v. Democratic National Committee*, *cert granted* 141 S.Ct. 222 (Mem)).

Part I of this Article provides an overview of the theory and application of communities of interest in the redistricting process. We argue for the centrality of COIs in fair political representation, a view that has gained traction amongst reformers and academics in recent years. At the same time, we illustrate the current shortcomings of the standard methods used to identify and apply COIs.

In Part II, we propose a new way to gather and use COIs in the form of a COI public mapping tool. We begin by demonstrating how such a tool can push forward an empirically-driven measure to identify COIs and improve the processes of public input and litigation. Then, we review the specific features a COI platform must include in order to be most effective. Finally, we propose two quantitative COI splitting metrics and apply them to real-world data, offering a rigorous standard for assessing the preservation of COIs.

I. THE CURRENT LANDSCAPE OF COMMUNITIES OF INTEREST

A. *Theory and Importance of Communities of Interest*

The preservation of communities of interest has become a critical consideration for fair redistricting. While there are varying definitions across states, a COI essentially refers to a group of people with common concerns, particularly those that can be addressed through legislation.¹⁷ One proposed federal definition of COIs can be found in H.R.1: “an area with recognized similarities of interests, including but not limited to ethnic, racial, economic, social, cultural, geographic or historic identities. The term communities of interest may, in certain circumstances, include political subdivisions such as counties, municipalities, or school districts, but shall not include common relationships with political parties or political candidates.”¹⁸ Drawing districts to respect COIs is key to effective political representation for individuals and the groups to which they belong, allowing for greater protection of identifiable common interests. Before assessing the current state of COIs from a practical perspective, it is helpful to examine the fundamental reasons why COIs should be considered in the first place.

Professor Nicholas Stephanopoulos has written most prominently about the conceptual importance of “territorial communities,” his term for spatially bounded COIs.¹⁹ In outlining the theoretical underpinnings that justify preserving territorial communities as a standard for redistricting, Professor Stephanopoulos argues in essence that “communities arise along geographic lines and should be represented in the legislature.”²⁰ His first tenet is that geography does indeed hold subjective and objective relevance in identifying meaningful communities; people generally *feel* connected to those who live in the same area, and they often *are* connected, for

¹⁷ See discussion *infra* Part I.B.

¹⁸ For the People Act of 2021, H.R.1, § 2413(a)(1)(D), 117th Cong. (introduced Jan. 4, 2021). H.R.1 passed the U.S. House of Representatives on March 4, 2021. A previous version of the bill also passed the House in 2019, but was not voted on by the Senate.

¹⁹ See Nicholas O. Stephanopoulos, *Redistricting and the Territorial Community*, 160 U. PA. L. REV. 1379, 1431 (2012).

²⁰ *Id.* at 1390.

instance by socioeconomic status, cultural values, or local industries.²¹ This representational theory thus lies in the political significance of these communities, which in turn legitimates them as a basis for redistricting.²²

Establishing districts around COIs facilitates the political process for both elected representatives and their constituents. From the representative's perspective, "the rationale for giving due weight to clear communities of interest is that to be an effective representative, a legislator must represent a district that has a reasonable homogeneity of needs and interests; otherwise the policies he supports will not represent the preferences of most of his constituents."²³ On the constituent side, COI-based districts encourage greater civic participation, as voters better understand and identify with districts that align with preexisting local networks and shared affiliations.²⁴ Keeping communities together yields greater political representation of common interests and concerns.

In addition to the inherent benefits of community-based districts, preserving COIs also indirectly promotes fairer maps. Requiring map drawers to respect community boundaries decreases their latitude to skew districts in favor of a political party or incumbent.²⁵ In this way, COIs act as a limit on gerrymandering by constraining the range of valid maps and making it more difficult to maximize unfair advantages. Furthermore, with concerns over traditional race-based remedies becoming less tenable, COIs also present an alternative route to protecting communities of color with clear socioeconomic or cultural commonalities.²⁶

Given their theoretical value and existing legal status, COIs have elicited renewed interest across states as a key path forward in the changing landscape of redistricting. In 2014, eighteen civil rights and democracy organizations endorsed a set of ten baseline redistricting principles, of which one stated: "Consideration of communities of interest is essential to successful redistricting. Maintaining communities of interest intact in redistricting maps should be second only to compliance with the United States Constitution and the federal Voting Rights Act as a consideration in redistricting."²⁷ Successful redistricting reforms in recent

²¹ *Id.* at 1390-91.

²² *Id.* at 1391.

²³ *Maestas v. Hall*, 274 P.3d 66, 78 (N.M. 2012) (internal citations omitted).

²⁴ See Nicholas O. Stephanopoulos, *Spatial Diversity*, 125 HARV. L. REV. 1903, 1917-19 (2012) (outlining scholarly arguments and empirical evidence for greater levels of voter engagement in more homogeneous districts).

²⁵ See Karin MacDonald & Bruce E. Cain, *Community of Interest Methodology and Public Testimony*, 3 U.C. IRVINE L. REV. 609, 613 (2013).

²⁶ For a discussion on why appeals to traditional race-based remedies will be more difficult given changing demographics, the weakening of the Voting Rights Act, and the direction of federal courts, see Li & Rudensky, *supra* note 15, at 715-26.

²⁷ Common Cause, *Redistricting Principles for a More Perfect Union* (2014), <https://www.commoncause.org/wp-content/uploads/2020/11/Redistricting-Principles-FINAL-with-endorsers.pdf>.

years have often included COI provisions, as seen in Colorado,²⁸ Michigan,²⁹ Utah,³⁰ and Virginia.³¹ To date, thirty-five states recognize the importance of COIs through formal requirements for their preservation in redistricting, enacted in state constitutions, statutes, legislative committee guidelines, or court orders.³² COIs have also gained increasing acknowledgement and prominence on a national level. Federal courts have repeatedly taken COIs into account when imposing redrawn redistricting plans on states.³³ H.R.1’s inclusion of protection for COIs over more traditional criteria like contiguity and compactness indicates the growing centrality of COIs to fair redistricting.³⁴

B. Current Community-of-Interest State Provisions

COI provisions in each state vary significantly in their specificity and scope. Roughly half of the thirty-five states with such requirements mention COIs but leave them wholly undefined.³⁵ Of the states that do offer a definition, some are specific and limited, such as the Alaska Constitution’s criterion of “relatively integrated socio-economic area[s].”³⁶ Others are much more expansive, such as Alabama’s legislative guidelines, which recognize COIs based in “racial, ethnic, geographic, governmental, regional, social, cultural, partisan, or historic interests; county, municipal, or voting precinct boundaries; and commonality of

²⁸ COLO. CONST. art. V, § 44.3(2)(a), § 48.1(2) (“As much as is reasonably possible, the commission’s plan must preserve whole communities of interest”).

²⁹ MICH. CONST. art. IV, § 6.13(c) (“Districts shall reflect the state’s diverse population and communities of interest”).

³⁰ UTAH CODE § 20A-20-302 (5)(a) (“The commission shall define and adopt redistricting standards for use by the commission that require that maps adopted by the commission, to the extent practicable, comply with the following, as defined by the commission: (a) preserving communities of interest”).

³¹ VA. CODE ANN. § 24.2-304.04(5) (“Districts shall be drawn to preserve communities of interest”).

³² See Wang, Ober & Williams, *supra* note 15, at 245 n.195 (2019); see also Appendix A. This represents a significant increase in recent decades; in 1985, only eight state constitutions contained explicit provisions about preserving COIs.

³³ Dillard v. City of Greensboro, 946 F. Supp. 946, 952 (M.D. Ala. 1996); Larios v. Cox, 314 F. Supp. 2d 1357, 1360 (N.D. Ga. 2004); Toerner v. Cameron Par. Police Jury, No. 2:11-cv-1302, 2011 U.S. Dist. LEXIS 90584, at *24 (W.D. La. Aug. 15, 2011); Greig v. City of St. Martinville, 2001 WL 34895961 (W.D. La. Sept. 28, 2001); Rodriguez v. Pataki, 207 F. Supp. 2d 123, 124 (S.D.N.Y. 2002); Smith v. Hosemann, 852 F. Supp. 2d 757 (S.D. Miss. 2011).

³⁴ For the People Act of 2021, *supra* note 18.

³⁵ See, e.g. ARIZ. CONST. art. IV, pt. II, § 1(14)(D) (“District boundaries shall respect communities of interest to the extent practicable”); N.Y. CONST. art. III, § 4 (“The Commission shall consider . . . communities of interest.”).

³⁶ ALASKA CONST. art. VI, § 6.

communications.”³⁷ Meanwhile, states such as California,³⁸ Michigan,³⁹ and Virginia⁴⁰ explicitly prohibit the consideration of political or partisan interests in identifying COIs. Finally, some states go further in specifying concrete examples of COIs;⁴¹ one of the most extensive lists can be found in the Colorado Supreme Court case *Hall v. Moreno*, which identifies COIs as particular as the Rocky Flats radioactive cleanup area, the I-70 corridor, Rocky Mountain National Park, and the pine bark beetle kill infestation.⁴²

States give differing levels of consideration and priority to COIs. For example, California places a heavy emphasis on preserving COIs,⁴³ ranking the criterion fourth, only below the federal requirements of equal population, compliance with the Voting Rights Act, and basic measures of contiguity.⁴⁴ On the other hand, some states only protect COIs after all other criteria are met.⁴⁵

The fifteen states which have not yet adopted official COI criteria may still have the option to consider COIs in the redistricting process. Without passing a statute or amending the state constitution, COIs can be adopted by legislative committee guidelines—as is the case in nine states, or through court decisions, as has occurred in seven states.⁴⁶ Furthermore, COIs have been recognized as a traditional redistricting criterion by the U.S. Supreme Court in no fewer than nine

³⁷ ALA. LEGIS., REAPPORTIONMENT COMM. GUIDELINES FOR CONG. LEGIS., AND STATE BD. OF EDUC. REDISTRICTING (May 2011).

³⁸ CAL. CONST. art. XXI, § 2(d)(4) (“Communities of interest shall not include relationships with political parties, incumbents, or political candidates.”).

³⁹ MICH. CONST. art. IV, § 6(13)(c) (“Communities of interest do not include relationships with political parties, incumbents, or political candidates.”).

⁴⁰ VA. CODE ANN. § 24.2-304.04(5) (“A ‘community of interest’ does not include a community based upon political affiliation or relationship with a political party, elected official, or candidate for office.”).

⁴¹ See, e.g. CAL. CONST. art. XXI, § 2(d)(4) (“[A]reas in which the people share similar living standards, use the same transportation facilities, have similar work opportunities, or have access to the same media of communication relevant to the election process.”); COLO. CONST. art. V, § 44.3(b)(ii)(b) (“[S]hared public policy concerns such as education, employment, environment, public health, transportation, water needs and supplies.”).

⁴² 270 P.2d 961, 975-80 (Colo. 2012).

⁴³ See Nicholas O. Stephanopoulos, *Communities and the California Commission*, 23 STAN. L. & POL’Y REV. 281, 282 (2012) (“[T]he California Constitution is unique in the premium that it now places on subdivision and community preservation. It is unique in clearly prioritizing this criterion—aimed at making districts more coherent and thus improving voter participation and the quality of representation—over values such as compactness, competition, and partisan fairness.”).

⁴⁴ CAL. CONST. art. XXI, § 2(d)(1)-(4).

⁴⁵ See, e.g. Order Stating Redistricting Principles and Requirements for Plan Submissions, *Hippert v. Ritchie*, No. A11-152, 11 (Minn. Spec. Redis. Panel Nov. 4, 2011) (“Where possible in compliance with the preceding principles, communities of interest shall be preserved.”); Criteria/Standards for Congressional Redistricting, Kentucky Interim Legislative Joint Comm. on State Gov’t Redistricting Subcomm. (July 11, 1991) (“Where possible, congressional districts should attempt to preserve communities of interest where such efforts do not violate the other stated criteria.”).

⁴⁶ See Appendices A & B; see also Wang, Ober & Williams, *supra* note 15.

decisions since 1995.⁴⁷ Citizens have solid ground on which to advocate for COIs in the public input process, regardless of state requirements.

It is necessary to acknowledge that in all states, COIs can at most serve as one of several important redistricting provisions. There are always trade-offs between different fairness standards, and no single criterion is a redistricting panacea.⁴⁸ COIs can and have come into conflict with other traditional criteria like equal population,⁴⁹ compactness,⁵⁰ and competitiveness.⁵¹ The goal should not be to maximize any one criterion. Rather, all redistricting provisions, including COIs, can serve as individual means to the end of achieving fair political representation.

C. *Standard Measures of Communities of Interest*

The varying legal requirements between states highlight the difficulty of defining COIs. Thus far, there have been a handful of standard—yet ultimately unsatisfactory—methods of objectively measuring COIs.

First, COIs may be identified using existing government subdivisions and designations. From a historical perspective, political subunits served as the original COIs, based on the rationale that residents who share a place of residence and a local government naturally share a variety of interests.⁵² For large scale constituencies, such as congressional districts, political subunits like counties and cities can serve as the functional equivalent of COIs.⁵³ For smaller constituencies,

⁴⁷ *Miller v. Johnson*, 515 U.S. 900, 916 (1995); *Bush v. Vera*, 517 U.S. 952, 977 (1996) (plurality opinion); *Abrams v. Johnson*, 521 U.S. 74, 92, 100 (1997); *Hunt v. Cromartie*, 526 U.S. 541, 555 (1999) (Stevens, J., concurring); *Vieth v. Jubelirer*, 541 U.S. 267, 360–61 (2004) (Breyer, J., dissenting); *League of United Latin Am. Citizens v. Perry*, 548 U.S. 399, 433 (2006); *Evenwel v. Abbott*, 136 S. Ct. 1120, 1124, 1133 (2016); *Bethune-Hill v. Virginia State Bd. of Elections*, 137 S. Ct. 788, 795 (2017); *Rucho v. Common Cause*, 139 S. Ct. 2484, 2500 (2019).

⁴⁸ See Grofman, *supra* note 13, at 124 (“[Redistricting] involves the need to reconcile multiple and conflicting desirable social goals, not all of which can simultaneously be achieved.”).

⁴⁹ See Bruce E. Cain et al., *From Equality to Fairness: The Path of Political Reform Since Baker v. Carr*, in *PARTY LINES: COMPETITION, PARTISANSHIP, AND CONGRESSIONAL REDISTRICTING* 6, 8 (Thomas E. Mann & Bruce E. Cain eds., 2005) (“The equal population criterion inevitably wreaked havoc on geographic representation since in many instances homogeneous communities of interest had to be split or combined in order to achieve population equality . . .”).

⁵⁰ See Nathaniel Persily, *When Judges Carve Democracies: A Primer on Court-Drawn Redistricting Plans*, 73 *GEO. WASH. L. REV.* 1131, 1158 (2005) (describing how seemingly compact districts can actually group unrelated communities and how districts based on local constituencies may be less compact).

⁵¹ See James G. Gimpel & Laurel Harbridge-Yong, *Conflicting Goals of Redistricting: Do Districts That Maximize Competition Reckon with Communities of Interest?*, *ELEC. L.J.* (forthcoming) (explaining the irreconcilable tensions between COIs and competitiveness, as COIs often share political interests and lead to heavily partisan districts).

⁵² See James A. Gardner, *What Is “Fair” Partisan Representation, and How Can It Be Constitutionalized? The Case for A Return to Fixed Election Districts*, 90 *MARQ. L. REV.* 555, 584 (2007) (“[C]ommon residency in a working, functioning, self-governing locality by itself can give rise to a political and administrative community of interest entitled to recognition.”).

⁵³ See *In re Reapportionment of the Colo. Gen. Assembly*, 45 P.3d 1237, 1248 (Colo. 2002) (“Counties and the cities within their boundaries are already established as communities of interest

such as city council districts or county supervisorial districts, COIs may be defined using geographic areas accorded special designations by local governments. These may include formally-recognized ethnic places, such as Koreatown or Little India, and neighborhoods with long-standing continuity, such as Chicago's community areas.⁵⁴ However, the degree to which residents identify with county and neighborhood units often varies, and pre-existing government lines do not necessarily reflect meaningful communities.⁵⁵ Moreover, as preserving political subdivisions is often its own distinct redistricting criterion, recognized in thirty-three state constitutions, local government units will not be considered further in this Article.⁵⁶

Another traditional way of defining COIs is to solely consider race and ethnicity. Race is implicated in many issues surrounding redistricting, and it is particularly central to COIs.⁵⁷ Race-based COIs permit shared racial identities to create salient communities due to collective societal and political forces, irrespective of geography and other factors.⁵⁸ As Justice Ruth Bader Ginsburg noted, "[E]thnicity itself can tie people together."⁵⁹ In the 1990s, the Department of Justice adopted this racial COI rationale to maximize majority-minority districts under the Voting Rights Act.⁶⁰ However, the Supreme Court largely rejected this approach, striking down such districts as unconstitutional racial gerrymanders where race was the predominant factor in drawing lines.⁶¹ Furthermore, using racial data alone can obscure intragroup differences as well as cross-racial similarities.

in their own right, with a functioning legal and physical local government identity on behalf of citizens that is ongoing").

⁵⁴ See, e.g., Moon Young Choi, *Putting Ethnicity on the Map: The Making, Contesting, and Assessing of Claims for the Formal Recognition of Ethnic Places* (Ph.D. diss., University of California, Irvine, 2014).

⁵⁵ For example, Arab-Americans in greater Detroit are spread across parts of Dearborn, Detroit, and Hamtramck, and city boundaries do not capture what is otherwise a cohesive community. PRINCETON UNIVERSITY SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, A COMMISSIONER'S GUIDE TO REDISTRICTING IN MICHIGAN 40 (2019).

⁵⁶ See Wang, Ober & Williams, *supra* note 15, at 242.

⁵⁷ See Justin M. Levitt, *Introducing "Clustering:" Redistricting in Geographic Perspective* 38 (Ph.D. diss., University of California, San Diego, 2016) ("While, broadly speaking, communities of interest can encompass any group of people linked by common bonds, in the United States, it almost always refers to race, and the use of race as a criteria in districting.").

⁵⁸ See Lisa A. Kelly, *Race and Place: Geographic and Transcendent Community in the Post-"Shaw" Era*, 49 VAND. L. REV. 227, 234 (1996) ("[T]he importance of race also transcends place, creating a community that has little to do with geography but everything to do with the larger political and cultural community of color.").

⁵⁹ *Miller v. Johnson*, 515 U.S. 900, 946 (1995) (Ginsburg, J., dissenting).

⁶⁰ See Jonathan I. Leib, *Communities of interest and minority districting after Miller v. Johnson*, 17 POL. GEOGRAPHY 683, 688 (1998) ("The DOJ's maximization of majority-minority districts in the redistrictings of the early 1990s demonstrated a conception of community of interest defined solely in racial and ethnic terms; that is members of the same racial or ethnic group constitute a community of interest that transcends space as a result of the group's shared history, culture, sense of group identity, legacy of discrimination and segregation.").

⁶¹ See *Miller*, 515 U.S. 900; *Bush v. Vera*, 517 U.S. 952 (1996); *Shaw v. Hunt*, 517 U.S. 899 (1996).

Communities that fall under a common race category may in fact have significant conflicts and divergent needs.⁶² Meanwhile, different racial groups may form coalitions to represent common interests.⁶³

Finally, a technical method of measuring COIs is available through statistical clustering. Analysis of demographic data, most commonly from the Census Bureau, can reveal clusters of individuals with common traits and interests which may constitute COIs.⁶⁴ Professor Stephanopoulos has used a statistical procedure called factor analysis to operationalize his theory of territorial communities.⁶⁵ In brief, he analyzed variables from the American Community Survey (“ACS”) and election results on popular initiatives to assess California’s 2010 redistricting plans for spatial homogeneity—a measure that points to the adherence of districts to COIs.⁶⁶ Other scholars have also performed geodemographic analyses of Census and ACS variables that can serve to identify natural clusters of COIs.⁶⁷ However, some have warned against relying too heavily on quantitative data, which serve as incomplete proxies for possible communities,

⁶² For example, Dearborn, Michigan has a significant Arab-American population—for which the Census does not even have a race category—where the Yemeni and Lebanese communities have a history of division and discrimination and exhibit differences in educational outcomes and religious practices. *See, e.g.*, Hassan Khalifeh, *Local Yemenis feel marginalized as Lebanese brethren gain momentum*, THE ARAB AMERICAN NEWS (July 7, 2017), <https://www.arabamericannews.com/2017/07/07/local-yemenis-feel-marginalized-as-lebanese-brethren-gain-momentum/>.

⁶³ For example, Chinese immigrants in Manhattan’s Chinatown and Latino immigrants in the Lower East Side achieved common goals when placed in the same City Council district. *See* Margaret Fung, *A District Like a Mosaic*, N.Y. NEWSDAY 68 (Apr. 12, 1991) (“Working class Asians and Latinos in this area have successfully united in the past to win affordable housing, health care, immigrant services, and bilingual education.”). *See also* Glenn D. Magpantay, *A Shield Becomes a Sword: Defining and Deploying a Constitutional Theory for Communities of Interest in Political Redistricting*, 25 BARRY L. REV. 1, 18 (2020); Benjamin Forest, *Mapping Democracy: Racial Identity and the Quandary of Political Representation*, 91 ANNALS OF THE ASS’N OF AM. GEOGRAPHERS 143, 160 (2001) (“[S]ome geographers have advocated the creation of multi-ethnic ‘influence districts’ in which ethnic and racial minorities can form coalitions to advance common interest.”).

⁶⁴ *See* Stephen J. Malone, *Recognizing Communities of Interest in a Legislative Apportionment Plan*, 83 VA. L. REV. 461, 480 (1997). (“Census data on population density, race, national origin, income, education, ancestry, occupation, religion and household size can point to commonalities within the population that may indicate the existence of a community of interest.”).

⁶⁵ *See* Stephanopoulos, *supra* note 43, at 289–93.

⁶⁶ *Id.* at 283.

⁶⁷ *See, e.g.*, Kalyn M. Rossiter, et al., *Congressional Redistricting: Keeping Communities Together?*, 70 PROF. GEOGRAPHER 610, 614 (2018) (outlining the use of cluster analysis to group 2010 Census block groups together based on variables such as median age, percentage renters, and race and ethnicity, as the basis for defining COIs); Seth E. Spielman & Alex Singleton, *Studying Neighborhoods Using Uncertain Data from the American Community Survey: A Contextual Approach*, 105 ANNALS OF THE ASS’N OF AM. GEOGRAPHERS 1003 (2015) (classifying each tract in the conterminous United States and conducting tract-level analysis of 136 ACS variables); Daniel W. Phillips & Daniel R. Montello, *Defining the community of interest as thematic and cognitive regions*, 61 POL. GEOGRAPHY 31, 32 (2017) (using Spielman & Singleton’s classification scheme to group contiguous tracts of the same class into clusters representing COIs).

and losing sight of the actual qualitative interests that COIs are meant to protect.⁶⁸ Indeed, people often define their communities around factors that inform their daily lives, such as infrastructure and physical features, that fall outside the purview of the Census or ACS.⁶⁹

D. Previous Applications of Communities of Interest

In addition to the pitfalls of existing approaches to identifying COIs, there are also major concerns with the ways in which COIs have previously been applied in the redistricting process. Evidence and arguments on COIs can be presented at two stages: (1) before plans have been finalized, during the map-drawing period; and (2) after plans have been drawn, during litigation.

During the map-drawing period, COIs can be introduced into the redistricting process through public input. Currently, twenty-eight states legally mandate some form of citizen participation in redistricting, such as public hearings, public comment, and public map submissions.⁷⁰ Even in states without legal requirements, nearly all held at least one public hearing in the last redistricting cycle following the 2010 Census.⁷¹ Through these avenues of public input, citizens can appeal to redistricting authorities to preserve COIs. The most extensive public input process with a heavy emphasis on COIs took place in California.⁷² In total, the California Citizens Redistricting Commission gathered over 14,000 public comments, of which more than half explicitly addressed COIs.⁷³

A principal difficulty in handling public comment is how to organize a high volume of citizen input. Staff and consultants in California faced significant challenges in making the data usable for the Commission and incurred high monetary and temporal costs.⁷⁴ These costs can also become a barrier of entry,

⁶⁸ See MacDonald & Cain, *supra* note 25, at 612 (“The ‘interest’ in a COI is not merely a clustering of some measurable social or economic characteristic. Residents in that area have to perceive and acknowledge that a social, cultural, or economic interest is politically relevant. COI geography is ultimately subjective as well.”).

⁶⁹ See ESRI, *How Well Do District Boundaries Reflect Natural Communities?*, <https://www.arcgis.com/apps/Cascade/index.html?appid=1e5f6e98c8df47f1abd2709fd2406fba> (last visited Mar. 4, 2021).

⁷⁰ See NAT’L CONF. OF STATE LEGISLATURES, *Public Input and Redistricting*, <https://www.ncsl.org/research/redistricting/public-input-and-redistricting.aspx#/> (last updated Sept. 9, 2019).

⁷¹ Based on the authors’ reviews of state government websites and local newspapers, at least forty-seven states held one or more public hearings in the redistricting cycle after the 2010 Census.

⁷² For a detailed overview of the public testimony process in California in 2011, see MacDonald & Cain, *supra* note 25, at 623-28.

⁷³ See *id.* at 626-28 (specifying 2,365 comments in the public hearing database, 1,385 of which addressed COIs, and 12,425 records of written comments, 7,138 of which addressed COIs).

⁷⁴ See *id.* at 627 (“CRC staff also had tremendous problems keeping the submissions organized and getting them to the consultants in a timely manner or at all. Consultants had to sift through dozens of folders that contained duplicate submissions, had the wrong file names attached, and were not properly redacted. Three separate quality control processes by consultants to randomly check the public input sent to them for coding against what was posted on the website showed discrepancies.”).

leaving public hearings prone to selectivity bias that favors those who have the resources to participate, including special interest groups.⁷⁵ Thus, while the formidable efforts in California to gather COI input did appear to bring about better maps,⁷⁶ the various pitfalls that arose during the process hint towards the difficulty of replicating such a model of public testimony.

After redistricting maps are passed, COIs can again be invoked, this time during litigation. The aforementioned COI provisions in various states provide the basis for legal arguments in court. Courts often take COIs into account when assessing the constitutionality of challenged district plans.⁷⁷ However, some courts have rejected consideration of COIs due to the lack of a clear, articulable standard. For example, a Maryland court dismissed the criterion as “nebulous and unworkable,”⁷⁸ and a Pennsylvania court declared communities “too elastic and amorphous.”⁷⁹ In the absence of a concrete definition, arguments on the basis of COIs can often be offered as pretext, providing a post hoc justification for challenged districts.⁸⁰

Notably, appeals to COIs commonly arise in the context of racial gerrymandering. The Supreme Court first recognized the concept of COIs in the 1995 case of *Miller v. Johnson*, but rejected the State’s “mere recitation of purported communities of interest,” finding that the Black population in Georgia’s majority-minority district was in reality defined not by commonality but by “fractured political, social, and economic interests.”⁸¹ The following year, the Court dismissed COI-based arguments twice more in striking down majority-minority districts, citing concern that in Texas, the legislature “compiled detailed racial data for use in redistricting, but made no apparent attempt to compile, and did not refer specifically to, equivalent data regarding communities of interest,”⁸² and that in North Carolina, “respecting communities of interest . . . came into play only after the race-based decision had been made by the legislature.”⁸³ Lower

⁷⁵ *Id.* at 616.

⁷⁶ See Stephanopoulos, *supra* note 43, at 293-94 (describing his empirical findings that California’s new 2011 districts more closely correspond to geographical communities than the prior plan, though they could have been better still).

⁷⁷ For a curation of all relevant case law, see Appendix B.

⁷⁸ *In re Legislative Districting*, 475 A.2d 428, 445 (Md. 1984) (“The provision does not, in our view, encompass protection for a concept as nebulous and unworkable as ‘communities of interest,’ involving as it does concentrations of people sharing common interests. We think it apparent that the number of such communities is virtually unlimited and no reasonable standard could possibly be devised to afford them recognition in the formulation of districts within the required constitutional framework.”).

⁷⁹ *Albert v. 2001 Legislative Reapportionment Comm’n*, 790 A.2d 989, 999 (Pa. 2002) (“The appellants urge us to consider the “homogeneity” and “shared interests” of a community as guidelines. We believe that these concepts are too elastic and amorphous, however, to serve as a judicial standard for assessing the reapportionment process.”).

⁸⁰ *Favors v. Cuomo* 881 F. Supp. 2d 356 (E.D.N.Y. 2012) (“[A]rguments based on communities of interest can often be pretexts for incumbency or partisan-related considerations.”).

⁸¹ 515 U.S. 900, 919 (1995).

⁸² *Bush*, 517 U.S. at 967.

⁸³ *Shaw*, 517 U.S. at 907.

courts have also rejected appeals to COIs as pretexts for racially-motivated redistricting.⁸⁴ These decisions reveal that a common weakness for COIs is their post hoc appearance, as comprehensive and rigorous data on COIs have not generally been collected during the map-drawing process.

II. A PATH FORWARD FOR COMMUNITIES OF INTEREST USING TECHNOLOGY AND MATHEMATICAL ANALYSIS

Given the value of COIs in promoting fair representation for individuals and their communities, it is important to ensure that they are used effectively in the redistricting process. As it stands, the current methods of measuring and identifying COIs fall short, and previous applications of COIs through public input and litigation have also raised concerns. We propose a new path forward for COIs in two parts: first, a dedicated mapping tool for the collection of COIs, and second, a metric for the evaluation of maps based on the COIs thus collected.

Technology has changed the dynamic between citizens and redistricting. Over the last two decades, a key development in redistricting has been the advent of software-based citizen mapping tools. First emerging in the mid-2000s, these technologies have made it possible for citizens to actively participate in the map-drawing process.⁸⁵ Free tools—like Dave’s Redistricting App,⁸⁶ DistrictBuilder,⁸⁷ and DistrictR⁸⁸—as well as professional software—like Maptitude⁸⁹ and Esri Redistricting⁹⁰—allow interested individuals to draw their own district maps, which they can then submit to the legislature or redistricting commission as public input or to courts as evidence.⁹¹

⁸⁴ See, e.g., *Kelley v. Bennett*, 96 F. Supp. 2d 1301 (M.D. Ala. 2000) (“[T]he evidence in this case does not show that protecting communities of interest prevailed over race”); *Diaz v. Silver*, 978 F. Supp. 96 (E.D.N.Y. 1997) (“[C]ommunities of interest were not as important as race in the referees’ redistricting”); *Seamon v. Upham*, 536 F. Supp. 1030 (E.D. Tex. 1982) (“The record does not contain any indication whatever as to the existence of compelling communities of interest”).

⁸⁵ See Jeremy W. Crampton, *Political Applications of the Geoweb: Citizen Redistricting*, 45 ENV’T AND PLANNING A 70 (2013) (discussing the emergence of citizen redistricting tools, in particular DistrictBuilder, Dave’s Redistricting App, and Esri Redistricting).

⁸⁶ DAVE’S REDISTRICTING, <https://davesredistricting.org/maps#home> (last visited Mar. 1, 2021).

⁸⁷ DISTRICT BUILDER, <https://www.districtbuilder.org/> (last visited Mar. 1, 2021).

⁸⁸ DISTRICTR, <https://districtr.org/> (last visited Mar. 1, 2021).

⁸⁹ MAPTITUDE, <https://www.caliper.com/maptovu.htm> (last visited Mar. 1, 2021).

⁹⁰ ESRI REDISTRICTING, <https://www.esri.com/en-us/arcgis/products/esri-redistricting/overview> (last visited Mar. 1, 2021).

⁹¹ One example of a citizen who leveraged redistricting software to push for reform is Amanda Holt, a piano teacher from Pennsylvania. In 2011, she used Dave’s Redistricting App to draw district maps that fully met the state’s constitutional requirements. Ultimately, her maps influenced the Pennsylvania Supreme Court to strike down the legislature’s gerrymandered plans. See MICHAEL P. MACDONALD & MICAH ALTMAN, *THE PUBLIC MAPPING PROJECT: HOW PUBLIC PARTICIPATION CAN REVOLUTIONIZE REDISTRICTING* 77 (2018).

The promulgation of such tools demonstrates the pivotal role technology can play in democratizing redistricting. However, these district mapping tools have two problems. First, it is still difficult for the public to access such tools. Drawing a redistricting plan requires a high degree of technical expertise and domain-specific knowledge.⁹² The same features that render redistricting software powerful, such as the ability to conduct geospatial analyses or evaluate detailed election and demographic statistics, can also make the software confusing to navigate.⁹³ Second, the average citizen is unlikely to be familiar with political geography across an entire state. He or she may be primarily interested not in a statewide map, but in specific issues relating to fair representation where they live—in short, their community of interest.

A technology platform dedicated to drawing COIs, rather than full district plans, would capitalize on the benefits of existing redistricting technologies while bypassing current barriers to entry. An online COI mapping tool can engage a wider audience by prioritizing accessibility and ease of use, with the opportunity to educate community members on the redistricting process and the importance of COI representation. Ultimately, a COI platform allows individuals to delineate their own geographical communities in a standardized and integrated way, ensuring that a wide variety of COIs are readily available for consideration in the redistricting process.

A. *An Empirically-Driven Measure of Communities of Interest*

A COI public mapping tool would support and advance an empirically-driven method of measuring COIs that relies on the complex perceptions of community members themselves, rather than limited, objective indicators. Using such a tool, individuals themselves can draw the boundaries of the COIs with which they identify. The idea of self-defined COIs is not novel. It reflects the cognizability principle: the ability of residents to cognize their district by being aware of the general configuration of its boundaries.⁹⁴ This facilitates “identification of and with the district,” which allows for better representation and greater civic participation.⁹⁵ Defining COIs through the personal cognitive maps of community members ensures that the resulting COI-based districts are cognizable and meaningful to their constituents.⁹⁶ Indeed, numerous scholars have emphasized the need for

⁹² Josh Goodman, *The Rise of Do-It-Yourself Redistricting*, GOV'T TECH. (Feb. 3, 2011) (“Redistricting, after all, is a not just a political process but also a very technical one, requiring map makers to consider everything from a district’s compactness to the Supreme Court’s latest interpretation of the Voting Rights Act.”), <https://www.govtech.com/dc/articles/The-Rise-of-Do-It-Yourself-Redistricting.html>.

⁹³ See Crampton, *supra* note 85, at 74-75 (describing Esri Redistricting’s functionalities and its inaccessibility to the average citizen).

⁹⁴ See Bernard Grofman, *Would Vince Lombardi Have Been Right If He Had Said: “When it Comes to Redistricting, Race Isn’t Everything, It’s the Only Thing”?*, 14 CARDOZO L. REV. 1237, 1262-63 (1993).

⁹⁵ *Id.* at 1262.

⁹⁶ See Phillips & Montello, *supra* note 67, at 35 (describing how individuals can define COIs using their own subjective cognitive maps).

individuals to be at the center of defining their own COIs to ensure that districts are truly representative.⁹⁷

By focusing on the perceptions of the community itself, an empirically-driven approach to identifying COIs can capture salient COIs that do not fall neatly into the current objective measures of racial categories or Census clusters. First, an empirical method of defining COIs can reveal nuanced distinctions or coalitions between racial and ethnic communities that are obscured by racial data alone.⁹⁸ To avoid race essentialism, residents with first-hand experience and familiarity should be in charge of identifying their own communities. Similarly, a standard of COI definition centered on community perceptions improves upon statistical clustering by recognizing key qualitative interests not reflected in quantitative data.⁹⁹ Communities that appear demographically similar may have significantly different policy concerns due to other external factors.¹⁰⁰ A community-led standard of defining COIs allows individuals to point out compelling interests that are not evident from general population data but nevertheless require attention from political representatives.

There have been a few previous attempts to apply the idea of self-identified COIs in the context of redistricting. In 2011, the Asian American Legal Defense and Education Fund (AALDEF) presented a federal court with maps of 15 Asian American COIs in New York City “as defined by community groups and residents who live and work in those geographic areas.”¹⁰¹ These maps were accompanied with a thorough description of each community’s particular concerns and needs, such as lack of medical insurance, language assistance, and places of worship, that could not have been discerned without input from community members themselves.¹⁰²

⁹⁷ See, e.g., Todd Makse, *Defining Communities of Interest in Redistricting Through Initiative Voting*, 11 ELEC. L.J. 503, 506 (2012) (“In other words, voters should determine when geography matters, and when it is trumped by partisanship and ideology, economic interests, or socioeconomic and racial divisions.”); MacDonald & Cain, *supra* note 25, at 635 (“[W]e reject the idea that objective indicators, especially those derived from the ACS, are an adequate substitute for public testimony and we endorse the construction of COIs based on how residents perceive them . . .”).

⁹⁸ *Supra* notes 62-63 and accompanying text.

⁹⁹ See MacDonald & Cain, *supra* note 25, at 611 (“First, purely quantitative measures of community of interest cannot supplant qualitative public testimony... public testimony gives a better snapshot of what matters to voters, residents, and communities at a given time and place.”).

¹⁰⁰ One striking example of the need for community input to delineate distinct COIs is in the case of San Fernando Valley and the Los Angeles Basin. While the two communities appear indistinguishable in ACS data given their demographic and socioeconomic similarities, residents testified to the California Commission that the Santa Monica Mountains between the two areas created a great physical divide, leading to the wildfire hazards and fire prevention interests on the Los Angeles Basin side not being present on the San Fernando Valley side. *Id.* at 632.

¹⁰¹ These maps were presented as exhibit B to the Lee Intervenors February 2012 brief in *Cuomo v. Favors*, and had been previously submitted to New York’s Legislative Task Force on Demographic Research and Reapportionment (LATFOR) at a public hearing in Queens on September 7, 2011. *Supra* note 4.

¹⁰² *Id.*

Researchers Daniel Phillips and Daniel Montello also conducted a study in which they had participants identify COIs through their own subjective cognitive maps.¹⁰³ They asked respondents to draw and fill in “bubbles” representing the boundaries of what they saw as their community of interest, which were then digitized and analyzed.¹⁰⁴ The study produced mixed results on the effectiveness of such an approach; while the COIs drawn were sometimes larger than the city council districts and showed moderate consensus, the researchers concluded that the cognitive maps of individuals offer important insights and “should represent the core or center of whatever district is being crafted.”¹⁰⁵

These two research studies reveal valuable advantages of an empirically-driven measure for COIs, but their methodologies are impractical to scale or replicate. Both rely on time-intensive processes of surveying and experimentation, with researchers individually meeting with community members. These constraints limit the scope of study to singular localities. A public mapping tool, on the other hand, can efficiently and effectively gather and analyze a wide array of community input, thus making a bottom-up approach to defining COIs feasible. In this way, a COI mapping tool provides the necessary technical foundation to effectuate a comprehensive, community-centered measure of identifying COIs.

B. Improving the Applications of Communities of Interest

A COI software tool would be extremely useful during the map-drawing process as well as litigation. By optimizing the public input process, it may be possible to forestall inequities when lines are first drawn, thus preventing the need for a lawsuit. The same COI data may also be archived for later use if litigation does arise, providing a well-documented record that the existence of a community was known, yet not respected when districts were drawn. In both cases, an effective COI platform can resolve the previously discussed pitfalls.

First, a COI mapping tool streamlines and standardizes the public input process. Using a digital platform to gather COIs is cheaper, faster, more accessible, and more transparent than traditional public input processes. Online tools can also prioritize public accessibility by providing multiple languages, disability considerations, and mobile compatibility, ensuring that more of the public is able to get involved in the redistricting process. Moreover, a COI mapping tool that outputs computer-readable maps makes it easier for redistricters to incorporate COIs while drawing maps in a consistent, systematized manner.¹⁰⁶ If used

¹⁰³ Phillips & Montello, *supra* note 67, at 35.

¹⁰⁴ *Id.* at 38.

¹⁰⁵ *Id.* at 44.

¹⁰⁶ In its guide to public hearings, the California Citizens Redistricting Commission stresses the benefit of actual maps of COIs beyond purely verbal testimony: “In addition, it is very helpful to provide the Commission with a map of where your community is located, including any landmarks or locations that are particularly important to your community.” CALIFORNIA CITIZENS REDISTRICTING COMMISSION, GUIDE TO REDISTRICTING AND THE PUBLIC INPUT HEARING PROCESS (2011), https://wedrawthelines.ca.gov/wp-content/uploads/sites/64/2011/04/learnmore_20110419_guidebook.pdf

throughout a jurisdiction, it can reduce concerns around vague and incomplete public input, allowing map-drawers to clearly identify meaningful COIs in areas with which they may not otherwise be familiar.¹⁰⁷

Furthermore, a COI mapping tool provides the basis for objective evaluation during litigation. A pre-made database of COI maps prevents map-drawers from employing post-hoc defenses in court. Indeed, courts have previously struck down plans purportedly drawn to respect COIs precisely because no such organized database was available during redistricting.¹⁰⁸ A community mapping tool allows for the systematized collection and collation of COI data, dispelling criticisms that COIs are inherently nebulous or amorphous. By compiling clear and concrete COI coordinates prior to the map-drawing process, a mapping tool also limits the pretextual use of COIs to justify ulterior motives such as racial gerrymandering. Moreover, a database of standardized COIs can then be used by redistricters and courts alike to evaluate district plans for compliance with a legal requirement to respect communities of interest.

C. Features of a Community-of-Interest Mapping Tool

A COI mapping tool is not merely a theoretical proposal; several such tools have already been developed. The California Citizens Redistricting Commission has created a state-specific tool that California residents can use to draw and submit COIs.¹⁰⁹ This tool arose to alleviate the aforementioned challenges faced by the Commission during the 2011 redistricting cycle. On a national level, there are currently two primary tools with COI mapping functionality. Representable, a tool created by a team at Princeton University, focuses exclusively on gathering COI maps.¹¹⁰ DistrictR, redistricting software created by the Metric Geometry and Gerrymandering Group at Tufts University, allows the drawing of both COIs and complete district plans.¹¹¹

In the following, we review the necessary features for a COI public mapping tool to be most effective, using Representable as an illustrative example.

1. Crowdsourcing

A COI mapping tool should gather input directly from community members. A bottom-up rather than top-down approach of collecting COIs is independent from the state, reducing concerns of political manipulation or exclusivity.¹¹² A crowdsourced tool is most successful when it is connected with

¹⁰⁷ For an example of the problems that can arise when a mapdrawer draws COIs without being familiar with the area, see *Perez v. Abbott*, 253 F. Supp. 3d 864 (W.D. Tex. 2017) (“He used racial shading because he did not ‘know Fort Worth at all’ and the only way for him to identify the community of interest of ‘the Fort Worth black population’ was racial shading.”).

¹⁰⁸ See *Vera v. Richards*, 861 F. Supp. 1304 (S.D. Tex. 1994) (“[T]here is no evidence that the information it [a demographic study about similarities in a community beyond race] contains was available to the Legislature in any organized fashion.”).

¹⁰⁹ DRAW MY CA COMMUNITY, <https://drawmycacommunity.org/> (last visited Mar. 1, 2021).

¹¹⁰ REPRESENTABLE, <https://representable.org/> (last visited Mar. 1, 2021).

¹¹¹ DISTRICTR, <https://districtr.org/> (last visited Mar. 1, 2021).

¹¹² See Benjamin Forest, *Information sovereignty and GIS: the evolution of ‘communities of interest’ in political redistricting*, 23 POL. GEOGRAPHY 425, 429 (2004) (arguing that Texas

grassroots efforts and existing organizations to reach diverse communities across a state. For example, Representable partners with advocacy groups and civic organizations to tailor the tool and conduct community mapping drives, a means for groups to aggregate collections of COIs in a common automated database.

2. Mappability

It is essential to gather community input in a mappable format.¹¹³ Having the direct coordinates of the geographic areas comprising communities makes COIs more concrete than a verbal description alone. These COI maps should also be exportable as standard geographical file formats compatible with other mapping software. As such, machine-readable COIs can be used by map-drawers directly when creating district plans. To ensure mappability, Representable directs users to draw COIs on a map of the state that is overlaid by Census block groups and supports the exporting of COIs as GeoJSON files.¹¹⁴

3. Annotation

In addition to collecting geographic coordinates, a COI mapping tool must also gather qualitative input on the shared interests constituting the basis for the community. Individuals should be able to explain the lines they draw and express their views of community interests. Combined with the maps, these annotations can serve as testimony during the public input process, providing redistricters with valuable context that cannot be discerned using quantitative or demographic data alone.¹¹⁵ Representable incorporates annotation by requiring that users fill out a community's economic or environmental interests, cultural or historical interests, activities and services, or other needs and concerns.

4. Scalability

Lastly, a COI mapping tool must work on different scales. Congressional, legislative, and local districts vary widely in population. These different levels of redistricting may all require information about COIs, which can also vary in population. COI maps created with more focus on local redistricting will be smaller than those created for use when drafting congressional districts. Thus, a mapping tool should support the drawing of communities that range in size from only a handful of block groups to hundreds. In order to support different use cases, Representable works with partner organizations to adapt the tool for statewide, county, and municipal needs.

decided to exclude and filter certain COIs from its GIS database to maintain state information sovereignty).

¹¹³ See Peter Miller & Bernard Grofman, *Public Hearings and Congressional Redistricting: Evidence from the Western United States 2011-2012*, 17 ELEC. L.J. 21, 28 (2018) (discusses the need for public comment to be “feasibly mappable,” with specific locations and instructions, in order to be instructive for redistricting authorities).

¹¹⁴ GeoJSON (Geographic JavaScript Object Notation) is a popular computer data standard designed for the purpose of representing geographic features along with nongeographic annotations. It is based on the JSON format. GEOJSON, <https://geojson.org/> (last visited Mar. 1, 2021).

¹¹⁵ MacDonald & Cain, *supra* note 99.

D. Quantitative Metrics for Community-of-Interest Splitting

Once a set of COI information gathered from a mapping tool is in hand, it can be used to measure how much or little any given district plan splits COIs. This is important as members of a community have greater ability for their votes to influence the outcome of a political race when they are not split across multiple districts. If a community is “cracked” into parts, it loses the ability to gain representation.¹¹⁶

A quantitative splitting metric would aid courts in determining whether state law was violated in relation to provisions on preserving COIs. Taking a cue from existing legal precedent, one option is for courts to measure the protection of COIs in the same way as they currently assess preservation of county boundaries—by counting the number of splits.¹¹⁷ With access to a standardized database of COI maps, one can easily overlay the district plan and count the total number of communities that are split. In addition, it is generally desirable to consider not only whether a community is split, but also how many times it is split, as a community may be divided more than once by multiple district lines.¹¹⁸ Multiple measures exist for defining the splitting of counties or other political subdivisions.¹¹⁹

One special need of a splitting metric for our purposes arises from the fact that COIs are generally not defined with the precision of a county or city. As we propose an empirically-driven measure of COIs, there is likely to be some subjectivity and disagreement between community members over the exact placement of boundary lines.¹²⁰ Therefore, it is desirable to have splitting metrics that prioritize the preservation of the agreed-upon core of a community and do not unduly penalize the exclusion of small slivers of a community. Such measures have long been developed in the physical, engineering, and social sciences, and we identify two that can easily be applied to COIs in order to quantify the fragmentation of communities. The first measure, which we call “Uncertainty of Membership,” is foundational to the science of information theory and quantified

¹¹⁶ If a population is large enough, it can also be deprived of representation by being packed into a small number of districts.

¹¹⁷ For examples of federal judges and Supreme Court justices citing the number of split counties in gerrymander challenges, *see, e.g.*, *League of United Latin American Citizens v. Perry*, 548 U.S. 399, 455 (2006); *Cooper v. Harris*, 137 S. Ct. 1455, fn. 3 (2017); *Common Cause v. Rucho*, 279 F.Supp.3d 587, 605 (M.D.N.C. 2018).

¹¹⁸ For example, one could add up the total number of components each split community is broken into, and use the sum as the final score. This provides a way to quantify the fragmentation of a community into more than two parts. *See* Bernard Grofman & Jonathan Cervas, *The Terminology of Districting* (2020), available at <https://ssrn.com/abstract=3540444>.

¹¹⁹ *See, e.g.*, MOON DUCHIN, OUTLIER ANALYSIS FOR PENNSYLVANIA CONGRESSIONAL REDISTRICTING 10-11 (2018); Guth et al., *Three Applications of Entropy to Gerrymandering*, in *POLITICAL GEOMETRY* (Moon Duchin & Olivia Walch eds., 2021) (forthcoming); James Saxon, *Methods for Respecting Political Subdivisions*, in *Automated Redistricting* (2020), https://saxon.cdac.uchicago.edu/~jsaxon/communities_pg.pdf; John A. Curiel & Tyler Steelman, *Redistricting Out Representation: Democratic Harms in Splitting Zip Codes*, 17 *ELEC. L.J.* 328, 338-39 (2018).

¹²⁰ *See* Phillips & Montello, *supra* note 67, at 44 (finding that the majority of people agreed about the core of a community but differed on outer boundaries).

in the unit of bits.¹²¹ The second measure, known as the effective number of parties, was originally developed by Laakso and Taagepera in 1979 and has a long history in election research.¹²² Applied to COIs, we suggest that this measure be modified

¹²¹ This measure characterizes how many bits of information are needed to specify how an entity is divided up. If a COI is split into two halves of equal population, there is 1 bit of uncertainty about what district a resident belongs to. If the community is unequally split, the amount of uncertainty is smaller. This definition matches the idea that a highly uneven split of a COI should be counted less than an even split. In a particular community of interest, let p_i be the proportion of the community contained in a district. Then the Uncertainty of Membership is in units of bits and is defined as:

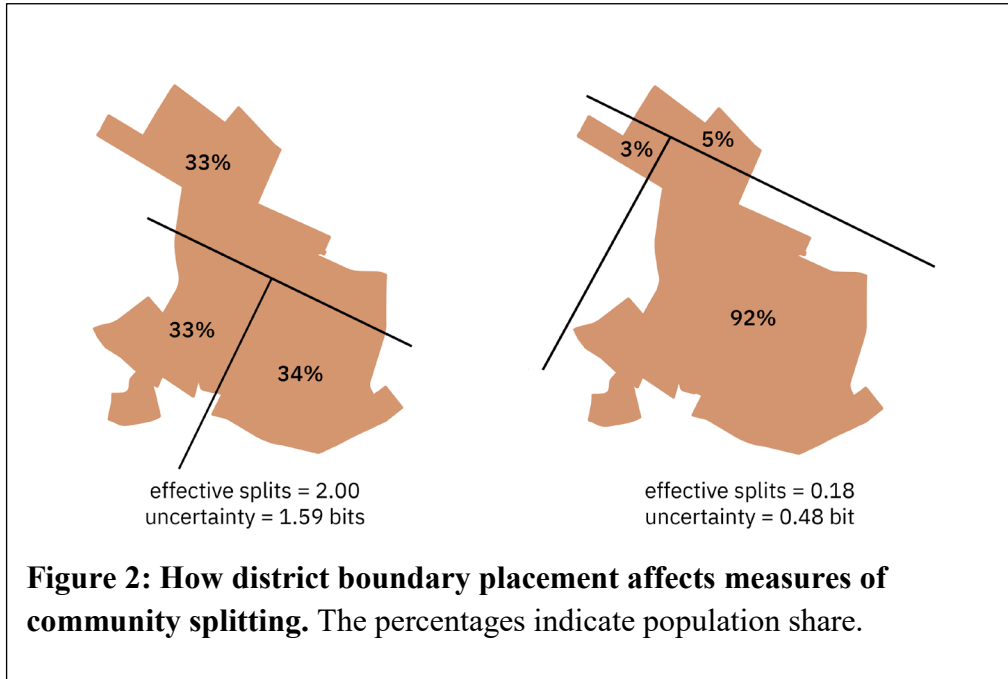
$$(\text{Uncertainty of Membership}) = -\sum (p_i \log_2 p_i)$$

Effectively, this corresponds to the amount of uncertainty a resident of that COI experiences when attempting to guess what district he/she resides in. Uncertainty of greater than 0.5 bit may be considered substantial. For the concept of measuring uncertainty in bits, see CLAUDE E. SHANNON & WARREN WEAVER, *THE MATHEMATICAL THEORY OF COMMUNICATION* (1st ed., 1949). In physics, the same mathematical definition is also called entropy. CHARLES KITTEL & HERBERT KROEMER, *THERMAL PHYSICS* (2nd ed. 1980).

¹²² Markku Laakso & Rein Taagepera, “*Effective*” *Number of Parties: A Measure with Application to West Europe*, 12 *COMPARATIVE POLITICAL STUDIES* 3–27 (1979). In the Laakso and Taagepera article, the metric is used to quantify the effective number of political parties, but it has far wider applicability. In the party and electoral systems literatures, this index is a standard metric for measuring fractionalization. See, e.g., Orris C. Herfindahl, “Concentration in the Steel Industry” (Ph.D. diss., Columbia University, 1950); ALBERT O. HIRSCHMAN, *NATIONAL POWER AND STRUCTURE OF FOREIGN TRADE* (1945); Scott L. Feld & Bernard Grofman, *The Laakso-Taagepera Index in a Mean and Variance Framework*, 19 *J. THEORETICAL POL.* 101, 101-06 (2007).

and called the “Effective Splits Index.”¹²³ **Figure 2** gives a diagram of two hypothetical ways of splitting a COI, and the associated measures of splitting.

To assess how each of these splitting calculations behave when applied to real world data, we will consider two different sets of communities.



1. Queens

First, let us examine the Asian American communities in Queens, as described in the introduction. According to the in-depth fieldwork conducted by AALDEF in 2011, Flushing had 152,078 people, equal to 21.2% of the population of a New York congressional district, while Bayside had 43,588 people, or 6.1% of a congressional district.¹²⁴ Despite the fact that these two communities add up to 27.3% of the population of one district, the maps of 1997, 2002, and 2012 all had district boundaries that split one or the other of them (**Table 1**).

	Fraction of community in a district	Splitting metrics
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¹²³ Using the Laakso-Taagepera index, the effective number of splits may be calculated as follows. In a particular community of interest, let p_i be the proportion of the community contained in a district. The effective number of split parts can be defined as:

$$(\text{Effective Splits}) = (1 / \sum p_i^2) - 1$$

The “- 1” turns the number of parts (Laakso and Taagepera’s original analysis) into a number of splitting events. For a community that is split into equal halves by population, this formula gives 1 effective split. For a community that is divided into two components, one with 90% of its population and one with 10% of its population, the index works out to 0.22 effective split. More than 0.5 effective split may be regarded as a substantial split. In short, “effective splits” deem an unevenly split community as being less split than an equal split.

¹²⁴ ASIAN AMERICAN NEIGHBORHOOD BOUNDARIES, *supra* note 1.

Community	Map	Largest	Second-largest	Third-largest	Splits	Uncertainty of Membership (bits)	Effective Splits Index
Flushing	1997	72.88%	17.94%	9.18%	2	1.094	0.7489
Flushing	2002	100.00%			0	0.000	0.0000
Flushing	2012	99.98%	0.02%		1	0.003	0.0005
Bayside	1997	100.00%			0	0.000	0.0000
Bayside	2002	71.24%	28.76%		1	0.866	0.6943
Bayside	2012	100.00%			0	0.000	0.0000
Flushing and Bayside	1997	78.93%	13.94%	7.13%	2	0.937	0.5445
Flushing and Bayside	2002	93.59%	6.41%		1	0.344	0.1364
Flushing and Bayside	2012	99.98%	0.02%		1	0.002	0.0004

Table 1: Community-of-interest splits in Flushing and Bayside in the congressional maps of 1997, 2002, and 2012.

In 1997, Flushing was distributed across three districts, with nearly 27% of the population carved off from the great majority of the population. By conventional measures, this would count as two splits. By the two indices we propose, it scores as 1.09 bit of Uncertainty of Membership, and 0.75 effective split, both values indicating a substantial split.¹²⁵ In 2002, Flushing was not split, and the indices are both calculated at zero.

Finally, in the 2012 map, Flushing was, strictly speaking, split once. However, one of the two split components only had 35 people, or 0.02% of the total community population. This case is instructive, because the indices of splitting give very low values: 0.003 bit of Uncertainty of Membership and 0.0005 effective split. These scores reflect the intent and design of both measures to not penalize splits that are highly asymmetric, that is, those which split off only a small fraction of the population from the core of the community.

The splitting measures behave similarly when Flushing and Bayside are considered as a single, unified community. In 1997, over 20% of the population was carved from the main community, forming a three-way split that is reflected as 0.94 bit of Uncertainty of Membership, and 0.54 effective split. In 2002, a reduced two-way split of 93.6% to 6.4% is reflected by lower splitting indices. Finally, in 2012, the values of both splitting metrics are negligible, again demonstrating the fact that these measures are capable of distinguishing district maps that damage

¹²⁵ *Supra* notes 121, 123.

community representation (1997 or 2002) from a map that preserves the core community and enables it to elect its candidate of choice (2012).

2. Richmond

As a second example using citizen-reported COIs, we have analyzed the greater Richmond area. Richmond is part of a region in southeast Virginia whose legislative map was redrawn as a consequence of the Bethune Hill redistricting

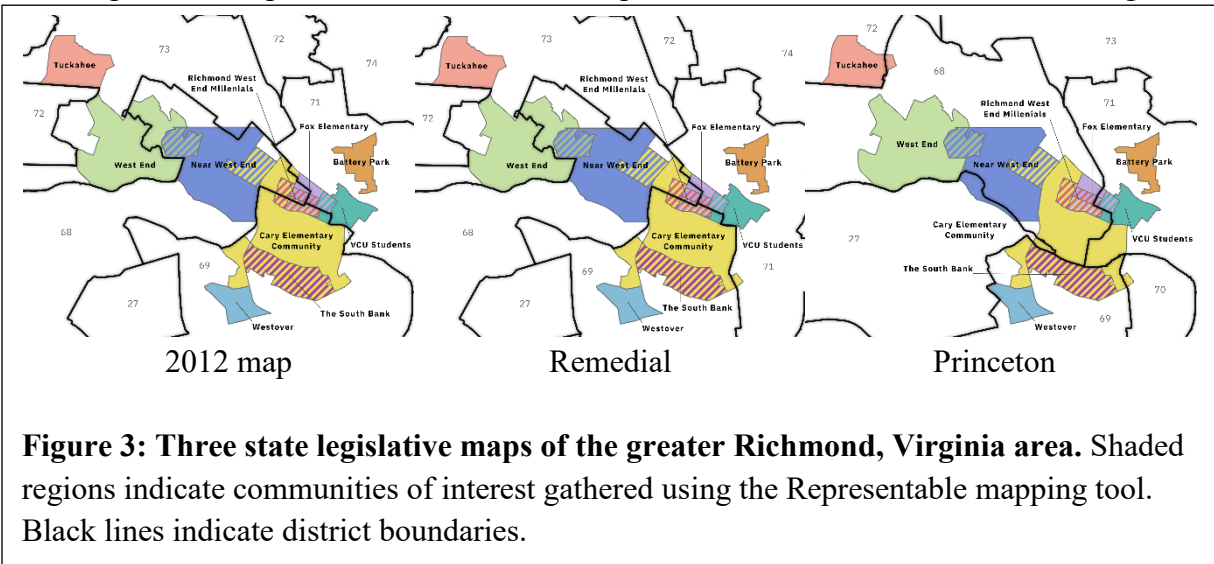


Figure 3: Three state legislative maps of the greater Richmond, Virginia area. Shaded regions indicate communities of interest gathered using the Representable mapping tool. Black lines indicate district boundaries.

case.¹²⁶ We set up a community mapping drive on Representable and shared the link widely, through Representable social media and the email lists of advocacy organizations in Virginia, such as OneVirginia2021 and the National Black Nonpartisan Redistricting Organization. We additionally held a training session via Zoom where participants were given thorough instructions on how to map their community with Representable. After curation, the process resulted in 16 COIs with populations ranging from 2,620 to 39,090 people.¹²⁷ For comparison, the average population of a state legislative district was 80,010.

To analyze splitting measures, we focused on three maps of Virginia’s State House: the 2012 map that was struck down, the final court-ordered map, and an alternative map drawn by the Princeton Gerrymandering Project (**Figure 3**).¹²⁸ The resulting statistics are shown in **Table 2**.

¹²⁶ Bethune-Hill v. Virginia State Bd. of Elections, 368 F. Supp. 3d 872 (E.D. Va. 2019).

¹²⁷ Curation of COIs consisted of removing duplicates and eliminating COIs with populations much larger than the size of one district. Such large-population COIs must be split no matter what the plan.

¹²⁸ Ben Williams, William T. Adler & Sam Wang, *Lawmakers should fix inequitable district lines*, THE VIRGINIAN-PILOT (Aug. 30, 2018), https://www.pilotonline.com/opinion/columns/article_7a44a308-abb4-11e8-bec1-0361d680b78f.html.

Map	Total Splits	Uncertainty of Membership	Effective Splits
2012 map	13	8.42 bits	7.81
Remedial map	13	8.47 bits	7.85
Princeton	13	6.31 bits	4.64

Table 2: Community-of-interest splits in three House of Delegates district maps in greater Richmond, Virginia.

In all three maps, COIs were split 13 times, often with multiple splits within a single COI. Furthermore, the two metrics of splitting are similar between the 2012 map and the remedial map. If COI preservation had been a focus of litigation and community maps had been made available to the court, these metrics could have been easily calculated and used to inform the line-drawing process while still achieving the unpacking of Black districts that was the focus of the case. Drawn without access to such data, the remedial map succeeded in eliminating racially-packed districts but did not increase protection for COIs.

The Princeton alternative plan provides an instructive counterexample. Like the remedial map that was actually implemented, it was drawn as a publicly-available response to the remediation process and prioritized unpacking Black voters from the districts under examination.¹²⁹ In addition, it was drawn without using political data. Finally, where possible, it was drawn to ensure that there was a major roadway connecting every part of the district. Intuitively, one might expect that drawing districts around thoroughfares would reduce the splitting of COIs, as communities with various economic or social interests are likely to rely on common roads. The values of the splitting indices for the Princeton alternative plan were smaller than the other maps, demonstrating that COIs could be at least partially accommodated while still satisfying the requirements of racial fairness.

Ultimately, the splitting metrics we propose provide an objective, quantitative measure of how well a district plan respects community boundaries. While the lower the value of the splitting indices, the better, there is no universal COI splitting threshold above which a map should be presumptively unconstitutional.¹³⁰ This is because the number, size, and density of COIs differ from region to region, and compliance with other state criteria may necessitate the splitting of certain communities. Nonetheless, these splitting indices prove very instructive when comparing different maps of the same region, allowing redistricters and courts to determine whether a proposed district plan splits COIs more than is necessary.

¹²⁹ For a detailed explanation of the process behind drawing the Princeton alternative plan, see Princeton University, *VA-gerrymander*, GITHUB, <https://github.com/PrincetonUniversity/VA-gerrymander> (last visited Mar. 3, 2021).

¹³⁰ While there is no fixed threshold to judge a map overall, it is possible to assess the degree to which a single COI is substantially split. *Supra* notes 121, 123.

CONCLUSION

Communities of interest are a key criterion for fair redistricting. These communities are best defined by the people comprising them, who can identify common needs and interests that are not captured by demographic proxies. A participatory, citizen-led approach to COIs is made possible through the advent of software-based mapping tools, such as Representable. This technology, combined with convenient metrics to measure COI splits, allows map-drawers and courts to more effectively integrate and assess communities in district plans. In light of narrowing routes to achieving equitable representation under the Voting Rights Act in federal courts, the advancement of a viable and practical standard for communities of interest can provide a route through the states to promote fair and meaningful political representation.

APPENDIX A: COMMUNITY OF INTEREST DEFINITIONS BY STATE

C=Constitution S=Statute G=Legislative Guidelines D=Court Decisions															
No X = specifically excluded from consideration															
DEFINING "COMMUNITIES OF INTEREST" FOR REDISTRICTING PURPOSES	Follow political boundaries	Communities of interest	Geographic	Racial	Ethnic including indigenous, language	Social, educational level	Economic, occupation	Cultural	Historic	Communications links, media	Transportation	Climate	Religious	No gerrymandering for party	No gerrymandering for person/incumbent
Alabama	C	G	G	G	G	G		G	G	G				No G	No G
Alaska	C	C	D	D	D	C	C			D	D	D			
Arizona	C	C	D											C	C
Arkansas	C	G	G		G	G	G	G					G	G	No G
California	C	C	D			C	C			C	C			C	C
Colorado	C	C	C	C	C	C	C	D			C	D		C	C
Connecticut	C														
Delaware														C	C
Florida	C													C	C
Georgia	G	G													No G
Hawaii	C	C				S	S							C	C
Idaho	C	S	S						S	D	D			S	S
Illinois		D													
Indiana															
Iowa	C													S	S
Kansas	G	G		G	G	G	G	G		D	D				No G
Kentucky	C	G													
Louisiana	G														
Maine	C	S	S							S					
Maryland	C	No D													
Massachusetts	C	D													
Michigan	C	C					C	C	C					C	C

Minnesota	C	D	D	D	D	D	D	D	D					G	D
Mississippi	S	D					D		D		D				C
Missouri	C	No D												C	
Montana	S	G	G		G	G	G	G		G	G			S	S
Nebraska	C													G	G
Nevada	C	D			D	D	D	D							No D
New Hampshire	C	No D													
New Jersey	C	D			D	D	D	D						G	No D
New Mexico	G	G				D	D	D							No G
New York	C	C												C	C
North Carolina	C	D												No G	No D
North Dakota															
Ohio	C													C	C
Oklahoma	C	C		G	G	G	G	G						No C	No G
Oregon	C	S					G	G		G				S	S
Pennsylvania	C			D	D		D						D	D	
Rhode Island	S	S	S		D	D	D	D	S						
South Carolina	G	G	G			G	G	G	G	G				No G	No G
South Dakota	S	S													
Tennessee	C														
Texas	C	No D								D	D				
Utah	S	S	S								S			S	S
Vermont	C	S	S			S	S	D			D			No S	No G
Virginia	G	G	S			S	S	S			D			No G	No G
Washington	S	S	D				D							C	
West Virginia	S	S													
Wisconsin	C	S	D								D				
Wyoming	C	G													