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Measuring Legislative Behavior: An Exploration of Digitaldemocracy.org

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In the 2010 aftermath of the economic crisis, job approval ratings for the California State Legislature bottomed out at 14 percent (DiCamillo and Field, 2015). While support has rebounded somewhat, the legislature's ratings remain lower than those of Governor Brown or other statewide officeholders.

Declining support for the state legislature over the last decade has coincided with increased partisanship. Analysis of roll call votes has revealed that California has had one of the most polarized legislatures in the country (Shor and McCarty 2011). This polarization has contributed to extended budget battles and delays in policy implementation (Cummins 2015). It is increasingly rare that legislators from opposite parties collaborate on broadly shared goals (Rapoport 2013). California appears to be emulating Washington, D.C. in the use of more parliamentary procedures and behind-the-scenes deal-making in budgetary negotiations, making it increasingly unclear how the law is made (Walters 2015).

An April, 2015 survey of likely California voters sponsored by the Institute for Advanced Technology and Public Policy revealed that large majorities of voters across the political spectrum reported a need for greater transparency and reforms that would "make it easier to hold lawmakers accountable" (Myers 2015). High levels of support for such reforms resulted in the passage of Proposition 54 in November of 2016, which requires a three-day review period before legislation can be voted on and new requirements for online posting and campaign use of video from legislative hearings.

Such reforms are part of a broader Open Government Movement, which seeks to empower citizens with the capacity to access legislative information, in the hopes of enhancing performance and accountability (Lathrop and Ruma, 2010). The Open Government Movement seeks to harness information technology as a medium to reach increasingly dissatisfied and disengaged citizens. The internet makes it easier for people to participate politically, and increased acessibility and use of this technology may lead to greater citizen engagement in public policy (Newsom and Dickey 2014; Schlozman, Verba, and Brady, 2010; Noveck 2010). If the costs of accessing and analyzing large amounts of data are reduced through user-friendly platforms, it is possible that citizens will be better able to engage legislators and influence collective choices.

The Digital Democracy platform developed at California Polytechnic State University, www.digitaldemocracy.org, is an open government platform that features a searchable database of California state legislative committee hearings and floor sessions, allowing the user to search content by keyword, topic, speaker, or date. The platform provides citizens, media, and organizations with easy access to information that might otherwise be available only to select experts.

Unlike existing aggregation platforms, Digital Democracy increases access through interconnected electoral, organizational, and legislative data with behavior in legislative hearings. Using

a combination of face, voice, and text recognition with machine learning technology, when individuals speak in a hearing, they are identified by name, position on a particular bill, organizations they represent (if any), and a host of other indicators. Information is searchable in numerous ways, by bill, speaker, hearing, or organization. This allows citizens who might not otherwise have access to a senate or assembly hearing in Sacramento to be able to follow a bill or their legislator through the legislative process.

In this research note, we introduce the platform, summarize several measures of behavioral data, and encourage public feedback on what types of interactive features might be built into the platform in the near future. Using the 2015–2016 legislative session as our sample (the first complete legislative session for which data was collected), we review basic features of the platform before exploring the participation of parties, party members, and citizens. We conclude with a reflection on the potential for this technology to enhance citizen oversight and accountability in the legislative process.

The Platform

In the current version, committee and floor hearings can be searched using keywords, such as the "technology" search in Figure 1, or through advanced searches for specific bills, bill authors, hearings, or organizations. Search results provide a summary of linked bills, their principal authors, subject summary, and summary of the utterance of the term in a hearing. Bill summaries provide the official digest of a bill, all iterations of bill text as it is amended, the committee history, current analysis, and the vote history of the bill. Users can click on video clip selections with utterances of the bill arranged by date. Similarly, author searches produce a profile (Figure 2) of legislators that include an interactive district map, participation rate indicator (as a percentage of total hearing utterances), biography, testimony history, committee memberships, authored bills, campaign finance contributions, behests, and related information. Nonlegislator speaker searches produce a list of hearing testimony of speakers, along with available organizational information linked to the speaker.

The 2015–16 Legislative Landscape, Measured in Floor Votes

Behind the interface, digitaldemocracy.org archives a wealth of data that we hope media and scholars will utilize for legislative analysis. In our first example, using party membership and roll call votes from the floors of both chambers, we plot coordinates for all bills that reached a chamber floor, using the percentage of members from each party (x-axis Republican, y-axis Democratic) supporting the bills (Figures 3 and 4). Frequency of bills on a coordinate is reflected in the size of the circle. Of more than 5,000 bills that received a floor vote in either chamber, most were approved unanimously, or nearly unanimously, by both parties.

The large number of consensus bills should not be mistaken as a sign of bipartisanship, as these are primarily nonbinding resolutions, public recognitions, and other items that do not require debate. It would also be misleading to infer from these figures that the legislature spends most of its time on nonbinding resolutions. Rather, as expected, most of the bills that reach the floors have strong support from the majority Democratic Party.

The degree to which legislative behavior is structured by partisan control is also reflected in the fact that the second largest cluster of bills is located in the upper left quadrant, where nearly all Democrats vote in favor of a bill, and nearly all Republicans oppose it. Examples of these

Figure 1. Keyword Search Result "Technology"

Figure 2. Speaker Profile for "Mark Leno"

Figure 3. %Democrats and %Republicans Supporting Bills in Assembly Floor Votes

bills include AB 1594, which prohibits tobacco use on postsecondary education campuses, and SB 277 in the Senate, the repeal of personal exemptions to vaccinations. Overall, the minority Republican Party members exhibit much greater variance in their voting patterns, whereas very few bills that get a floor vote are opposed by a majority of the majority party.

The few bills that did make it to a chamber floor without eventually receiving majority Democratic support tended to be resolutions, or were voted down. In the Assembly, nearly all Republicans supported, and nearly all Democrats opposed or abstained from a 36–19 vote for ACR137, Matthew Harper's (R-Huntington Beach) recognition of May 26 as John Wayne Day. Similarly, the Senate voted 25–6 in favor of ACR117 to make February 6 Ronald Reagan Day with strong Republican support and much Democratic indifference. However, last September Assembly Democrats were split over SB443, which dealt with forfeiture of assets in drug arrests, and it was voted down 24–44 before eventually being reconsidered. In the middle square of each figure, where close, bipartisan bills would have been considered in the 2015–16 session, there is only empty space.

Figure 4. %Democrats and %Republicans Supporting Bills in Senate Floor Votes

2015–16 Legislator Behavior Measured in Floor Votes

Comparing the behavior of individual legislators, it becomes clear that the greater variance observed in Republican support for the majority party's legislative agenda is not random. We derive a bipartisanship score for each legislator based on the frequency of a legislator voting in favor of bills supported by the other party in the 2015–16 session, discounted by the unanimity of the overall vote. The standardized scores reveal greater variation among Republican legislators (red), who are more scattered around their mean of .51 with a bimodal distribution of more and less bipartisan legislators. Democratic legislators (blue) are clustered more tightly around their mean score of .41.

Figure 5. Distribution of Bipartisan Scores by Party
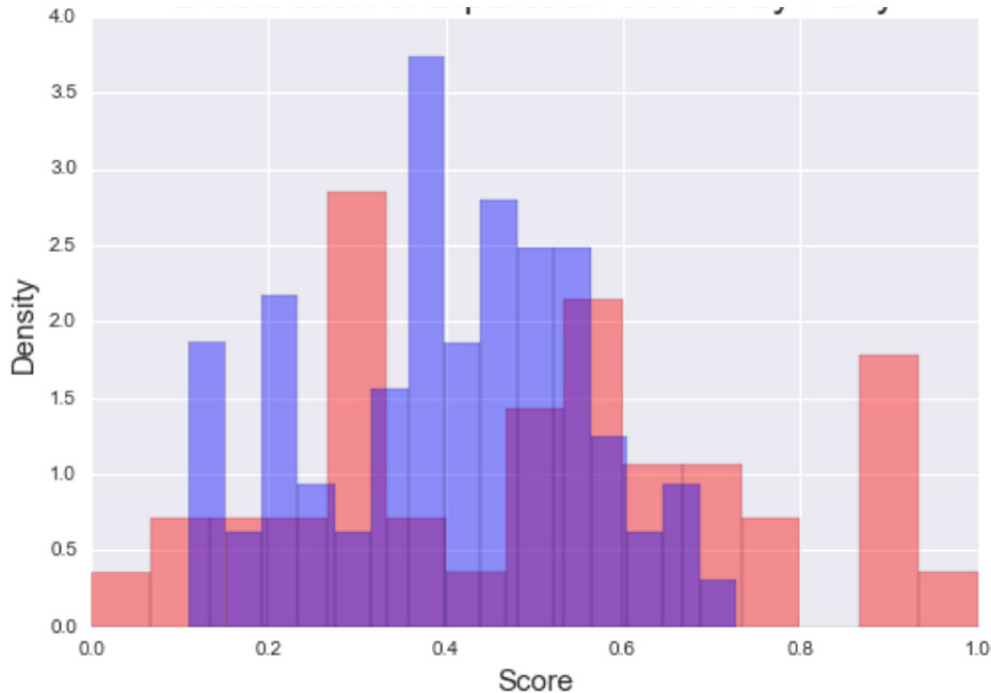
We list the five lowest and highest bipartisanship scores for each party (Tables 1 and 2). Combining these data with electoral results shows that the link between bipartisanship and electoral competition is not straightforward. For all legislators, there is only a weak positive correlation (Pearson's R = .35) between bipartisanship and partisan district competitiveness, but the relationship is somewhat stronger for Republicans than Democrats.

Interestingly, we find no indication that legislators who defeated challengers from their own party in the 2014 "Top Two" primary, presumably drawing on support from voters outside their party base, behave more cooperatively than other legislators. In fact, they are ranked among the least bipartisan members in both parties, while none of the top five bipartisan Democrats or Republicans come from unipartisan (DD or RR) November elections.

2015–16 Legislative Behavior Measured in Time

Most of what goes on inside any legislature is talking, not voting. One of the unique features of Digital Democracy is that it quantifies speech to measure what the legislature spends its time on. In contrast to votes taken, most of the time allotted in the 2015–16 session concentrated on just a handful of bills. Only 11 bills were discussed in hearings or on floors for more than 200 minutes, and of those, two bills dominated the legislative session.

The only bill to receive over 1,000 minutes of discussion was pediatrician Richard Pan's (D-Sacramento) SB277, the repeal of personal exemptions from vaccinations. Arguably the most controversial bill of the session, SB277 received extensive testimony in committee hearings from legislators, experts, and citizens, as well as multiple floor debates. The action actually extended

Table 1. Least and Most Bipartisan Democrats

	Democrats			
Name	**Bipartisan Score**	**District Competitiveness***	**Top 2**	**Locations Represented**
Bill Quirk	0.11	0.46	DR	Monterey & Santa Cruz
Jim Beall	0.11	0.55	DD	Los Gatos, Saratoga, Evergreen
Jerry Hill	0.12	0.50	DD	Santa Clara, San Mateo
Tony Mendoza	0.13	0.82	DR	Buena Park & Los Angeles
Ricardo Lara	0.14	0.53	DO	Los Angeles
Jacqui Irwin	0.64	0.94	DR	Ventura County
Mike Gatto	0.65	0.63	DR	Glendale & Burbank
Henry Perea	0.66	0.84	DR	Fresno
Rudy Salas	0.68	0.91	DR	Central Valley
Adam Gray	0.73	0.93	DR	Fresno & Kern

* standardized composite score based on margin of victory for candidates and gubernatorial election (only governor in unipartisan races), where a score of 1.00 represents the closest race.

Table 2: Least and Most Bipartisan Republicans

	Republicans			
Name	**Bipartisan Score**	**District Competitiveness***	**Top 2**	**Locations Represented**
Matthew Harper	0.00	0.89	RR	Orange County
Frank Bigelow	0.11	0.88	RR	Napa
James Gallagher	0.12	0.87	RD	Butte & Chico
Brian Jones	0.16	0.72	RR	San Diego
Donald Wagner	0.19	0.80	RD	Orange County
K.H. Achadjian	0.89	0.97	RD	San Luis Obispo & Santa Barbara
Catharine Baker	0.91	0.75	RD	San Ramon Valley
Brian Maienschein	0.92	0.98	RD	San Diego
Anthony Cannella	0.92	0.90	RD	Salinas, Modesto, Fresno
Eric Linder	1.00	0.88	RD	Riverside

* standardized composite score based on margin of victory for candidates and gubernatorial election (only governor in unipartisan races), where a score of 1.00 represents the closest race.

beyond the legislative process, with antivaccine advocates sending threats to the bill's authors, leading to enhanced security measures taken within the capitol. Next, SB826, the 2016 Budget Act, comes in second with more than 800 minutes of discussion. Budgetary talk is actually greater than this suggests, as time spent on SB826 does not include line items that may be considered separately. The minimum wage and paid sick leave expansion (SB3), expanded commitment to clean energy (SB350) and assisted suicide (SB128) round out the top five bills of the 2015–16 legislative session as measured by time allocated.

## 2015–16 Legislator Average Activity per Bill Discussion

Table 3 shows the most active California legislators of the 2015–16 session, as measured by average length of speech per bill discussion. For the Digital Democracy system, a "bill discussion" is a subdivision of a hearing where a single bill was discussed. The legislators may have multiple chances to discuss a bill in committees and on the chamber floor. If a bill is up for discussion within a chamber committee, and a legislator is on that committee (regardless of actual attendance), that bill discussion is counted in "number of bill discussions" in the table. In addition, a bill discussion where a legislator is providing testimony as an expert or bill author is also counted toward that legislator's total number of bill discussions. Thus the "number of bill discussions" represents the total number of occasions where a particular legislator took an opportunity to speak on any bill. For each individual bill discussion, the Digital Democracy system calculates a percentage of activity both by words and by time for all persons who spoke. For example, a particular legislator may have only a five percent share of spoken words in one bill discussion, but a 40 percent share in another. Columns five and six in Table 3 denote respectively the average share of words and average share of speaking time for the legislator.

A number of factors can explain the predominance of Democrats in Table 3. Committee and floor leaders in the legislator will necessarily have more words on the record due to their procedural duties. Since Democrats are the majority party in California, they are in leadership positions in all committees and floor hearings. Kevin Mullin is currently the Assembly Speaker Pro Tempore and Autumn Burke is the Assistant Speaker Pro Tempore. Jackson, Leno, Lara and Chiu have powerful committee chairmanships. However, Leyva and Gaines are not chairpersons, and there are other committee and floor leaders who are not in the table.

2015–16 Legislative Behavior Measured in Testimony

The time spent on legislation is driven to a considerable extent by who else attends the session, and this includes policy experts, industry representatives, and politically active citizens. For the 2015–16 session, debate on SB277 involved testimony from over 1,000 individuals, more than three times that of any other single bill. Without other sessions to compare, it is not clear just how much of a historical outlier this is, but the vaccine bill drew supporters and opponents from all over the state. As measured by the number of testifiers, the clean energy commitment remains a major issue that shaped the legislative session, but the budget act falls out of the top 20. Other major pieces of legislation that drew high levels of participation included the regulation of e-cigarettes (AB6), notification of abortion rights (AB775), and prohibition on the importation or sale of ivory or rhinoceros horn (AB96). Collectively, these bills drew some 2,000 individuals to speak at the capitol.

**Figure 6. Time Allocation in Both Chambers, Including Committee Hearings**
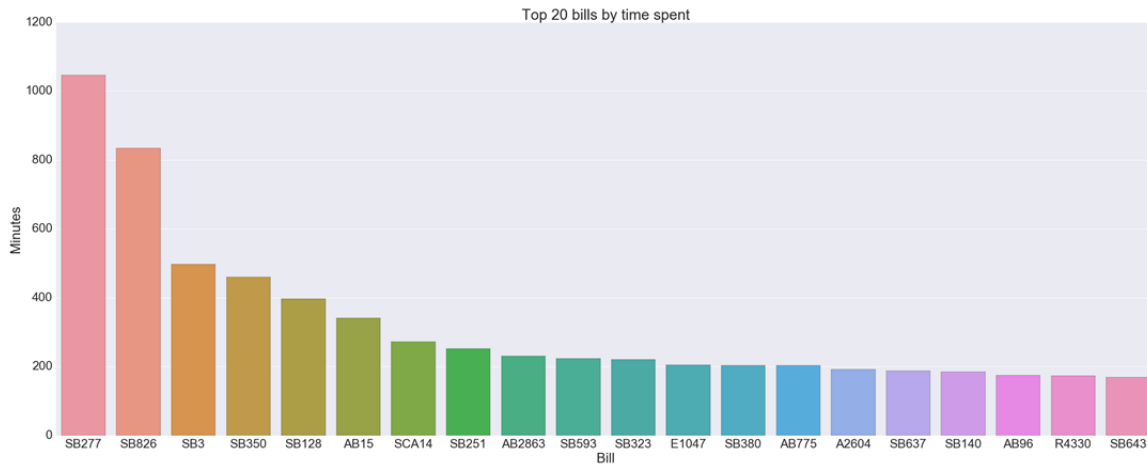
Table 3, Most Active Legislators in Bill Discussions

Legislators				
Name	**Party**	**Number of bill discussions**	**Average % of all words spoken per bill discussion**	**Average % speaking time per bill discussion**
Kevin Mullin	D	4367	18.22	19.96
Hannah-Beth Jackson	D	3711	11.37	11.97
Ricardo Lara	D	7579	8.49	8.65
David Chiu	D	4505	6.93	6.88
Mark Leno	D	3921	6.84	6.89
Autumn Burke	D	4287	4.62	4.79
Robert Hertzberg	D	3505	4.50	4.26
Connie Leyva	D	3914	4.42	4.65
Ted Gaines	R	3303	4.36	5.20
Ed Hernandez	D	3576	4.10	3.93

These measures demonstrate the capacity for open data to provide access and insight into legislative behavior and performance. Indicators at the level of chambers, parties, legislators, bills, and even citizens can illuminate patterns within the legislative process that help better understand the link between electoral and legislative outcomes, and predict the fate of legislative content. The value of the Digital Democracy platform goes far beyond transparency, though that is a crucial goal to the extent that transparency can improve performance, which is ultimately an em-

Figure 7. Number of Individual Testifiers on Bills in the 2015–16 Session
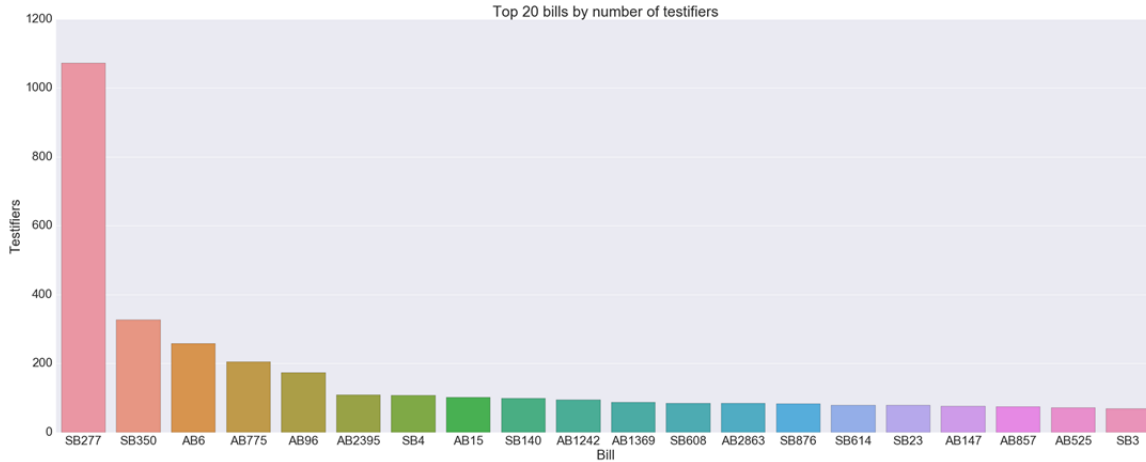
pirical question. We hope to contribute to the comparative study of legislatures and political institutions to contribute to our knowledge of institutional design.

Ultimately, the value of Digital Democracy rests in the hands of citizens. We are actively working to design a user interface that significantly lowers the costs of entry to more meaningful political observation and participation. Citizens who are able to track their own legislative agendas can improve legislative performance through greater oversight and regulation of principal-agent dilemmas that are inherent to institutions of representation. Of course, empowering individual advocates might also erode institutional performance by increasing the costs of legislative "defection" from partisan constituencies. Transparency is not enough, but it is a start. By empowering citizens with useful legislative information, they can become more informed about the process, especially the bargaining and compromise required for effective collective decision-making. But these tools should also harness the information and expertise of citizens whose experiences could improve the design of public policy, by increasing the diversity of information that legislators rely on. A thousand individuals attending a legislative session is currently an extraordinary event, in part because they can only speak one at a time. Digital Democracy could open a feedback loop for millions of individuals to play a larger role in their own governance.

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