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Examining Legislative Cue-Taking in the US Senate

We examine congressional cue-taking theory to determine its extent, conditionality, and various forms in the US Senate. Using a novel data-collection technique (timed C-SPAN footage), we focus on temporal dynamics via event history analysis. Examining the effects of senator characteristics across 16 votes from the 108th Congress, we find that committee leadership and seniority generally predict cue-giving, while other types of characteristics predict cue-giving on certain types of votes. Our results underscore the importance of considering the order and timing of voting when studying congressional behavior.

"On agriculture, all the Republicans would come into the chamber and ask, 'How did Conrad vote?,' because everyone knew Conrad Burns was *the* expert on agriculture issues."

—*Senior Legislative Assistant to Senator John Thune*

Pushed by a new Democratic president and their colleagues in the House, the 111th Senate was expected to deal with health care reform, economic issues, two wars, and the confirmation of Obama's appointees. These issues were the most well-known, but this Senate also had to deal with less salient legislative items, as do all Congresses. For example, in the midst of securing final passage on its version of health care reform in December of 2009, the Senate faced a number of other pressing items that the *New York Times* listed as "must-pass": raising the debt ceiling, seven spending bills (or an emergency appropriations bill), and renewing expiring provisions of the Patriot Act, the federal estate tax, highway construction programs, and unemployment assistance.[1] In addition to the bills themselves, the Senate also had to deal with each bill's accompanying—and sometimes sizable—set of amendments.[2]

Senators are expected to cast votes on procedures, amendments, and final passage on virtually every issue on the public agenda, whether big or small, prominent or inconspicuous. And, despite the substantial increase in the congressional workload, senators must be careful not to cast votes that could potentially alienate their constituents, party, relevant interest groups, or donors and lobbyists. In the 105th Congress (1997–98), senators recorded 633 floor votes, while their colleagues in the House logged 1,187 votes (Ornstein, Mann, and Malbin 1997). On many major issues, existing research suggests party-line votes or leadership instructions provide guidance. But, much of what Congress does is neither politically divisive nor particularly salient. The normal business of the institution receives less attention but constitutes the bulk of the congressional workload. In the different information environments of Congress, senators sometimes must rely on their fellow members' votes as cues to help them make their choices; this requires that some senators act as *cue-givers* by providing signals to other senators, while other senators act as *cue-takers*, receiving signals and making voting decisions based on them.

While cueing likely occurs in both chambers, we focus on the Senate for two reasons. First, the Senate provides competing theoretical expectations: on one hand, it seems a fertile environment for cue-taking behavior because senators have less specialized knowledge; on the other, cue-taking may be less likely as senators have greater access to information-gathering resources than their House counterparts. Put differently, because there are fewer members in the Senate, each senator serves on more committees than their House counterparts. However, senators are generally considered to have *less* in-depth knowledge about specific issues than members of the House. We see greater potential for cue-giving and cue-taking opportunities given the "breadth versus depth"/more general versus less specialized dynamic of the chamber.

Second, the unique voting procedure of the Senate provides a straightforward way of testing cue-taking theory. Data availability is a factor given our desire to test theoretical claims empirically. Although the electronic voting board in the House captures the order of voting, that information is not released to the public, and note taking is not permitted in the House or Senate Galleries. In the House, C-SPAN coverage does not capture enough of the voting board or action by the members to back-out complete voting-order information. However, C-SPAN coverage *does* permit us to retrieve such information in the Senate.

We explore the extent to which cue-taking behavior occurs, the conditions under which it is most likely (i.e., controversial vs. consensual votes), and which senators serve as cue-givers. Our main results tell a

simple story: the order of voting matters in the Senate. Senate voting behavior on normal, everyday issues depends largely on the ability of some senators to leverage their expertise, providing cues for others who may face uncertainty. This type of voting allowing members to manage workloads and cast votes consistent with their preferences, particularly when engaging in information-gathering activities, may be costly or inefficient. In the sections that follow, we begin by looking at voting and information in the Senate before reviewing the literature on cue-taking theory, noting its contributions and limitations. We then discuss the critical importance of examining timing when analyzing cue-giving and cue-taking, making the case for our unique dataset.[3] Finally, we present the evidence on cue-taking from a series of event history models—an approach that is ideally suited for examining temporal questions.

Voting and Information in the Senate

One Senate staff member noted that "[i]t is literally impossible for every single senator to hold in their head every single issue that comes before any body as diverse and complex as the Senate."[4] Indeed, senators are faced with such an immense amount of work, and such multifaceted and complicated issues, that they are often required to use information shortcuts when trying to decide how to vote (Porter 1974), or they may simply decide to ignore a certain set of issues if those seem to offer little payoff (Woon 2009). As the public agenda has expanded, so have the demands placed on members of Congress. One consequence of this is the increasing scarcity of floor time to discuss and debate bills and amendments, as evidenced by the rise in complex unanimous consent agreements as tools for managing the business of the floor (Smith and Flathman 1989) and the increasing power of the hold and filibuster as tools of obstruction (Binder and Smith 1997; Koger 2010; Smith 1989b; Wawro and Schickler 2006).

The time and information demands Senators face are, for multiple reasons, likely greater than those faced by House members. First, unlike the House, the Senate does not have a germaneness rule that prevents surprise amendments or limits the number of possible issues on any given vote.[5] Second, a majority coalition in the House can limit the number, scope, and type of amendments offered through its use of rules generated by the Rules Committee. This tool is typically used by the majority party to further its own agenda and restrict the rights of the minority party (Cox and McCubbins 2005). Finally, the House operates under strict time limits which may reduce the number and scope of amendments proposed.[6] For these reasons, the Senate lacks tools to limit

its agenda at any given time—*floor activity tends to be more convoluted, less controlled, and subject to more political maneuvering than in the House*. There are few constraints on how many amendments each member can introduce on any given bill and few constraints on amendment relevance. Both the number of issues on the floor and the number of amendments proposed by members have grown enormously (Smith 1989a, 1989b)—together, these increase information demands on senators.

For most final-passage decisions, as well as some amendments and procedural issues, the Senate holds a roll-call vote. These votes have important consequences for senators because their reelection prospects can be affected by the policy positions expressed through their vote choice. Voting is one of the most important ways members of Congress engage in position taking (Mayhew 1974), and the public is surprisingly attuned to members' roll-call voting records (Canes-Wrone, Brady, and Cogan 2002). Voting against the preferences of one's constituents can have negative reputation effects (Binder, Maltzman, and Sigelman 1998), and senators whose votes do not reflect the ideological and policy preferences of their constituents have a reduced probability of winning reelection (Abramowitz 1988).[7] To summarize, senators face voting and position-taking decisions on a wide variety of issues. Due to time constraints and the inherent fluidity of agendas and legislation in the Senate, it is impossible for any individual member to be an expert on all issues at one time, despite the potential consequences of taking an "incorrect" position or casting an "incorrect" vote.

Cue-Giving, Cue-Taking, and Legislative Organization: Theory and Hypotheses

One way that senators can avoid making such mistakes is to look to others (Kingdon 1973; Matthews and Stimson 1975; Sullivan et al. 1993; Young 1966). Rather than becoming an expert on every possible bill or amendment proposed, senators can take informative cues from other members who have more expertise on a particular issue. Cue-givers with expertise can be a party leader, committee chair, a trusted colleague, or even a senator in close physical proximity (Masket 2008). One of the clearest ways cues are provided is through the observation of votes cast by other senators on the floor during a roll-call vote. In particular, final passage votes on a bill or amendment are considered to be a revelation of a true preference which members of Congress can observe and use to inform their own voting decisions.

The procedure used by the Senate for most votes lends itself to informative cue-taking. During the voting process, senators approach the dais and announce their vote to the clerk; the clerk then publicly announces the vote of the senator. Other senators may see the vote cast, hear the announcement of the clerk, ask their colleagues milling around the chamber (as suggested by our interviews with Senate staffers), or ask to see the vote tally kept at the front of the chamber by the clerk.[8] The following statement by Senator Tom Daschle (quoted in Packer 2010) nicely illustrates such dynamics:

"Sometimes, you're dialing for dollars, you get the call, you've got to get over to vote, you've got fifteen minutes. You don't have a clue what's on the floor, your staff is whispering in your ears, you're running onto the floor, then you check with your leader— you double check but, just to make triple sure, there's a little sheet of paper on the clerk's table: The leader recommends an aye vote, or a no vote. So you've got all these checks just to make sure you don't screw up, but even then you screw up sometimes . . ."[9]

Seminal works on legislative behavior used personal interviews with members of Congress to determine the origins of cues, as well as the extent to which members use such information (Kingdon 1973; Matthews and Stimson 1975; Sullivan et al. 1993). Kingdon (1973) observed that not all members of Congress vote immediately after a bill or amendment is presented on the floor. Instead, he noted that many members wait to cast their vote until other chamber members have first cast theirs. Kingdon suggested that members rely upon the timing of others on the floor—and more specifically, the votes other members cast—to help them make informed decisions.

Given the different expectations about the presence and nature of cue-taking under conditions of high/low salience and the different behavior expected from some senators such as party leaders, we classify votes along "heavily debated" and "not heavily debated" dimensions. That is, while previous literature has provided some baseline expectations for when we should see the use of cues (e.g., Matthews and Stimson 1970), we argue that most votes do not fit neatly into such typologies. We expect to see some degree of cue-taking on most—though not all—legislation; the distinction is that different members will be cue-takers for different types of votes (sometimes this will involve partisan and/or highly salient legislation, sometimes complex and/or lower salience legislation).

To be clear, our focus is on informational shortcuts on the Senate floor. We examine the timing of votes, and we interpret early voting as potential evidence of cue-giving and later voting as potential evidence of cue-taking. We do not focus on the direction of a vote by possible cue-givers, because a vote signal may serve as a cue in either the same or

opposite direction. That is, a vote by a particular senator can be negative or positive and still be a cue. Some senators may use a colleague's vote as a signal of how *not* to vote. For example, a Democratic senator may use a Republican "yea" to influence his decision to vote "nay."

It is important to note that our theoretical question and analysis (1) is not about persuasion per se and (2) is very different from position taking on high-profile votes that happen months in advance (such as the North American Free Trade Agreement [NAFTA] or the 2010 votes on health care reform). In the case of the first point, while persuasion certainly takes place in Congress—and it is *possible* that cues play roles in processes of persuasion—our empirical evidence does not allow us to make inferences about it as a mechanism of decision making. On the latter point, there are fundamentally different theories and expectations about timing under "normal decision making" (Matthews and Stimson 1975) (i.e., low-profile cue-taking on the floor versus high-profile, publicly announced legislative position taking). Members are more likely to invest resources in doing research on high-profile issues because the stakes are higher and because their staffs are more likely to have the time to gather additional information. Such factors and pressures are very different in lower-profile amendment voting on the floor (e.g., Box-Steffensmeier, Arnold, and Zorn 1997; Gordon 2002; Matthews and Stimson 1975).

While Kingdon focused on *cue-taking* in Congress, Matthews and Stimson (1975) sought to distinguish exactly which members were most likely to serve as *cue-givers* to others on the floor; their interviews with individual members of Congress suggested that members are most likely to seek cues from those who are perceived to be more knowledgeable about the legislation in question. Furthermore, this research pointed to conditions under which this behavior is most likely to occur. We follow suit as we seek to understand both the presence of cue-taking as well as the types of members of who serve as cue-takers and cue-givers.[10]

The When of Cue-Giving/Cue-Taking:
Heavily Debated vs. Nonheavily Debated Votes

Matthews and Stimson's (1975) early findings are in many ways closely related to theories of legislative organization that address information dissemination. Their evidence suggested several potential cue sources: for example, they predict that party leaders should have significant influence. This makes intuitive sense and is consistent with theories of party influence on congressional voting, which suggest that members will delegate to the leadership to promote party cohesiveness (Aldrich 1995; Rohde 1991). The vote choice of the leadership serves as a signal

to an uninformed member about the preferences of the leadership, or the rest of the party. To be clear, early voting by party leaders is not a form of party pressure but rather a way for the leader to provide information to other members about which vote choice is consistent with a senator's partisan or ideological preferences. Accordingly, we present two sets of hypotheses that, in broad brush, address *when* we should see cue-giving and cue-taking behavior and *who* should engage in it. We also conjecture on other confounding factors that could potentially influence the timing of voting.[11]

On votes that receive attention on the floor, party leaders should stake out an early position to make the "official" party position clear to their caucus. That is, party leaders will send a clear signal about the vote choice of other party members. Senators will seek this type of information because partisanship is strongly predictive of a "correct" vote for most members of Congress (at least some of the time). It is worth noting that on votes that are not controversial or salient to many senators, we do not expect party leaders to provide voting assistance. These types of votes are likely to generate more consensus and policy agreement across both parties, so policy concerns rather than partisan considerations should drive vote choice. These are also more likely to be issues which cut across the standard economic-partisan dimension (Poole and Rosenthal 1997), of which there are a surprising number (Crespin and Rohde 2010)—in these cases, party position is not as useful to a senator.

To summarize, we expect that on votes dividing members across party lines (heavily debated votes), the leadership will serve as cue-givers by signaling the position of the party. On votes which are noncontroversial (less debated), party leaders will not need to make the party's position clear and therefore will behave no differently than other members. In these cases, there is no party position, thus there is no clear party voting signal to send.

H1: Party leaders should vote earlier than other senators, conditional on the vote being controversial (heavily debated).

The Who of Cue-Giving/Cue-Taking
Leadership and Jurisdiction

Information theory offers a slightly different set of predictions about which senators will give and receive cues. The theory claims that committees are established to solve the information problems inherent in a body that must deal with a wide range of issues (Krehbiel 1992). The implications of this argument for cue-giving and cue-taking are obvious.

Given their more informed position about specific policy issues and the vote at hand, we expect both committee leaders and committee members to serve as cue-givers. Similar to the role of party leaders, cue-giving by committee members serves as an informative signal to senators (if committees are broadly representative of the body). It is also important to note that unlike the relationship between party leaders and cue-giving, this relationship is *not* conditional on the type of vote. For both controversial (heavily debated) votes and for noncontroversial (nonheavily debated) votes, more knowledgeable members provide policy expertise to other members.

H2: On all types of votes, committee chairs and ranking members should vote earlier than other senators, ceteris paribus.

H3: On all types of votes, members of the committee with jurisdiction over the bill should vote earlier than other senators, ceteris paribus.

While we focus on the role of party chairs and committee members, other characteristics may make some senators more likely to serve as cue-givers versus cue-takers. In addition to being a party leader or a member of the relevant committee, characteristics which make a senator more knowledgeable include the number of terms served by a senator and whether the senator is the senior member of the state delegation. Both types of senators may be more likely to vote earlier because of their policy experience and expertise. Additionally, there may be other members who serve as cue-givers not because they are necessarily policy experts, but because their vote is a signal of the preferences of a relevant subset of members. Such examples include those members who are well "*connected*" to other senators (Fowler 2006a, 2006b), and are therefore sources of power and information; other examples include ideological extremists and strong supporters of the bill or amendment, such as sponsors or cosponsors.

Addressing Confounding Factors

Of course, other factors may also influence the timing of voting—these potential confounds must be controlled for if we are to demonstrate the presence of cue-giving and cue-taking. Among these are the *electoral environment* of the senator, senators' varied *responsibilities/"busyness,"* and *physical proximity* to the Senate floor. First, we expect the roughly one-third of senators up for reelection every two years to be generally more risk averse (because the negative consequences of an incorrect vote

are more proximate). This is consistent with other research that demonstrates senators become more visible in the two years leading up to their reelection (Franklin 1993), change the tone of their rhetoric to more closely identify with constituent concerns (Quaile Hill and Hurley 2002), and increase their responsiveness to constituents (Ahuja 1994). Second, we expect some senators, such as those from more populous states or from states farther away from Washington DC, to have more time demands/more compressed schedules while in Washington (and therefore, to possibly display differences in vote timing that are unrelated to actual cue-giving/taking behavior). Finally, we control for the practical question of whether being in an office physically further from the Senate floor affects the timing of casting a vote.

Data and Methods

The legislative behavior literature provides insight into the nature of cue-giving and cue-taking. While this work is theoretically appealing, heretofore the evidence has been largely based on qualitative interviews, surveys of members (Kingdon 1973; Matthews and Stimson 1975; Sullivan et al. 1993), and computer simulations (Stimson 1975). Our work contributes to this literature by providing quantitative, empirical support for the theory and by constructing a model of legislative cue-taking that uses temporal information. In this section, we discuss our selection of the bills used in the empirical analysis, our operationalization of likely cue-givers and cue-takers, and other key concepts. Our selection of bills and amendments reflects a range of theoretical and empirical considerations.

While cue-giving and cue-taking can and does occur at any stage of the legislative process, we argue that such a process is most prevalent at the floor-voting stage, when senators are faced with making quick decisions about issues they are not familiar with; these include votes that are less salient and that may be technical or substantively uninteresting to a majority of senators (see also Matthews and Stimson 1975). For these reasons—and based on our own interviews with senators and staffers—we selected votes in the 108th Congress on issues that vary across the dimensions of salience, partisanship, and complexity.

Cue-taking requires that senators increase their knowledge about a particular vote based on the temporally observed, previous actions of other senators. Thus, our coded data is a temporal measure of *when* senators voted. In the Senate, members vote by approaching the clerk and announcing their decision at some point during the open voting period.[12]

Once a senator informs the clerk of her vote, the clerk writes down the senator's vote and announces it to the rest of the chamber. We exploit this process to code the timing of senators' votes.

Timing Data
Coding C-SPAN Footage

The timing data was collected from purchased C-SPAN footage. Coders watched tapes containing the selected Senate votes and kept track of the time (in seconds) from the start of the roll-call vote until the voting period closed; they used the clerk's announcement to code each senator's vote decision and the time at which the senator voted.[13] The data collected from the announcement of the clerk is the dependent variable in our duration models; coding was completed for each senator voting on four amendments across four bills, for a total of 16 different votes. As explained previously, because cues can be taken from friends as well as opponents, directional information is not used to test cue-taking.[14]

Bill (Case) Selection

Matthews and Stimson (1975) describe three issue conditions under which cue-taking is most likely: legislation must be new, complex, or nonideological. Amendments, as opposed to final passage votes, are more likely to meet Matthews and Stimson's necessary conditions for cue-taking—they are more likely to require quick decisions, are more likely to deal with unfamiliar issues, are more likely to be highly technical in nature, and are less likely to be of substantive interest to a large number of senators. Thus, we looked for legislation with an eye towards final passage votes on amendments and conducted our search in two stages: (1) we pulled bills that had many amendments; (2) we took the pool of bills with many amendments and then selected four bills (each with four amendments) from among them, attempting to maximize variation on each of the aforementioned dimensions.[15] For example, one of the amendments coded was Amendment 2043 to H.R. 1904, sponsored by Senator Boxer. The amendment was about forest fire protection (a moderately salient issue among some senators), but Sen. Boxer's amendment was intended to "... increase the minimum percentage of funds allocated for authorized hazardous fuel reduction projects in the wildland-urban interface." This amendment is typical of the type we selected because it is highly technical in nature and is of substantive interest to a small number of senators (in this case, those from western states). Table 1 provides a summary of bills and amendments used in the analysis.

TABLE 1
Summary of Bills and Amendments
Used in the Analysis

Bill	Title	Issue or Purpose	Vote
H.R. 1904	Healthy Forests Restoration Act of 2003	Forest Fire Protection/Forest Management	Agreed to 80-14
	Amend. 2030 *Murray (D)-WA*	To ensure protection of old-growth stands	Agreed to 62-32
	Amend. 2035 *Bingaman (D)-NM*	To require the treatment of slash and other long term fuels management for hazardous fuels reduction projects	Agreed to 58-36
	Amend. 2038 *Cantwell (D)-WA*	To require the Comptroller General to study the costs and benefits of the analysis of alternatives in environmental assessments and environmental impact statements	Agreed to 57-34
	Amend. 2043 *Boxer (D)-CA*	To increase the minimum percentage of funds allocated for authorized hazardous fuel reduction projects in the wildland-urban interface.	Agreed to 61-34
S. 1	Prescription Drug and Medicare Improvement Act	Prescription Drug Benefit/Medicare Reform	Agreed to 76-21
	Amend. 931 *Stabenow (D)-MI*	To require that the Medicare plan, to be known as the Medicare Guaranteed Option, be available to all eligible beneficiaries in every year.	Defeated 37-58
	Amend. 998 *Dodd (D)-CT*	To modify the amount of the direct subsidy to be provided to qualified retiree prescription drug plans.	Defeated 41-55
	Amend. 1002 *Lincoln (D)-AR*	To allow Medicare beneficiaries who are enrolled in fallback plans to remain in such plans for two years by requiring the same contracting cycle for fallback plans as Medicare Prescription Drug plans.	Agreed to 51-45
	Amend. 1065 *Bingaman (D)-NM*	To update, beginning in 2009, the asset or resource test used for purposes of determining the eligibility of low-income beneficiaries for premium and cost-sharing subsidies.	Agreed to 65-29

TABLE 1
(continued)

Bill	Title	Issue or Purpose	Vote
S. 14	Energy Policy Act of 2003	Comprehensive Energy Policy	No Final Passage Vote
	Amend. 843 *Feinstein (D)-CA*	To allow the ethanol mandate in the renewable fuel program to be suspended temporarily if the mandate would harm the economy or environment.	Defeated 35-60
	Amend. 844 *Feinstein (D)-CA*	To authorize the Governors of the States to elect to participate in the renewable fuel program.	Defeated 34-62
	Amend. 850 *Frist (R)-TN*	To eliminate methyl tertiary butyl ether from the United States fuel supply, to increase production and use of renewable fuel, and to increase the Nation's energy independence.	Agreed to 67-29
	Amend. 865 *Dorgan (D)-ND*	To require that the hydrogen commercialization plan of the Department of Energy include a description of activities to support certain hydrogen technology deployment goals.	Agreed to 67-32
S. Res. 445	To eliminate certain restrictions on service of a Senator on the Senate Select Committee on Intelligence.	Reform Committee Jurisdiction for Homeland Security and Intelligence.	Agreed to 79-6
	Amend. 3999 *McCain (R)-AZ*	To strike section 402 and vest intelligence appropriations and jurisdiction in the Select Committee on Intelligence.	Defeated 23-74
	Amend. 4000 *McCain (R)-AZ*	To ensure that the Committee has jurisdiction over the Transportation Security Administration.	Defeated 33-63
	Amend. 4015 *Hutchison (R)-TX*	To implement responsible subcommittee reorganization in the Committee on Appropriations.	Agreed to 44-41
	Amend. 4041 *Nickles (R)-OK*	To vest sole jurisdiction over the Federal budget process in the Committee on the Budget, and to give the Committee on the Budget joint jurisdiction with the Governmental Affairs Committee over the process of reviewing, holding hearings, and voting on persons nominated by the President to fill the positions of Director and Deputy Director for Budget within the Office of Management and Budget.	Agreed to 50-35

Note: Sponsors are listed in italics under Amerndment number.

These types of votes—where technical expertise is valued—are classic test cases for cue-taking. However, we suspect that cues are not limited to such conditions. For example, ideological or party cues are certainly dominant, constant "cues" on many issues (especially where the vote divides along ideological lines), and other cues may exist at the same time and in varied contexts. Thus, for leverage on the more general presence or absence (and conditionality) of cue-giving and cue-taking—that is, to better understand the extent of cue-taking exists across the full spectrum of congressional business—we pool the 16 votes together not by bill, but on the basis of the amount of controversy/division they generate among senators. We operationalize this by using the amount of debate, by counting the number of pages in the congressional record, on an amendment. This measure captures, *prior to the vote*, whether the issue will be consensual or divisive, whether the parties will attempt to signal a preferred position during the vote, and whether a vote is likely to be close.

Having variation across ideological conditions is critical when examining the conditionality of cueing, so we include some votes which appear to be partisan. Again, however, we tried to strike a balance between explicitly partisan votes and votes which represent more typical and mundane legislative activity. Many of the votes were chosen because we wanted to avoid issues which were overtly ideological or exhibited characteristics of party-based voting. Given the high level of polarization in recent Senates and the narrow party coalitions in the 108th Congress (there were 51 Republicans and 49 Democrats, including Jim Jeffords, an independent who caucused with the Democrats), one would think that an ideological or party-based vote would likely be the primary cue, overwhelming any other cues based on informational or other factors. Of course, while much of the literature and the media tends to focus on ideological or partisan divides (i.e., "polarization"), most of what Congress does is actually bipartisan (Adler and Wilkerson 2007). In other words, partisan bills are not the only, or even modal, type that legislators deal with on the floor. We attempt to capture not only partisan and ideological votes, but also what Matthews and Stimson (1970) called "normal votes," which comprise the everyday business of Congress.

Of the four bills in the sample, three received more than 75 votes on final passage.[16] The amendment votes were divided into two categories, *heavily debated* and *nonheavily debated*; on this we observe a natural break point in the data, resulting in eight votes in each category. The debate for eight heavily debated bills took up six or more pages in the congressional record (mean = 10 pages), while the remaining

"nonheavily debated" bills took up four or fewer pages (mean = 3.1 pages). We experimented with different cut points and obtained consistent results (please see the endnote for details).[17] Importantly, the heavily debated votes tend to be partisan in nature—for example, an amendment sponsored by Blanche Lincoln, a Democrat, appears to have been particularly divisive; there are seven pages of debate in the congressional record for the amendment and every Republican voted "yea" on the motion to table,[18] while Democrats unanimously voted "nay." There are 759 observations on heavily debated votes (eight pooled votes), and 734 observations on nonheavily debated votes (eight pooled votes).[19]

Each of the bills and amendments cover different policy issues and vary on other important categories. Two of the bills, while *not* particularly ideological, were highly salient. S. 1 sought to amend the Social Security Act by providing for a prescription drug benefit, and S. 14 dealt with large-scale changes in energy policy. Each of the amendments offered on these two bills are germane to the legislation and vary in their technical complexity. Senators may have had an incentive to learn more about each of these bills, but levels of information on each of the amendments would have varied quite a bit.

The other two bills include one resolution dealing with the internal workings of the Senate (S. Res. 445) and one example of "normal" legislation (H.R. 1904). S. Res. 445 dealt with committee jurisdictions and service—a highly technical and abstract issue to the voting public, but one that may have been salient and controversial within the Senate, especially for the small group of senators on the affected committees. Of its four amendments, two—sponsored by John McCain—were soundly defeated; of the other two winning amendments, one sponsored by Republican Kay Bailey Hutchison was highly partisan (though a number of Democrats did not vote), and the other—sponsored by Don Nickles (also a Republican)—was decidedly bipartisan. H.R. 1904 dealt with forest fire protection and had four amendments offered by senators from western states (one from New Mexico and California and one from each of the Washington senators). The bill and its amendments qualify as "new" according to Matthews and Stimson's definition, because the bill (which was strongly supported by President Bush) introduced a number of new initiatives on a moderately salient issue. While the votes on the bill itself and the amendments were not particularly partisan (the narrowest amendment vote coded was a motion to table—it received 58 "yea" votes), the bill as a whole was somewhat controversial at the time it was passed due to the perception that it was too favorable to logging interests.[20]

Operationalization of Other Key Concepts and Model Specification

We coded for a number of other factors to distinguish likely cue-givers from likely cue-takers. Hypotheses 1 through 3 claim that party leaders and committee members are the most likely to engage in cue-giving. Party leaders are senators classified as serving in the leadership of each of the two parties, including the whips and conference chairs.[21] The majority and minority leaders were not coded as party leaders for methodological reasons—they often vote with the losing side at the end of a vote in order to be able to make a motion to reconsider the bill at a future time. The chair and ranking members from the relevant reporting committees were coded as such, as were senators who served on the committees.[22]

As mentioned, we posit that other members besides party and committee leaders may also serve as cue-givers. We expect sponsors and cosponsors of amendments to vote early in an attempt to generate support for their legislation. Cosponsorship is a low-cost position-taking activity, but it also indicates that these senators have a higher level of baseline information about the amendment in question than the average senator and thus are more likely to vote early in order to provide cues to their colleagues. Ideological extremists may also vote early, as well as more "connected" senators. To capture these potential effects, a variable measuring the absolute value of the senator's DW-NOMINATE score (Poole and Rosenthal 1997) is included in the models, as is a measure of a senator's connectedness to other senators, captured by their cosponsorship behavior (Fowler 2006a, 2006b). Senators who have more ties to other senators have an easier time getting their legislation passed and may have access to more information because of their larger network (Fowler 2006a). We expect their relative prominence to translate into a greater chance that they serve as cue-givers.

Finally, we include additional controls to make sure that vote timing is actually related to cue-giving/cue-taking. It may be the case that senators vote in groups by party, position, or based on some other factor not related to informational concerns. Thus, our models include controls for the party of the senator and for members who spoke on the floor recently before a vote. Likewise, it is possible that senators may vote later simply because they are busier or further away from the Senate floor. To control for these practical possibilities, we develop a rough measure of "busyness" that is the combination of the log of the population in the senator's state and the log of the distance from the senator's hometown to Washington D.C; we also include an ordered

TABLE 2
Summary Statistics for Variables
Used in the Analysis

| | Dichotomous Variables | | | |
| | Heavily Debated Votes | | Non-heavily Debated Votes | |
	Yes	No	Yes	No
Leadership Positions				
Party Leader	32	727	32	702
Chair/Ranking Member of Reporting Com.	7	752	16	718
Member of Reporting Com.	73	686	152	582
Senator Characteristics				
GOP Member	392	367	388	346
Up for reelection	183	576	181	553
Senior Member in State	364	395	351	383
Cosponsor	214	545	81	653
Senator Recently Spoke on Floor	19	740	29	705
Recent Speaker	19	740	29	705

| | Continuous Variables | | | |
	Mean	Std. Dev.	Min	Max
NOMINATE Score (Heavily debated)	.342	.127	.002	.684
NOMINATE Score (Non-heavily debated)	.346	.124	.002	.684
Connectedness Score (Heavily Debated)	1.04	.196	.568	1.43
Connectedness Score (Non-heavily Debated)	1.049	.193	.568	1.43
Office Location (Heavily Debated)	1.15	.918	0	2
Office Location (Non-heavily Debated)	1.15	.915	0	2
Busyness (Heavily Debated)	13.25	1.06	8.84	15.51
Busyness (Non-heavily Debated)	13.27	1.06	8.84	15.51
Number of Terms (Heavily Debated)	2.54	1.65	1	8
Number of Terms (Non-heavily Debated)	2.53	1.64	1	8

variable measuring the distance from the senator's office building to the capital.[23] Table 2 provides descriptive summary statistics for all covariates used in the analyses.

Qualitative Analysis of Voting Order

Prior to examining the results, we first provide some qualitative context, previewing a few examples of the cue-giving/taking dynamics

uncovered in the data. We do this to further demonstrate the structure of the data and to aid the reader in interpretation of the subsequent statistical analyses. Due to space constraints, we limit our focus to the four amendment votes on S. 445; here, the differences between heavily and nonheavily debated votes are most obvious. Table 3 shows the order and time of voting for all senators, across each of the four amendments, nested within the bill, S. 445. Senators highlighted in bold were either the chair or ranking member of the committee with jurisdiction over the bill, a party leader (excluding the majority and minority leaders, who were not coded for reasons described in the "Operationalization of Other Key Concepts; Model Specification" section of the article), or a cosponsor of a proposed amendment on the bill. Generally speaking, the lists show a propensity for these highlighted members to vote *earlier* in the voting period rather than later, consistent with our theory of cue-giving, and the empirical results that follow in Tables 4 and 5.

Seventeen highlighted senators were among the initial voters on S. Res. 445, across the four votes. Two of these votes, Amendments 3999 and 4000, are classified as heavily debated. During both of these votes, party leaders were among the *first 10* voters. For Amendment 4015—one of the two nonheavily debated votes—the party leaders voted with most other members during the initial roll call; for Amendment 4041, Senator Stevens voted 15th, while Reid voted 77th. The clustering of cosponsors and party leaders early in the 3999 and 4000 votes again suggests that cue-giving was occurring for these votes. In the case of 3999, of the first 10 voters, four are either a leader or cosponsor; three of the first 10 are either a leader or a cosponsor in the case of Amendment 4000. On the two noncontroversial (nonheavily debated) votes, only one cosponsor voted among the first 10 senators for Amendment 4041, while most senators voted during the roll-call process on Amendment 4015.

Event History Analysis

For our empirical analysis, the nature of the dependent variable (the amount of elapsed time until a senator votes) dictates we use Cox Proportional hazards models to identify the effects of the independent variables.[24] The Cox Proportional hazards model is semiparametric, making no assumptions about the distribution of the baseline hazard; it is a common choice for those estimating survival models (Box-Steffensmeier and Jones 2004). A key assumption of the Cox model is that covariates' effects on the hazard rate are proportional over time (Box-Steffensmeier and Zorn 2001)—we test and correct for

TABLE 3
Order of Voting, S. Res. 445 Amendments

Vote Order	Amend. 3999	Time	Amend. 4000	Time	Amend. 4015	Time	Amend. 4041	Time
1	CRAPO	314	COLLINS	294	AKAKA	580	BILL NELSON	299
2	DASCHLE	314	CORNYN	294	ALEXANDER	580	BURNS	299
3	DOMENICI	314	INOUYE	294	ALLARD	580	COLEMAN	299
4	HUTCHINSON	314	LIEBERMAN (cosp.)	294	B. GRAHAM	580	COLLINS	299
5	INHOFE	314	MCCAIN (cosp.)	294	BAUCUS	580	CONRAD (cosp.)	299
6	LIEBERMAN (cosp.)	314	STEVENS (leader)	294	BENNETT	580	JOHNSON	299
7	MCCAIN (cosp.)	314	THOMAS	294	BOND	580	KYL	299
8	REID (leader)	314	FEINGOLD	303	BROWNBACK	580	LEAHY	299
9	ROCKEFELLER	314	BAYH	305	BUNNING	580	VOINOVICH	299
10	STEVENS (leader)	314	GREGG	329	BURNS	580	HATCH	326
11	FRIST	320	LUGAR	375	BYRD	580	BIDEN	401
12	HARKIN	323	CAMPBELL	413	CANTWELL	580	SESSIONS	406
13	LANDRIEU	357	HOLLINGS	418	CARPER	580	DASCHLE	458
14	BURNS	479	REID (leader)	422	CHAFEE	580	STEVENS (leader)	461
15	HOLLINGS	561	BOND	425	COCHRAN	580	LOTT (comm.)	489
16	BAYH	581	BUNNING	441	COLEMAN	580	HARKIN	504
17	FEINGOLD	599	SESSIONS	488	COLLINS	580	ROBERTS (cosp.)	515
18	KYL	626	MURRAY	497	CONRAD (cosp.)	580	HUTCHISON	541
19	BUNNING	656	ROBERTS (cosp.)	538	CRAPO	580	LANDRIEU	585
20	CORNYN	694	ALLARD	542	DASCHLE	580	DURBIN	621
21	BIDEN	698	REED	560	DAYTON	580	GREGG	627
22	MURRAY	714	ROCKEFELLER	594	DEWINE	580	THOMAS	634
23	THOMAS	727	DURBIN	616	DODD (comm.)	580	DEWINE	652

TABLE 3
(continued)

Vote Order	Amend. 3999	Time	Amend. 4000	Time	Amend. 4015	Time	Amend. 4041	Time
24	DAYTON	747	DAYTON	620	DOLE	580	**DODD** (comm.)	670
25	COLEMAN	771	BEN NELSON	658	DORGAN	580	FEINGOLD	683
26	MILLER	780	DEWINE	669	DURBIN	580	FRIST	687
27	KOHL	802	SUNUNU	714	ENZI	580	GRASSLEY	689
28	JOHNSON	806	ALEXANDER	719	FEINGOLD	580	MURRAY	694
29	JEFFORDS	812	L. GRAHAM	722	FEINSTEIN	580	ALLARD	698
30	SMITH	828	BIDEN	740	FITZGERALD	580	LUGAR	701
31	LEAHY	833	BURNS	762	FRIST	580	REED	705
32	CARPER	842	DOLE	772	GRASSLEY	580	BUNNING	708
33	COCHRAN	853	JEFFORDS	832	GREGG	580	FITZGERALD	717
34	REED	858	HUTCHINSON	855	HAGEL	580	CANTWELL	722
35	CAMPBELL	863	**SANTORUM** (leader)	865	HARKIN	580	CLINTON	728
36	LUGAR	867	LEVIN	871	INOUYE	580	DAYTON	731
37	ALEXANDER	878	JOHNSON	878	JEFFORDS	580	**SNOWE** (cosp.)	736
38	L. GRAHAM	886	**NICKLES** (cosp.)	889	JOHNSON	580	BENNETT	743
39	**MIKULSKI** (leader)	890	ENZI	892	KYL	580	STABENOW	761
40	**NICKLES** (cosp.)	900	TALENT	897	LEAHY	580	DORGAN	766
41	BILL NELSON	905	**MIKULSKI** (leader)	901	LEVIN	580	INOUYE	795
42	BOXER	912	**SNOWE** (cosp.)	924	**LIEBERMAN** (cosp.)	580	ENZI	803
43	DEWINE	917	WYDEN	955	LINCOLN	580	AKAKA	832
44	SPECTER	965	CANTWELL	965	**LOTT** (comm.)	580	CHAFEE	855
45	SESSIONS	985	B. GRAHAM	972	**MCCAIN** (cosp.)	580	DOMENICI	865

TABLE 3
(continued)

Vote Order	Amend. 3999	Time	Amend. 4000	Time	Amend. 4015	Time	Amend. 4041	Time
46	BEN NELSON	992	FITZGERALD	992	MCCONNELL	580	PRYOR	875
47	B. GRAHAM	995	SHELBY	1004	MIKULSKI (leader)	580	LIEBERMAN (cosp.)	878
48	GREGG	1000	DORGAN	1050	MURKOWSKI	580	NICKLES (cosp.)	894
49	DURBIN	1004	CLINTON	1054	MURRAY	580	WYDEN	898
50	BINGAMAN	1008	MCCONNELL	1080	NICKLES (cosp.)	580	DOLE	904
51	BOND	1012	HAGEL	1107	REED	580	SMITH	908
52	BYRD	1048	MILLER	1113	REID (leader)	580	SHELBY	937
53	GRASSLEY	1053	SMITH	1118	ROBERTS (cosp.)	580	BINGAMAN	974
54	DORGAN	1059	COCHRAN	1122	SANTORUM (leader)	580	B. GRAHAM	1008
55	DOLE	1067	CONRAD (cosp.)	1132	SCHUMER	580	MCCONNELL	1013
56	BREAUX	1079	CRAPO	1136	SESSIONS	580	ENSIGN	1040
57	BROWNBACK	1084	BILL NELSON	1142	SHELBY	580	BEN NELSON	1061
58	DODD (comm.)	1087	INHOFE	1151	SMITH	580	BAUCUS	1064
59	ALLARD	1094	LANDRIEU	1164	THOMAS	580	MURKOWSKI	1071
60	HATCH	1100	BAUCUS	1168	VOINOVICH	580	COCHRAN	1075
61	HAGEL	1104	CHAFEE	1174	WARNER	580	KOHL	1083
62	FEINSTEIN	1107	BINGAMAN	1176	WYDEN	580	WARNER	1111
63	INOUYE	1111	BROWNBACK	1205	DOMENICI	585	TALENT	1124
64	CHAFEE	1120	LAUTENBERG	1226	BIDEN	596	BOND	1129
65	CRAIG	1123	BREAUX	1240	HATCH	615	MCCAIN (cosp.)	1138
66	PRYOR	1131	HARKIN	1244	LAUTENBERG	641	FEINSTEIN	1164

TABLE 3
(continued)

Vote Order	Amend. 3999	Time	Amend. 4000	Time	Amend. 4015	Time	Amend. 4041	Time
67	TALENT	1154	BOXER	1247	ROCKEFELLER	661	INHOFE	1168
68	WARNER	1157	BENNETT	1251	INHOFE	665	JEFFORDS	1185
69	STABENOW	1167	COLEMAN	1255	BINGAMAN	668	CRAPO	1190
70	ALLEN	1173	FRIST	1259	BILL NELSON	729	LAUTENBERG	1210
71	LEVIN	1189	STABENOW	1262	CLINTON	733	HAGEL	1231
72	SHELBY	1193	KENNEDY	1269	PRYOR	736	ALEXANDER	1235
73	SNOWE (cosp.)	1197	LINCOLN	1273	STEVENS (leader)	776	SCHUMER	1283
74	CONRAD (cosp.)	1223	FEINSTEIN	1277	STABENOW	785	KENNEDY	1321
75	SANTORUM (leader)	1229	SARBANES	1283	CORZINE	789	LEVIN	1358
76	ENZI	1234	BYRD	1286	KOHL	803	CORZINE	1380
77	BENNETT	1276	DASCHLE	1289	ALLEN	815	REID (leader)	1396
78	CORZINE	1293	KYL	1293	KENNEDY	870	ROCKEFELLER	1401
79	LAUTENBERG	1298	LOTT (comm.)	1295	LANDRIEU	1010	LINCOLN	1418
80	BAUCUS	1303	ENSIGN	1308	ENSIGN	1019	MIKULSKI (leader)	1501
81	LOTT (comm.)	1308	HATCH	1316	HUTCHISON	1024	SANTORUM (leader)	1537
82	FITZGERALD	1312	LEAHY	1323	TALENT	1032	CARPER	1627
83	KENNEDY	1314	SPECTER	1330	SNOWE (cosp.)	1103	BYRD	1654
84	AKAKA	1320	CRAIG	1334	BAYH	DNV	ALLEN	1660
85	MURKOWSKI	1355	MURKOWSKI	1340	BEN NELSON	DNV	BROWNBACK	1796
86	SARBANES	1359	PRYOR	1356	BOXER	DNV	BAYH	DNV
87	COLLINS	1444	ALLEN	1384	BREAUX	DNV	BOXER	DNV
88	SCHUMER	1455	KOHL	1392	CAMPBELL	DNV	BREAUX	DNV

TABLE 3
(continued)

Vote Order	Amend. 3999	Time	Amend. 4000	Time	Amend. 4015	Time	Amend. 4041	Time
89	CLINTON	1466	AKAKA	1443	CHAMBLISS	DNV	CAMPBELL	DNV
90	SUNUNU	1551	VOINOVICH	1495	CORNYN	DNV	CHAMBLISS	DNV
91	VOINOVICH	1556	CORZINE	1508	CRAIG	DNV	CORNYN	DNV
92	CANTWELL	1596	DODD (comm.)	1595	EDWARDS	DNV	CRAIG	DNV
93	ROBERTS (cosp.)	1704	CARPER	1622	HOLLINGS	DNV	EDWARDS	DNV
94	MCCONNELL	1759	GRASSLEY	1686	KERRY	DNV	HOLLINGS	DNV
95	LINCOLN	2028	CHAMBLISS	DNV	L. GRAHAM	DNV	KERRY	DNV
96	CHAMBLISS	DNV	DOMENICI	DNV	LUGAR	DNV	L. GRAHAM	DNV
97	EDWARDS	DNV	EDWARDS	DNV	MILLER	DNV	MILLER	DNV
98	ENSIGN	DNV	KERRY	DNV	SARBANES	DNV	SARBANES	DNV
99	KERRY	DNV	SCHUMER	DNV	SPECTER	DNV	SPECTER	DNV
100	WYDEN	DNV	WARNER	DNV	SUNUNU	DNV	SUNUNU	DNV

Note: (Cosp.)-Senator cosponsored amend. for bill; (leader)-Senator is a party leader (excluding majority and minority leaders); (comm.)-Senator was the chair or ranking member of the relevant committee; DNV-Senator did not vote on amendment. Time is the number of seconds elapsed until the Senator voted.

TABLE 4
Pooled Models of Vote Timing
in the U.S. Senate 108th Congress;
Cox Proportional Hazards Model Estimates

Variables	Pooled Votes		Pooled Votes With Debated × Leader	
	β*	Std. Err.	β*	Std. Err.
Leadership Positions				
Party Leader	−.241*	.06	−.337*	.126
Party Leader × Debated	—	—	.193	.211
Chair/Ranking Member of Reporting Com.	.288#	.162	.286#	.161
Member of Reporting Com.	−.068	.07	−.069	.07
Senator Characteristics				
NOMINATE Score (Abs.Val.)	.164	.315	.157	.314
GOP Member	−.065	.059	−.065	.059
Up for Reelection	.061	.061	.059	.061
Number of Terms	.062*	.028	.061*	.028
Senior Member in State	−.062	.065	−.062	.065
Connectedness Score	.078	.25	.083	.25
Office Location	.053	.038	.053	.037
Busyness	−.118*	.055	−.118*	.056
Cosponsor	.09	.07	.094	.071
Senator Recently Spoke on Floor	.035	.136	.029	.136
Vote Characteristics				
Heavily Debated	1.41*	.071	1.4*	.072
H.R. 1904	2.43*	.111	2.42*	.111
S. 1	1.56*	.071	1.55*	.071
S. Res. 445	1.96*	.125	1.96*	.125
S. 14	(excluded)			
Proportional Hazards Corrections—Interaction with Natural Log of Time				
H.R. 1904 × time	−.75*	.019	−.75*	.019
S. 1 × time	−.276	.017	−.275*	.017
S. Res. 445 × time	−.568*	.018	−.567*	.018
Debated × time	−.567	.017	−.567	.017
Number of Obs	1493		1493	
Number of Failures	1493		1493	
Log pseudo-likelihood	−2750.57		−2750.35	
Wald χ^2	3108.51*		3146.23*	
AIC	5543.15		5544.7	

#$p < .1$, *$p < .05$, two-tailed tests.
Results clustered on Senator, stratified by state.

violations of this assumption in the empirical analysis. The initial results are reported in Table 4 and discussed in the following section.[25]

We first estimate a pooled model with all 16 votes (on each of the four amendments, for each of the four bills). However, to fully capture the conditionality of cue-taking across different types of votes, we specify additional models. One duplicates the pooled model but also includes an interaction term where the effect of party leadership is conditioned on the level of debate. Following the literature (e.g., Cohen and Malloy 2010; Coleman Battista and Richman 2011), we also estimate a second set of models on two different data sets—those that are classified as heavily debated versus nonheavily debated (per the previous discussion); we do this because of our theoretical contention that different types of votes should display distinct cue-giving and cue-taking behavior and because we expect relationships for certain types of senators to change based on the voting environment.[26] While most of the votes classified as "heavily debated" contain voting patterns consistent with partisan divisions, they also involve the defection of a number of Democratic senators who voted with the Republicans (consistent with theories of congressional polarization, which suggest that Republicans are usually more unified than Democrats; e.g., Theriault 2006).[27] Generally, on votes that were not heavily debated—based on our criteria—large numbers of Democrats voted with the Republicans.

Results

Table 4 shows the results for both the pooled model and a pooled model with an interaction between leadership and level of debate.[28] A positive coefficient indicates that the risk of voting is increasing with changes in a covariate (i.e., that a senator will vote earlier); a negative coefficient that the risk of voting is decreasing with changes in a covariate (i.e., that a senator will vote later).[29] In our models, the "survival time" is the time until a senator casts his vote during the roll-call voting period. Using the following formula,

$$\%\Delta hazard = \left(\frac{e^{\beta(x_i = X_1)} - e^{\beta(x_i = X_2)}}{e^{\beta(x_i = X_2)}} \right) * 100 \qquad (1)$$

we can determine the percent change in the hazard for a specified increase in the independent variable (Box-Steffensmeier and Jones 2004). In the above equation, e is the exponentiation of x_i, a variable, and X_1 and X_2 are given values of the variable.[30]

Looking first at the pooled votes model (left columns of Table 4), we see that the results largely conform to expectations. First, the coefficient denoting senators who are the chair or ranking member of a reporting committee is positively signed and significant ($p < .09$), meaning that these senators are predicted to vote earlier (and supporting Hypothesis 2). The result for committee leaders has the largest substantive effect of any nonbill variable—an increase in the hazard of about 32% (obtained by exponentiating the coefficient).

Surprisingly, the hazard for party leaders in the pooled model is negative, indicating that all else equal, party leaders wait until later to vote. Our theory suggests that party leaders will vote earlier, but this expectation is conditional on the type of vote—specifically, we suspect that leaders will vote later on controversial (heavily debated) votes. To investigate the effect of party leaders more closely, we interact the indicator for party leader with level of debate, addressing the question of whether or not the party leaders behave differently under conditions of divisiveness. The results are shown in the right columns of Table 4.

The heavily debated component term is positive and significant, indicating that all senators tend to have a higher risk of voting when the legislation is contentious. As this variable violates the proportional hazards assumption, we apply a time-interaction adjustment; this indicates that heavily debated votes increase the hazard for senators, but the effect is mitigated by time (bottom of right column). The hazard for the party leader indicator remains negative, suggesting that these senators are not likely to vote earlier than other members, even on controversial votes. Importantly, the interaction term is not statistically significant, thereby failing to provide support for the hypothesis (H1) that party leaders vote earlier on controversial votes. Additionally, when interpreted in the context of the interaction term, party leaders actually demonstrate a lower hazard on nonheavily debated votes than other senators.

Other results are quite similar across the two model specifications. The committee leader effect remains substantively unchanged (significant at $p < .1$). Also consistent with expectations, the number of terms served by a senator increases her hazard (by about 6% per term)—consistent with our claim that more experienced senators are more likely to serve as cue-givers, while less experienced senators are more likely to serve as cue-takers. Two other results warrant mention: First, those senators coded as "busy"—a combination of the senator's home state population and distance to DC—are predicted to vote later (a one-unit increase on this measure reduces a senator's hazard by about 12%). Second, the bill indicator covariates emerge as statistically significant, indicating that important variation between votes remains.[31]

TABLE 5
Models of Voting Timing by Heavily and Non-heavily Votes
in the U.S. Senate 108th Congress;
Cox Proportional Hazards Model Estimates

Variables	Heavily Debated		Non-heavily Debated	
	β^*	Std. Err.	β^*	Std. Err.
Leadership Positions				
Party Leader	.567*	.158	.052	.119
Chair/Ranking Member of Reporting Com.	.161	.382	.325	.272
Member of Reporting Com.	.097	.174	−.165#	.086
Senator Characteristics				
NOMINATE Score (Abs.Val.)	.255	.369	1.03*	.298
GOP Member	.056	.103	.099	.07
Up for Reelection	−.069	.1	.19*	.064
Number of Terms	.04	.03	.093*	.029
Senior Member in State	−.002	.099	−.098	.063
Connectedness Score	−.072#	.433	.248	.273
Office Location	.085	.054	.039	.036
Busyness	−.174*	.069	−.22*	.042
Cosponsor	−.001	.095	.263*	.097
Senator Recently Spoke on Floor	.61*	.237	.131	.2
Vote Characteristics				
H.R. 1904	—	—	2.96*	.174
S. 1	.236*	.079	2.72*	.169
S. Res. 445	1.88*	.142	—	—
S. 14	(excluded)			
Proportional Hazards Corrections—Interaction with Natural Log of Time				
S. Res. 445 × time	−.424*	.022	—	—
S. 1 × time	—	—	−.369*	.026
H.R. 1904 × time	—	—	−.56*	.022
Number of Obs	759		734	
Number of Failures	759		734	
Log pseudo-likelihood	−1336.31		1065.23	
Wald χ^2	545.75*		866.17*	
AIC	2704.62		2164.46	

#$p < .1$, *$p < .05$, two-tailed tests.
Results clustered on Senator, stratified by state.

Our theoretical expectations are that cue-giving and cue-taking behavior is situation-specific; we expect to see different results based on the level of controversy. By splitting the sample into heavily and nonheavily debated votes, the models are the equivalent of interacting each covariate with the level of debate on a vote. Table 5 shows the estimates when the roll-call votes are split by this factor. Again, the amount of debate is quantified through an examination of the number of pages appearing in the congressional record (please see the previous discussion and accompanying endnote). Important differences emerge between the two sets of estimates—these provide some evidence that cue-giving and cue-taking does indeed depend on the voting environment.

We begin with heavily debated votes (left columns), where the hazard is roughly 76% higher for party leaders; on those votes which were not heavily debated, we observe no statistically significant difference between party leaders and other senators. Of course, we must be cautious in how we interpret this result. Although these models are different specifications from those presented in Table 4 (here, the equivalent of including many interactions), and although we find a positive effect on this subset of votes, the results from the interaction term in the previous, pooled models tell us that the *difference* in hazards between the subsets of data is not statistically significant. Given the estimates in Table 4, we do not take the positive, significant coefficient for party leader in the heavily debated model as support for conditional effects (Hypothesis 1). That said, the substantively small (and nonstatistically significant) coefficient in the nonheavily debated model comports with our related expectation that leaders will not behave distinctly on noncontroversial votes.

Other interesting results emerge from these two models. For example, in both cases those senators classified as "busier" are predicted to vote later. Looking at heavily debated votes, we see that recent speakers are more likely to vote early (the coefficient is considerable—roughly an 83% increase in the hazard). The substantive size of the effect suggests that these debates are meaningful; senators who speak about these bills have strong preferences on the vote outcome, and they attempt to provide information to others by voting earlier. When viewed against the null effect for this covariate in both the pooled and nonheavily debated specifications, it suggests that the result is not merely a function of senators who happen to be on the floor when the vote occurs. Rather, recent speakers try to articulate their beliefs to other senators with their statements during debate, and their early vote is a way of communicating their preferences (this willingness to debate the merits of a bill on the floor is

indicative of higher levels of information, and ultimately, cue-giving behavior).

Looking at the nonheavily debated model, one of the measures of expertise—the number of terms a senator has served—increases the risk of a senator voting by about 10% (for each additional term served). Interestingly, we also find that members of the reporting committee vote later (significant at the $p < .1$ level). This is somewhat counterintuitive (and does not support Hypothesis 3) but emphasizes the point that on nonheavily debated items, the votes are often not as controversial, may not be as salient to other senators, and may provide a situation in which more informed senators have little incentive to engage in cue-giving. We do observe that ideological members and cosponsors are both predicted to have higher hazards in this model, suggesting that on noncontroversial matters, members do not necessarily look to party or committee leaders, thus potentially empowering individual members with greater information to serve as cue-givers. We do find that members up for reelection have a higher risk of voting (a 21% increase in the hazard). Our expectation was that these members would be risk averse, acting primarily as cue-takers on controversial votes. The higher hazard on nonheavily debated votes may be a sign of their desire to position-take on these types of issues (behavior that would still be consistent with avoiding the risks of early voting on salient or controversial issues). Finally, it is worth noting that we do not observe evidence of significant/different effects for committee leaders by types of votes. That said, the nonsignificant coefficient remains positive in both models, which is consistent with the pooled estimates in Table 4, and with Hypothesis 2 (i.e., the expectation that chairs and ranking members serve as cue-givers, regardless of the type of vote).

An Additional Check: Randomization Inference

In order to further test the robustness of our results, we apply randomization/permutation inference to examine whether our estimates of vote timing are significantly different from what we might expect to find under conditions of random voting. A common application of randomization inference is to "break the relationship between a variable of interest Z and an outcome Y for a multivariate model with other covariates X" (Erikson, Pinto, and Rader 2010, 186).

Following political science examples (e.g., Erikson, Pinto, and Radar 2010; Groseclose 1994; Keele, McConnaughy, and White 2012)—as well as the broader methods literature (e.g., Good 2005; Kennedy 1995)—we randomly shuffle senator vote timing (the dependent variable in our analyses), apply the model to our data, and then

compare the estimated coefficients from our survival models to the distribution of estimated coefficients obtained from applying the same model to the randomly shuffled data.[32] Using Stata, we wrote a loop[33] to do the following, for each model specification in Tables 4 and 5:

1) randomly shuffle vote timing among senators. That is, we randomly reassigned observed vote times across senators, within each vote;
2) set the data (in preparation for event history analysis), pooling votes and altering specifications, depending on the particular analysis;
3) estimate the model;
4) capture the coefficients, standard errors, and z-scores for all parameters; and
5) repeat this process 5,000 times.

For each covariate/parameter in each model specification, we plot the estimate from our empirical model and the 5–95% distribution of coefficients obtained through randomization. Figures 1 and 2 compare our coefficients to the 5th and 95th percentile of the distribution of the coefficients (we want our coefficient estimates from the observed data to be outside these bounds, in accordance with conventional levels of statistical significance [1]). The results from these simulations largely confirm our initial findings. To summarize, across the four models presented, we have 20 substantive parameters that are statistically significant at conventional levels (this excludes the bill dummy variables, or their interactions with time). After the randomization procedure, the observed coefficients for one-half (10) of these parameters remain within the 10% most extreme scores (5% on a particular tail); an additional four parameters are extremely close to—right at these marks (e.g., committee chair/ranking member). The results give us additional confidence that the models are producing meaningful inferences and that cue-giving and cue-taking dynamics are real.

Discussion and Conclusion

By looking at levels of debate, we observe cue-taking behavior, and importantly, find some preliminary evidence that such dynamics are situation-specific. The result for party leaders is mixed. We detect cue-giving by party leaders on controversial votes, but because of the statistical insignificance of the interaction term in the pooled models, cannot confirm conditional effects as stated in Hypothesis 1. More senior senators, as measured by the number of terms served, also seem to be a primary source of legislative information—the covariate has a significant

FIGURE 1
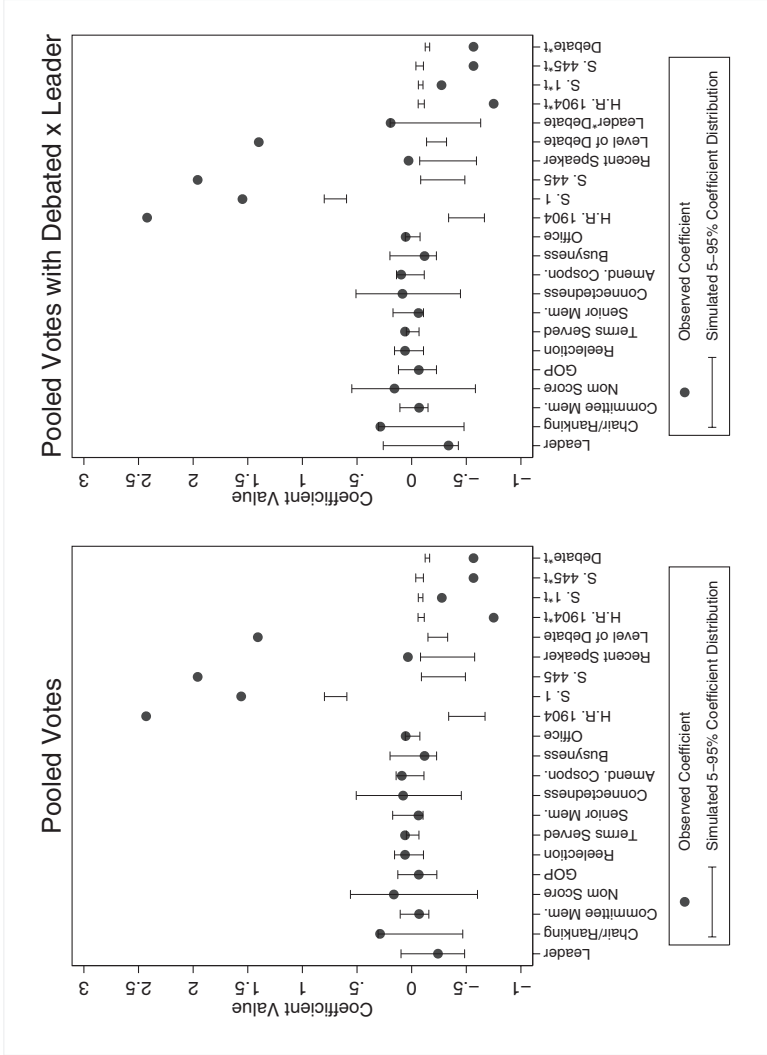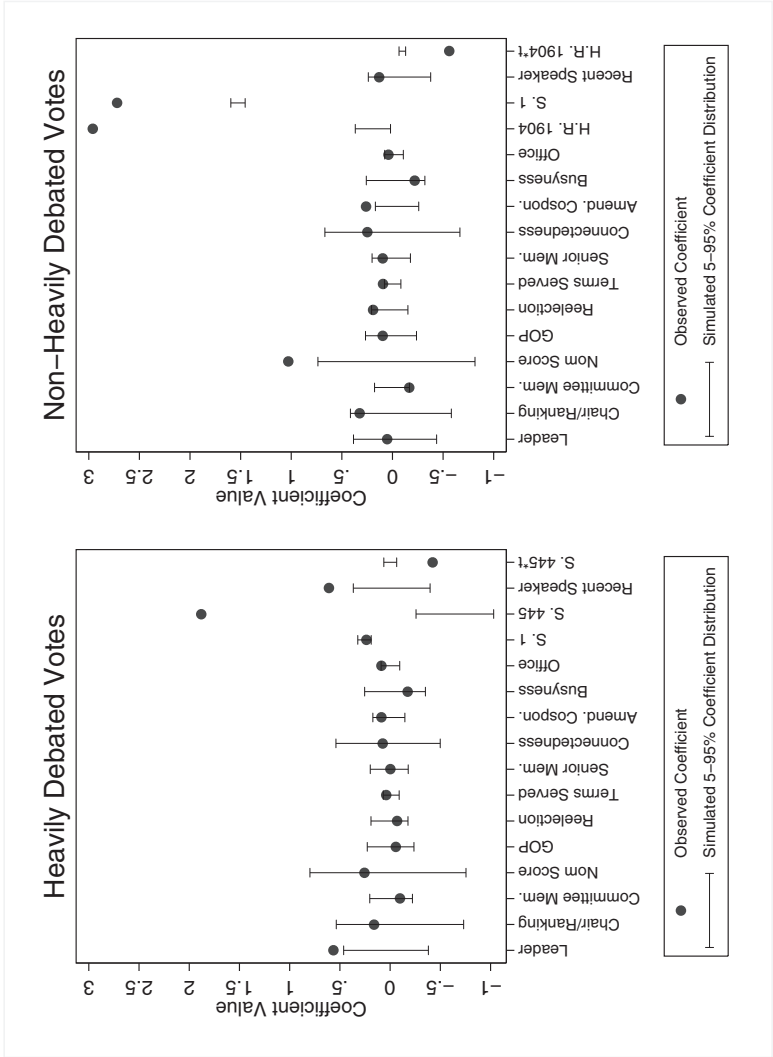Permutation Results for Pooled Models
(Table 4 Estimates)

FIGURE 2
Permutation Results by Level of Debate
(Table 5 Estimates)

and nontrivial effect in three of the models, though it does not emerge on controversial votes. The influence of committee leaders (Hypothesis 2) is apparent from the pooled results, though their cue-giving behavior does not seem conditional on the type of vote.

The evidence supports the idea that under some conditions, committee leaders solve information problems for members, *while* under other conditions, party leaders may attempt to coordinate party votes on contentious issues. These results may be unsatisfying in that they do not provide a clear distinction between committee or party leaders as cue-givers, but we find it encouraging that both explanations are relevant under specific circumstances.

We also find that other members likely to have more information about the vote, including amendment cosponsors and recent speakers, cast their vote first as a way of signaling preferences. Taken as a whole, the results yield strong evidence for our central theoretical claim: cue-giving and cue-taking dynamics exist in the US Senate. The empirics support a story of senators relying on the expertise or judgments of other senators to help guide their votes—this is the result of them being relatively uninformed about a large number of issues which come up for a floor vote, given the nature of the institution and the realities of the job.

We see evidence of systematic patterns of voting and waiting, across a full spectrum of bills, and under varying conditions of controversy. On the latter point, recall that the timing dynamics between heavily debated and nonheavily debated votes are distinct. We see some groups of senators serving as cue-givers for heavily debated votes, some serving as cue-givers for nonheavily debated votes, and other groups of senators serving in different capacities for different types of votes (e.g., extremists, party leaders, amendment cosponsors, committee leaders, and long-serving senators). Vote-timing is a dynamic, strategic process in which senators use the votes of others to gather information for their own vote choices. In unpacking this process, we see that leadership matters but that other characteristics do as well. Our theoretical tack also implies that some senators may receive additional benefits or privileged positions due to their outsized role in the lawmaking process. For example, lobbyists may be more likely to communicate with those senators who serve as cue-givers rather than those who serve as cue-takers.

Although this effort builds on the early cue-taking literature (e.g., Kingdon 1973; Matthews and Stimson 1975), we improve on the previous research in several ways. First, while congressional cue-taking theory is intuitively appealing, it has heretofore not been subjected to quantitative, empirical testing. Looking across 16 votes from the 108th Congress, we provide some of the first such evidence of its existence. Our results

concerning cue-giving and cue-taking behavior support what previous qualitative studies, anecdotal evidence, and our own qualitative investigations suggest.

Second, our unique data set—coded C-SPAN coverage—and empirical approach directly models the factor most central to cue-giving and cue-taking theory: time. Using publicly available resources, we overcome long-standing research design challenges (e.g., the note-taking policy in the galleries) to address an important question about legislative behavior.

Finally, while previous literature suggests that cue-taking should be present under specific conditions (i.e., lower-salience, high-complexity votes), we provide a more general theory of cue-taking, suggesting—and finding evidence for—its existence across the spectrum of bills appearing before Congress. After selecting bills with variation on partisanship, salience, and complexity, we find that these factors matter but that other cues matter as well. Thus, the question becomes not "Are the policy conditions right for cue-taking?," but "Given conditions of (non)divisiveness, what constellation of cues should we expect to observe?"

Senators are careful about their voting behavior, and with good reason. Senate elections are often higher profile than House elections, voters usually have more information about the candidates (Kahn and Kenney 1999), and the races tend to attract high-quality challengers (Gronke 2000, Squire 1992). Further, senators—like their counterparts in the House—seek reelection, opportunities to credit claim, and try to avoid blame (Mayhew 1974). Senators obviously think their individual voting decisions are important (Stimson 2004), and in this environment, where risk-averse senators must make a multitude of decisions about which they have little information, the consequences of making a poor vote choice can be severe. Cue-taking from more informed colleagues is an efficient and effective strategy to minimize the electoral risks associated with any particular vote.

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APPENDIX

TABLE A
Grambsch and Therneau Global/Local Tests
for Non-proportionality
(for estimates in Tables 4 and 5)

Variables	Pooled Votes		Pooled Votes W/Debated × Leader		Heavily Debated		Not Heavily Debated	
	rho	sig.	rho	sig.	rho	sig.	rho	sig.
Leadership Positions								
Party Leader	.006	0.817	−.002	.949	−.01	.89	.007	.92
Party Leader × Debated	—	—	.011	.794	—	—	—	—
Chair of Reporting Com.	.001	.965	−.001	.96	−.042	.277	.014	.695
Member of Reporting Com.	.021	0.381	.022	.356	.019	.57	−.004	.924
Senator Characteristics								
NOMINATE Score (Abs.Val.)	−.011	.625	−.011	.651	−.007	.897	.021	.518
GOP Member	−.002	.931	−.003	.904	−.007	.898	.038	.488
Up for Reelection	−.028	0.232	−.028	.228	−.049	.223	−.018	.698
Number of Terms	.027	.341	.027	.338	.002	.975	.021	.599
Senior Member in State	.012	.632	.012	.645	.022	.593	.004	.932
Connectedness Score	−.044	.091	−.044	.092	−.02	.606	−.015	.707
Amendment Cosponsor	.023	.533	.03	.394	.041	.339	.11	.069
Office	.02	.451	.021	.439	.029	.468	.021	.611
Busyness	.017	.522	.017	.518	.014	.793	−.019	.666
Senator Recently Spoke on Floor	−.036	.14	−.039	.113	−.031	.387	−.013	.726
Vote Characteristics								
Heavily Debated	.117*	0.00	.112*	0.00	—	—	—	—
H.R. 1904	.189*	0.00	.191*	0.00	—	—	.157*	0.00
S. 1	.138*	0.00	.141*	0.00	.09	.054	.116*	.008
S. Res. 445	.133*	0.00	.137*	0.00	.162*	0.00	—	—
Global Test	56.19*		58.56*		21.12		24.89	

*$p < .05$. Statistical significance indicates the variable violates the proportional hazards assumption. These variables were interacted with the natural log of time. See the text for more details.

NOTES

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1. Carl Hulse. "A Slow Pace in the Senate, and Much Left to Do." *New York Times*, November 21, 2009.

2. For example, the Senate's version of the health care bill alone contained 506 proposed amendments! Of course, not all amendments are voted on—some are tabled, and some are substituted into other amendments/otherwise dealt with. *Source*: Thomas.loc.gov, Legislative History of H.R. 3780.

3. The data and supplementary file referenced in the text are both available via Dataverse and ICPSR.

4. Confidential interview with authors, May 2001.

5. Even attempts by Senate conferees to add nongermane provisions to existing legislation during the conference process have been met with considerable resistance from the House (Bach 1982).

6. Recently, Senate minority coalitions have used amendments as a tool to slow down action on a bill (Oleszek 2007). However, while increased time for debate on the Senate floor may provide an opportunity for senators to learn about a bill, evidence suggests that many (if not most) floor speeches are motivated by representational or electoral concerns (Quaile Hill and Hurley 2002), rather than legitimate attempts to convince other members.

7. Bernhard and Sala (2006) demonstrate how senators became less responsive to state legislatures and more responsive to state voters after the adoptions of the 17th Amendment.

8. During a roll-call vote, senators can be observed leaning over the front desk of the clerk and glancing at the vote tally.

9. Packer, George. 2010. "The Empty Chamber." The New Yorker, August 9.

10. Matthews and Stimson 1975 conducted their interviews in 1969. Fortunately, in a great service to other scholars, they provide an appendix with their interview question-naire and another that discusses their interview techniques. We used these documents in May, 2001, to conduct interviews with Senate staffers and received answers consistent with the early work in the field (despite an intervening span of over 30 years).

11. We do not address the debate about whether party leaders cause members of their caucus to vote in a way that is inconsistent with their own preferences through vote-buying or some other mechanism (if a member were to have clear preferences due to high information); we do not address whether party leadership positions simply reflect the preferences of a majority of their party (Cox and McCubbins 2005; Krehbiel 1993, 1995; Snyder and Groseclose 2000). Instead, we claim only that under conditions of low information, the vote of a party leader is an easy way for a member to decide how to vote.

12. Formal, seated votes also occur, but these are rare and occur on highly salient issues.

13. All votes are put on the same time scale by subtracting the earliest vote time on a particular vote, for every senator. In other words, for every bill, the first senators that vote are coded as voting at time 1, while all the other vote times are the time as coded minus the time of the earliest voter. If this is not done, when votes are pooled there is an arbitrary

comparison across votes based on the time in which the vote was taken. This also allows for a comparison of vote timing between different bills.

14. Two coding issues deserve mention: At the beginning of the Senate voting process, an alphabetical roll call takes place during which senators may announce their vote when their name is called. Senators do not need to vote during the roll call, and most do not. However, some senators do, and we treat all those who vote in this initial roll call as a "tie," or coterminous event in the data—that is, each of these senators is coded as voting at time 1. The other coding issue occurs when a group of senators approach the clerk and announce their vote to the clerk at the same time. In these cases, the clerk does not announce each senator's vote individually, but collects all the votes from the group, then announces each senator's vote in alphabetical order. Again, we code these votes as coterminous. These coding decisions have little effect on our dependent variable, and when senators vote together, they usually do so in pairs (minimizing any difference between their actual vote on the Senate floor and the timing of the clerk's announcement).

15. We selected bills carefully as the coding of tapes was quite labor intensive, making a "larger" sample infeasible. As with all case selection/sampling, we *could* have chosen other bills. However, we are confident that the 16 selected votes (four bills * four amendments) are representative of a broad class of legislative activity, and of behavioral dynamics that are invariant to the choice of a particular Congress.

16. The fourth, S. 14, was not voted on in the Senate, but most of the bill was repackaged into H.R. 6, an omnibus energy bill which passed the Senate with 84 votes.

17. We designate "heavily debated" with a cutoff at six pages, given the natural break point in the data. None of the votes were debated for five pages; three have four pages in the congressional record, four take up three pages, and one takes up one page. The other eight votes take between 6 and 17 pages. This division produces eight votes in each category. We experimented with creating different page splits, and the results are generally robust to different choices.

18. Practically speaking, a "yea" vote on a motion to table is a vote to kill the amendment.

19. See Table 1 for detailed information about each bill and amendment. Not every senator voted on each amendment, so the actual number of observations is less than the 800 that would be expected for each set of pooled votes (100 senators x 8 votes). For example, John Kerry missed all the votes (and John Edwards nearly all) given his bid for President. Between the two, Kerry and Edwards combine to miss 14 of the 70 total missing votes in the close-votes model.

20. For example, an article in the Los Angeles Times cites Democrats and environmental groups as claiming that the bill would allow "timber companies not only to remove kindling but also to cut down healthy older trees—and avoid lengthy delays posed by current logging requirements." Chen, Edwin. 2003. Los Angeles Times, August 12. Accessed May 5, 2013, http://articles.latimes.com/2003/aug/12/nation/na-bush12.

21. Democrats do not have a separate position for conference chair.

22. Specifically, the members from the following committees were coded: for H.R. 1904, the Agriculture, Nutrition and Forestry committee; for S. 1, the Finance Committee; for S.14, the Energy and Natural Resources Committee; and for S.Res. 445, the Rules and Administration Committee.

23. The Russell building is the closest, followed by Dirksen and then Hart.

24. We cluster by senator due to there being multiple votes per senator. If we did not cluster, we would be assuming we have more information than we actually do (clustering accounts for correlation across votes by senator). Similarly, we stratify by state to account for correlation between senators from the same state. That is, because senators represent the exact same population/state, this potential correlation should be accounted for in the model (see Therneau and Grambsch 2000).

25. An alternative approach to estimating some of the theoretical implications of cue-taking theory and exploring the heterogeneity in the direction/type of cues would be to treat pairs of senators as dyads, where each senator cue-takes from other senators with similar characteristics (e.g., another senator with similar ideology). This technique is not feasible given our event history approach, so we leave it to future research to explore the dyadic relationships between senators.

26. In addition, given our different expectations about covariate effects, the data should be split or stratified. Stratification by such variables is common in event history (Box-Steffensmeier and Jones 2004; Homser, Lemeshow, and May 2008; Mills 2011).

27. Generally, those who defected were considered to be among the most conservative Democrats in the Senate at that time: Senators Landrieu and Breaux of Louisiana, Mark Pryor of Arkansas, and Senator Ben Nelson from Nebraska.

28. An online appendix of additional descriptives/figures, analyses, and robustness checks is available with the archived data. The appendix also includes a list of the order of voting for each of the 16 votes, as well as a discussion of this ordering.

29. In each of the models, a number of variables are interacted with the log of time as indicated under the "Proportional Hazards Corrections" subheading in Tables 4 and 5. Each of these variables violated the proportional hazards assumption (results of the Grambsch and Therneau Global/Local Tests for Non-Proportionality are shown in Table A). The component terms in each of these interactions should not be interpreted by themselves because, as with any interaction, the coefficients show the effect of the variable when the interaction term is equal to zero—in this context, time never equals zero (except at the origin).

30. Graphs of the survivor functions are available in the supplemental information.

31. Both H.R. 1904 and S.445 are interacted with the log of time because they violate the proportional hazards assumption.

32. In the supplemental information document, we also vary the model specification and compare our estimated z-scores to the z-scores obtained from shuffled data, as recent literature suggests this is a more conservative test as compared to plotting only coefficients (Erikson, Pinto, and Rader 2010, 186, 196).

33. All analyses were conducted in *Stata 12*.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Figure 1: Kaplan-Meier Estimates of Survivor Functions
Figure 2: Pooled Votes (Table 3 in paper)
Figure 3: Pooled Votes (cont.) (Table 3 in paper)
Figure 4: Pooled Votes (cont.) (Table 3 in paper)
Figure 5: Pooled Votes (cont.) (Table 3 in paper)