

The Utility of Text: The Case of Amicus Briefs and the Supreme Court (Supplementary material)

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This document contains material to supplement the main paper.

A Brief writing trade offs

Consider the first-order (or KKT) condition for the purposeful amicus' maximization w.r.t. the d th issue:¹

$$\begin{aligned} & \sum_{j \in \mathcal{J}} \sigma' \psi_{j,d} c^s - \xi (\Delta_d - \theta_d) \\ & = \sum_{j \in \mathcal{J}} \sigma' \psi_{j,1} c^s - \xi (\Delta_1 - \theta_1) \quad \text{if } 0 < \Delta_d < 1 \end{aligned}$$

where σ' is the first order derivative of the vote probability sigmoid function. Optimality drives all topics (with positive weight) to have equal marginal values.² The marginal value highlights the tradeoffs an amicus faces, in four components: (i) the cost of deviating from the merits, i.e., a large difference between Δ_d and θ_d , is ξ ; (ii) a justice whose σ' is large, i.e., whose vote is uncertain, receives greater attention, in particular (iii) on issues she cares about, i.e., $\psi_{j,d}$ is large, with (iv) c^s controlling the strength of correspondence to issues justices care about.

B Likelihood of Random Utility Ideal Point Model

The likelihood of our amici model with random utility is given below,

$$\begin{aligned} & p(\mathbf{v}, \rho, \boldsymbol{\psi}, \mathbf{a}, \mathbf{b}, \mathbf{c}^{\text{p}, \text{r}} \mid \lambda, \boldsymbol{\theta}, \boldsymbol{\Delta}, \mathbf{s}) \\ & \propto \prod_{j \in \mathcal{J}} p(\psi_j \mid \lambda, \rho) \prod_{i \in \mathcal{C}} p(a_i, b_i, c_i^{\text{p}, \text{r}} \mid \boldsymbol{\sigma}) \\ & \times \prod_{i \in \mathcal{C}} \prod_{j \in \mathcal{J}} V_{i,j} \prod_{k \in \mathcal{A}_i} \mathbb{E}[U_{i,k}]^\eta \end{aligned}$$

where

$$\begin{aligned} V_{i,j} & = p(v_{i,j} \mid \psi_j, \boldsymbol{\theta}_i, \boldsymbol{\Delta}_i, a_i, b_i, c_i^{\text{p}, \text{r}}) \\ & = \sigma \left[(1 - v_{i,j}) a_i \right. \\ & \quad \left. + (1 - v_{i,j}) \psi_j^\top (b_i \boldsymbol{\theta}_i + c_i^{\text{p}} \boldsymbol{\Delta}_i^{\text{p}} + c_i^{\text{r}} \boldsymbol{\Delta}_i^{\text{r}}) \right], \end{aligned}$$

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¹We consider inner points for clarity; if $\Delta_d = 1$, equality is replaced with \geq (respectively, 0 and \leq).

²Comparing each topic's proportion to topic 1 is arbitrary. In a D -topic model, the amicus has only $D - 1$ choices.

$\sigma(x) = \frac{\exp(x)}{1 + \exp(x)}$ is the logistic function, and

$$\begin{aligned} \mathbb{E}[U_{i,k}] & = \sum_{j \in \mathcal{J}} \sigma(a_i + \psi_j^\top (b_i \boldsymbol{\theta}_i + c_i^{\text{p}, k} \boldsymbol{\Delta}_{i,k})) \\ & \quad + \xi \left(1 - \frac{1}{2} \|\boldsymbol{\Delta}_{i,k} - \boldsymbol{\theta}_i\|_2^2 \right) \end{aligned}$$

We add a constant to the expected utility term so that it will always be ≥ 0 . During each iteration of Gibbs sampling, we sampled each latent variable ρ , ψ_j and $[a_i, b_i, c_i^{\text{p}, \text{r}}]$ blockwise from the likelihood in turn using the Metropolis-Hastings algorithm. In each Metropolis-Hastings random walk, we took 500 steps, ignoring the first 250 for burn-in and keeping every 10th step to compute the mean, which we use as our Gibbs update. In total, we performed 2,000 Gibbs iterations over the training data.

Hyperparameters. We fixed the number of topics in our model to 30. For LDA, the symmetric Dirichlet parameter for document-topic and topic-word distributions are 0.1 and 0.001, respectively. For priors on the IP latent variables, we follow the same settings used by Lauderdale and Clark (2014), setting priors on case parameters, $\boldsymbol{\sigma}$, to 4.0, and justice IPs component-wise variance, λ to 1.0. In the random utility model, we set both hyperparameters η and ξ to 1.

C Data

We tokenized all the texts and tagged the tokens with the Stanford part of speech tagger (Toutanova et al. 2003). We extract n -grams with tags that follow the simple (but effective) pattern (Adjective|Cardinal|Noun) + Noun (Justeson and Katz 1995), representing each document as a “bag of phrases”, and filtering phrases that appear in less than 25 or more than 3,000 documents obtaining a vocabulary of 55,113 phrase types. Table 1 summarizes details of our corpus.

We manually labeled 1,241 randomly selected amicus briefs with its side (petitioner, respondent, neither), and trained a logistic regression classifier³ using lexical and formatting features. We identified 5 sections which are common across almost all briefs and used

³We used a C++ implementation of logistic regression classifier available at <https://github.com/redpony/creg>.

Cases	2,074
w/amicus briefs	1,531
Max. briefs/case	76
Word tokens	110.5M
Phrase tokens	8.9M
Ave. words/brief	3,094
Ave. phrases/brief	339

Table 1: Corpus statistics ignoring amicus briefs whose supporting side could not be automatically classified confidently. In the last row, briefs include merits and amicus briefs.

them as features. The feature templates for our classifier are: $\langle w \rangle$, $\langle \text{title}, w \rangle$, $\langle \text{counsel}, w \rangle$, $\langle \text{introduction}, w \rangle$, $\langle \text{statement}, w \rangle$, $\langle \text{conclusion}, w \rangle$, where w can be any unigram, bigram, or trigram.

We evaluated the performance of our classifier using 5 random splits, with 50% of our data for training, 30% for testing, and 20% for the development set. We tuned the ℓ_1 -regularization weights on our dev set over the range of coefficients $\{0.5, 1, 2, 4, 8, 16\}$. The average accuracy of our classifier is 79.1%. Limiting our evaluation to instances whose posterior probability after classification is greater than 0.8, we obtain 90.0% accuracy and recall of 52.1%. Thus, we used 7,258 (out of 13,162) briefs that were classified as supporting neither side or whose posterior probability is ≤ 0.8 (higher precision at the expense of recall).

D Topic Distribution

Table 2 lists the topics and top phrases estimated from our dataset using LDA.

E Justices’ Ideal Points

The ideal points of justices vary depending on the issues. We present the justices’ ideal points for each of the 30 topics in Fig. 1.

F Amici Influence on Justices

Various justices have expressed opinions on the value of amicus briefs. Some justices, such as Scalia, are known to be dubious of amicus briefs, preferring to leave the task of reading these briefs to their law clerks, who will pick out any notable briefs for them.⁴ In contrast, recent surveys of amicus citation rates in justice opinions have often ranked Sotomayor and Ginsburg among justices who most often cite amici in their opinions (Franze and Anderson 2011; Walsh 2013).

For each justice, we compute the difference in vote log-likelihood between the issues IP and random utility IP models, as a (noisy) measure of amici influence. A larger difference suggests that more of a justice’s decision-making can be explained by the presence of amicus briefs. Table 3 presents these differences, and the rankings are consistent

⁴See *Roper v. Simmons*, 543 U.S. 551, 617-18 (2005) (Scalia J., dissenting); also, “Dont re-plow the ground that you expect the parties to plow unless you expect the parties to plow with a particularly dull plow” (attributed to Scalia on the California Appellate Law Blog, <http://bit.ly/1wOmlRE>).

Justice	Diff. ($\times .01$)
John Paul Stevens	31.5
Clarence Thomas*	30.8
Thurgood Marshall	29.4
Elena Kagan*	28.9
Sonia Sotomayor*	24.7
John Roberts*	24.0
Ruth Bader Ginsburg*	23.9
William Rehnquist	23.8
Stephen Breyer*	22.2
David Souter	22.0
Samuel Alito*	21.8
Harry Blackmun	18.0
Byron White	16.9
Antonin Scalia*	16.6
Anthony Kennedy*	15.3
Sandra Day O’Connor	14.7

Table 3: Justices ordered by how much amicus briefs can explain their votes, estimated as quadratic mean difference in vote log-likelihood between the issues IP model and the random utility IP model. * denotes current sitting justices.

with extant hypotheses noted above. We take this consistency as encouraging, in the spirit of the “preregistered” hypotheses of Sim et al. (2013), but caution that it does not imply a conclusion about causation.

G Expected utility curve for hypothetical amicus in Obamacare case

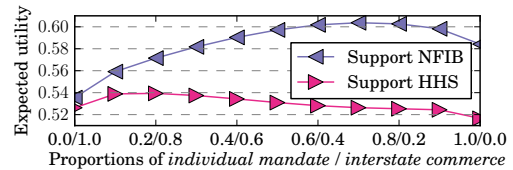


Figure 2: Expected utility when varying between proportions of *individual mandate* and *interstate commerce* topics.

Fig. 2 illustrates the expected utility curve faced by a single amicus as we vary the topic proportions of the *individual mandate* and *interstate commerce* topics. The model expects an amicus on NFIB’s side to get more votes and hence, higher utility, as the model expects justices to be in favor of NFIB prior to amici influence.

We note that interior solutions for the expected utility optimization only exist when proportions are $\in (0, 1)$. During our experiment, we set the proportions of inactive topics to 10^{-8} instead of 0.

#	Topic	Top phrases
1	Criminal procedure (1)	reasonable doubt, supervised release, grand jury, prior conviction, plea agreement, controlled substance, guilty plea, double jeopardy clause, sixth amendment, jury trial
2	Employment	erisa plan, plan administrator, employee benefit plan, insurance company, pension plan, health care, plan participant, individual mandate, fiduciary duty, health insurance
3	Due process	due process clause, equal protection clause, fundamental right, domestic violence, equal protection, state interest, d e, assisted suicide, controlled substance, rational basis
4	Indians	m r, m s, indian tribe, tribal court, indian country, fifth amendment, miranda warning, indian affair, vice president, tribal member
5	Economic activity	attorney fee, limitation period, hobbs act, security law, rule 10b, actual damage, racketeering activity, fiduciary duty, loss causation, security exchange act
6	Bankruptcy law	bankruptcy court, bankruptcy code, 1996 act, state commission, telecommunication service, network element, eighth circuit, new entrant, pole attachment, communication act
7	Voting rights	voting right, minority voter, j app, voting right act, covered jurisdiction, fifteenth amendment, redistricting plan, political process, political subdivision, minority group
8	First amendment	first amendment right, commercial speech, strict scrutiny, cable operator, free speech, first amendment protection, protected speech, child pornography, government interest, public forum
9	Taxation	interstate commerce, commerce clause, state tax, tax court, gross income, internal revenue code, income tax, dormant commerce clause, state taxation, sale tax
10	Amicus briefs	national association, amicus brief, vast majority, brief amicus curia, large number, wide range, recent year, public policy, wide variety, washington dc
11	Labor management	north carolina, collective bargaining agreement, confrontation clause, sta t, north platte river, collective bargaining, inland lake, laramie river, labor organization, re v
12	Civil action	class action, class member, injunctive relief, final judgment, federal claim, civil action, preliminary injunction, class certification, civil procedure, subject matter jurisdiction
13	Civil rights	title vii, title vi, civil right act, age discrimination, sexual harassment, old worker, major life activity, reasonable accommodation, prima facie case, disparate impact
14	State sovereign	sovereign immunity, eleventh amendment, state official, absolute immunity, false claim, private party, 42 usc 1983, state sovereign immunity, eleventh amendment immunity, federal employee
15	Federal administrations	federal agency, statutory construction, plain meaning, other provision, statutory text, dc circuit, sub (a), fiscal year, senate report, agency action
16	Interstate relations	special master, new mexico, prejudgment interest, arkansas river, rt vol, comp act, new jersey, elli island, john martin reservoir, video game
17	Court of Appeals	eleventh circuit, sixth circuit, circuit court, fourth circuit, oral argument, tenth circuit, further proceeding, appeal decision, instant case, defendant motion
18	Fourth amendment	fourth amendment, probable cause, arbitration agreement, police officer, national bank, search warrant, exclusionary rule, arbitration clause, reasonable suspicion, law enforcement officer
19	Eighth amendment	eighth amendment, sex offender, prison official, facto clause, copyright act, copyright owner, unusual punishment, public domain, liberty interest, public safety
20	International law	international law, foreign state, vienna convention, human right, foreign country, foreign government, jones act, united kingdom, native hawaiian, foreign nation
21	Equal protection clause	peremptory challenge, law school, equal protection clause, strict scrutiny, high education, racial discrimination, prima facie case, school district, consent decree, compelling interest
22	Commerce clause (2)	interstate commerce, commerce clause, local government, political subdivision, state regulation, supremacy clause, federal regulation, tobacco product, tenth amendment, federal fund
23	Immigration law	judicial review, immigration law, final order, removal proceeding, immigration judge, due process clause, deportation proceeding, administrative remedy, compliance order, time limit
24	Death penalty	death penalty, habeas corpus, reasonable doubt, trial judge, death sentence, ineffective assistance, direct appeal, defense counsel, new rule, mitigating evidence
25	Environmental issues	navigable water, clean water act, colorado river, special master, project act, public land, fill material, water right, point source, lake mead
26	Establishment clause	establishment clause, school district, public school, private school, religious school, ten commandment, boy scout, religious belief, religious organization, free exercise clause
27	Patent law	federal circuit, patent law, prior art, subject matter, expert testimony, lanham act, hazardous substance, patent system, patent act, new drug
28	Antitrust law	antitrust law, sherman act, contr act, market power, postal service, joint venture, natural gas, high price, public utility, interstate commerce
29	Election law	political party, taking clause, private property, property owner, fifth amendment, independent expenditure, federal election, property right, contribution limit, general election
30	Criminal procedure (2)	punitive damage, habeas corpus, second amendment, punitive damage award, enemy combatant, military commission, compensatory damage, state farm, new trial, due process clause

Table 2: Topics and top-10 phrases estimated from briefs using LDA. We manually annotated each topic with the topic labels.

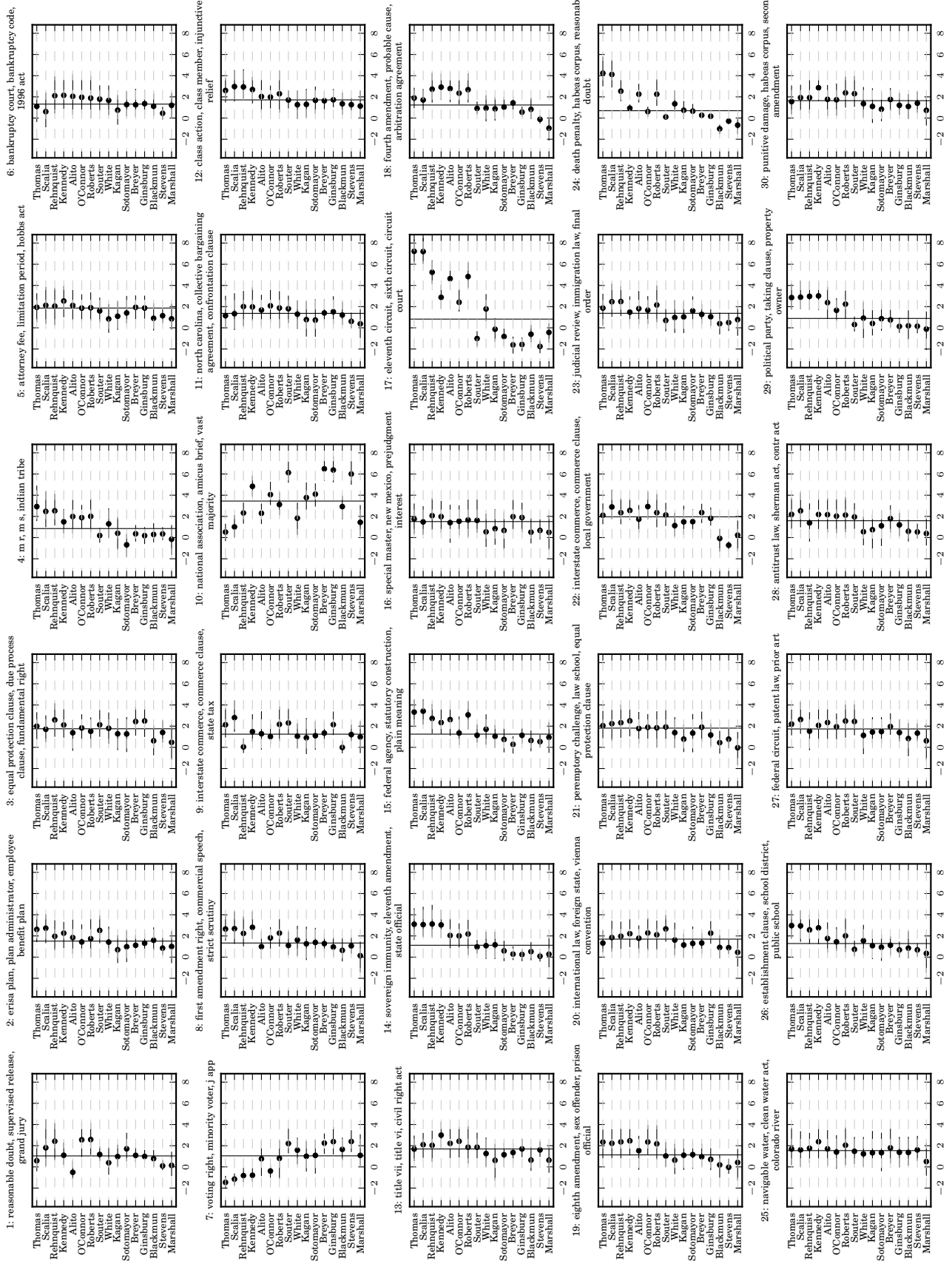


Figure 1: Justices' ideal points by topics. Solid vertical line denotes median ideal point of the justices.

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