

The Politics of Attention

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Hamilton vs. Madison

Coauthors of the federalist papers, which offered a justification and a marketing plan for the U.S. constitution

Then disagreed on Hamilton's economic policies as the Secretary of Treasury that featured national bank, national debt, policies favoring manufacturing and trade over agriculture

To "arouse and attract public attention," the two of them

- Founded political parties that adopted extreme and exaggerated positions
- Sponsored partisan newspapers

Madison vs. Hamilton (Cont'd)

Madison, who always believed that the country would have some manufacturing, trade and agriculture, said that “people need to look inwards to the center of the country, to farmers, and go back to the values that made American great, namely low taxes, agriculture and less trade...”

Hamilton responded to this by saying that “Madison’s goal was to turn the United States into a primitive autarchy, self-reliant and completely ineffectual on the global scale...”

Reference: Feldman (2017)

Research Agenda

An equilibrium theory of attention and politics:

- 1 What kinds of political behaviors capture voter's limited attention?
- 2 How does the need to capture attention affects political outcomes?

The Downsian Doctrine

“In our model, as in the real world, political decisions are made when uncertainty exists and information is obtainable only at a cost. Thus a basic step towards understanding politics is analysis of the economics of being informed, i.e., the rational utilization of scarce resources to obtain data for decision-making.”

- Anthony Downs, *An Economic Theory of Democracy* (1957)

Preview

- Formalize the idea that voters are rationally inattentive
- Analyze a generalized Downsian model of spatial electoral competition
- In equilibrium, voters pay attention to policy and issue positions that are extreme and exaggerated
- Comparative statics with respect to attention cost and media technology

Agenda

- 1 Baseline model
- 2 Extensions
- 3 Discussion

Baseline Model

- ① Setup
- ② Optimal attention rule
- ③ Equilibrium analysis
- ④ Comparative statics and applications

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Players

A unit mass of infinitesimal voters and two candidates α and β

Single-dimensional type capturing preferences for policies in $\Theta = [-1, 1]$

Camp α if type belongs to $\Theta_\alpha = [-1, 0]$ and camp β if type belongs to $\Theta_\beta = [0, 1]$

Type distributions:

- Voters: $t \sim P$ with full support on Θ and zero median
- Candidate c : $t_c \sim P_c$ with finite support $T_c \subset \Theta_c$

Each candidate c can implement policies in Θ_c

Payoff

In case candidate c assumes office and implements policy a :

- Voter t : $u(a, t)$
- Candidate c : $u_+(a, t_c)$
- Candidate $-c$: $u_-(a, t_{-c})$

Assumption 1.

$u(\cdot, t)$ is strictly increasing on $[-1, t]$ and strictly decreasing on $[t, 1]$.

E.g., $u(a, t) = -|t - a|$, $u_+(a, t) = R - \gamma_+|t - a|$ and $u_-(a, t) = -\gamma_-|t - a|$

Generalized Downsian Game

Timeline:

- 1 Nature draws types
- 2 Candidate c observes t_c and proposes a_c
- 3 The press releases news ω about the policy state $\mathbf{a} = (a_\alpha, a_\beta)$
- 4 Voters attend to politics and cast votes
- 5 Winner is determined by simple majority rule with even tie breaking and implements his policy proposal in Step 2

Generalized Downsian Game

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Candidate's Strategy

Candidate c 's strategy $\sigma_c : T_c \rightarrow \Delta(\Theta_c)$

A strategy profile $\sigma = (\sigma_\alpha, \sigma_\beta)$ yields a random policy state;
non-degenerate if $|\text{supp}(\sigma)| \geq 2$

Voter's Problem

- 1 Sincere voting, i.e., each voter perceives himself as the only decision maker and maximizes his expected utility
- 2 Attending to politics is costly and yields a signal that enables better decision-making

Voter's Problem (Cont'd)

Voter t 's attention rule is $m_t : \text{supp}(\sigma) \rightarrow [0, 1]$:

- $m_t(\mathbf{a})$: prob. that voter t supports candidate β in state \mathbf{a}

Define

- $v(\mathbf{a}, t) = u(a_\beta, t) - u(a_\alpha, t)$
- $V_t(m_t, \sigma) = \mathbb{E}_\sigma [m_t(\tilde{\mathbf{a}}) v(\tilde{\mathbf{a}}, t)]$

Voter t 's expected utility:

$$V_t(m_t, \sigma) - \text{attention cost}$$

Candidate's Problem

Winning probability:

- $\int m_t(\mathbf{a}) dP(t)$: total votes for candidate β in state \mathbf{a}

- $w_\beta(\mathbf{a}) = w(\mathbf{a}) = \begin{cases} 0 & \text{if } \int m_t(\mathbf{a}) dP(t) < \frac{1}{2} \\ \frac{1}{2} & \text{if } \int m_t(\mathbf{a}) dP(t) = \frac{1}{2} \\ 1 & \text{if } \int m_t(\mathbf{a}) dP(t) > \frac{1}{2} \end{cases}$

- $w_\alpha(\mathbf{a}) = 1 - w(\mathbf{a})$

Candidate c 's expected utility:

$$V_c(m, \sigma) = \mathbb{E}_\sigma [w_c(\tilde{\mathbf{a}}) u_+(\tilde{a}_c, \tilde{t}_c) + (1 - w_c(\tilde{\mathbf{a}})) u_-(\tilde{a}_{-c}, \tilde{t}_c)]$$

Equilibrium

A strategy profile (m^*, σ^*) is a BNE if

- 1 m_t^* maximizes voter t 's expected utility, taking σ^* as given:

$$m_t^* \in \arg \max_{m_t: \text{supp}(\sigma^*) \rightarrow [0,1]} V_t(m_t, \sigma^*) - \text{attention cost}$$

- 2 σ_c^* maximizes candidate c 's expected utility, taking m^* and σ_{-c}^* as given:

$$\sigma_c^* \in \arg \max_{\sigma_c} V_c(m^*, \sigma_c, \sigma_{-c}^*)$$

For now, suppose $\mathbf{a} \notin \text{supp}(\sigma^*)$ leads to dire consequences that all players wish to avoid

The Downsian Doctrine

Evidence:

- Voters are poorly informed and hold sticky party images
- Seek information shortcuts and soft news, e.g., party identity, personal traits, the “Oprah effect”
- Rational attention allocation, e.g., farmers vs. laborers during Eisenhower’s first term in office, blacks vs. whites on civil rights issues

References: Campell et al. (1960); Popkin (1994); Baum and Jamison (2006); Vavreck (2009)

Theorization

Acquire any signal of the policy state at a cost proportional to the mutual information between the signal and the policy state

Suffice to consider binary signals that induce obedient behaviors on the voter's part

$$\underbrace{\mu_t}_{\text{marginal attention cost}} \cdot \underbrace{I(m_t, \sigma)}_{\text{mutual information}}$$

Mutual Information

Reduction in uncertainty:

$$I(m_t, \sigma) = H(\sigma) - H(\sigma | m_t)$$

where

$$H(\sigma) = - \sum_{\mathbf{a} \in \text{supp}(\sigma)} \sigma(\mathbf{a}) \log(\sigma(\mathbf{a}))$$

is the entropy of the policy state, and $H(\sigma | m_t)$ the conditional entropy of the policy state

Extreme Cases

- 1 Most informative voting ($I = +\infty$):

$$m_t(\mathbf{a}) = \begin{cases} 1 & \text{if } v(\mathbf{a}, t) > 0 \\ 0 & \text{otherwise} \end{cases}$$

- 2 Least informative voting ($I = 0$): decision and policy state are independently distributed

Information Theoretic Foundation

Shannon (1948)'s fundamental problem of communication:

Source data $\xrightarrow{\text{channel}}$ received signal

Here, policy state $\xrightarrow{\text{attention}}$ voting decision

Shannon's entropy determines the minimum channel capacity to losslessly transmit source data as encoded in binary digits

If voters ask yes-no questions at a fixed unit cost, then the expected cost is entropy-based

Marginal Attention Cost

Rich heterogeneity due to age, gender, ideology, income, race, etc.

Major cost shifters:

- Improvements in education and printing technology
- Intensified competition for consumer eyeballs
- Opportunities to entertain and socialize, made accessible through cable TV, internet and digital media

References: Campell et al. (1960); Popkin (1994); Baum and Kernel (1999); Gentzkow et al. (2004); Teixeira (2014); Prior (2005); Dunaway (2016); Perez (2017)

Baseline Model

- ① Setup
- ② Optimal attention rule
- ③ Equilibrium analysis
- ④ Comparative statics and applications

Optimal Attention Rule

Lemma 1.

Fix any σ and t . For any $\mathbf{a} \in \text{supp}(\sigma)$,

$$m_t^*(\mathbf{a}) \begin{cases} = 0 & \text{if } \mathbb{E}_\sigma \left[\exp \left(\mu_t^{-1} v(\tilde{\mathbf{a}}, t) \right) \right] \leq 1, \\ = 1 & \text{if } \mathbb{E}_\sigma \left[\exp \left(-\mu_t^{-1} v(\tilde{\mathbf{a}}, t) \right) \right] \leq 1, \\ \in (0, 1) & \text{otherwise,} \end{cases}$$

and the following condition holds true in the last case:

$$v(\mathbf{a}, t) = \mu_t \cdot \log \left(\frac{m_t^*(\mathbf{a})}{1 - m_t^*(\mathbf{a})} \cdot \frac{1 - \mathbb{E}_\sigma [m_t^*(\mathbf{a})]}{\mathbb{E}_\sigma [m_t^*(\mathbf{a})]} \right).$$

Optimal Attention Allocation

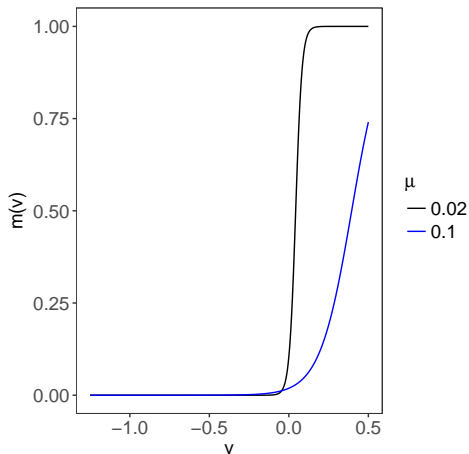


Figure 1: Plot $m_t^*(\mathbf{a})$ against $v(\mathbf{a}, t)$ for $t = -.25$: a_c is uniformly distributed on Θ_c and $u(a, t) = -|t - a|$.

Endogenous Confirmatory Bias

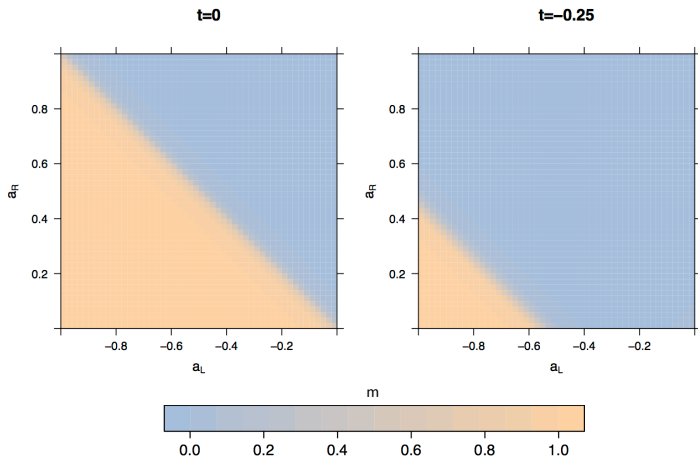


Figure 2: Plot $m_t^*(\mathbf{a})$ against \mathbf{a} for $t = 0$ and $-1/4$: a_c is uniformly distributed on Θ_c , $u(a, t) = -|t - a|$ and $\mu = .02$.

Baseline Model

- ① Setup
- ② Optimal attention rule
- ③ **Equilibrium analysis**
- ④ Comparative statics and applications

Symmetry

Assumption 2.

For all a and t , $\tilde{u}(a, t) = \tilde{u}(-a, -t)$ for all $\tilde{u} \in \{u, u_+, u_-\}$,
 $\mu_t = \mu_{-t}$, $P(t) = P(-t)$ and $P_c(t) = P_{-c}(-t)$.

Symmetric equilibrium:

- 1 $\sigma_c(a | t) = \sigma_{-c}(-a | -t)$ for all a and t
- 2 $m_t(-a, a') = 1 - m_{-t}(-a', a)$ for all t and $(-a, a') \in \text{supp}(\sigma)$

Example

Candidates can be either centrist ($t = \pm\frac{1}{4}$) or extreme ($t = \pm\frac{3}{4}$) with prob. $\frac{1}{2}$

Payoff functions are $u(a, t) = -|t - a|$, $u_+(a, t) = R - \gamma_+|t - a|$, $u_-(a, t) = -\gamma_-|t - a|$, where $R, \gamma_+, \gamma_- \geq 0$

Suppose candidate adopt pure strategies and the policy state is non-degenerate

Let equilibrium policies be $-a_2 < -a_1 \leq 0 \leq a_1 < a_2$, each realized with prob. $\frac{1}{2}$

Example (Cont'd)

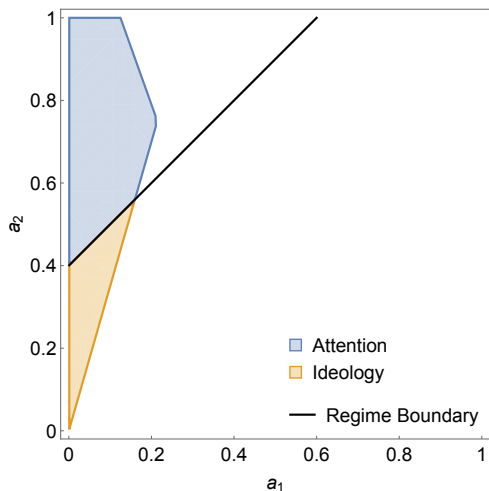


Figure 3: Equilibrium outcomes: $\gamma_+ = 9$, $\gamma_- = 1$, $R = 6$. The regime boundary is drawn for voter $t = -.001$.

Matrix Representation

Let $-a_N < \dots < -a_1 \leq 0 \leq a_1 < \dots < a_N$ be policy proposals

Let \mathbf{A} , Σ and \mathbf{W} be $N \times N$ matrices:

- \mathbf{A} : policy matrix, $\mathbf{a}_{ij} = (-a_i, a_j)$
- Σ : probability matrix, $\sigma_{ij} \geq 0$, $\sum_{i,j} \sigma_{ij} = 1$
- \mathbf{W} : winning probability matrix, $w_{ij} \in \{0, 1/2, 1\}$

E.g., $\Sigma = \frac{1}{4} \mathbf{J}_2$ in our example; winner is determined as in the case of complete information if

$$w_{ij} = \begin{cases} 0 & \text{if } a_i > a_j \\ \frac{1}{2} & \text{if } a_i = a_j \\ 1 & \text{if } a_i < a_j \end{cases}$$

Matrix Representation (Cont'd)

Definition 1.

$[\mathbf{A}, \Sigma]$ is incentive compatible for candidates given \mathbf{W} if there exists σ such that

- 1 the probabilities of policy states under σ are given by Σ , i.e.,

$$\sigma(\mathbf{a}_{ij}) = \sigma_{ij} \quad \forall i, j;$$

- 2 each σ_c maximizes candidate c 's expected utility, taking the winning probability matrix \mathbf{W} and the other candidate's strategy σ_{-c} as given, i.e.,

$$\sigma_c \in \arg \max_{\sigma'_c} V_c(\mathbf{W}, \sigma'_c, \sigma_{-c}).$$

Matrix Representation (Cont'd)

Definition 2.

\mathbf{W} is can be rationalized by optimal attention allocations under $[\mathbf{A}, \Sigma]$ if

$$w_{ij} = w(\mathbf{a}_{ij}) \quad \forall i, j,$$

where $w(\mathbf{a}_{ij})$ can be obtained from plugging $m_t^*(\mathbf{a}_{ij})$, $t \in \Theta$ under $[\mathbf{A}, \Sigma]$ into function w .

$[\mathbf{A}, \Sigma, \mathbf{W}]$ can be attained in a symmetric equilibrium of the generalized Downsian game if and only if $[\mathbf{A}, \Sigma]$ is \mathbf{W} -incentive compatible and \mathbf{W} is $[\mathbf{A}, \Sigma]$ -rationalizable.

Equilibrium Policy

For any prob. matrix Σ , define

$$\mathcal{E}(\Sigma) = \left\{ \mathbf{A} : \exists \mathbf{W} \text{ s.t. } \begin{array}{l} [\mathbf{A}, \Sigma] \text{ is } \mathbf{W} - \text{IC} \\ \mathbf{W} \text{ is } [\mathbf{A}, \Sigma] - \text{rationalizable} \end{array} \right\}$$

Assumption 3.

$u(a, t)$ is concave in a for all t .

Equilibrium Policy (Cont'd)

Theorem 1.

Assume Assumptions 2 and 3. Then for any integer N and any $N \times N$ probability matrix Σ ,

$$\mathcal{E}(\Sigma) = \left\{ \mathbf{A} : [\mathbf{A}, \Sigma] \text{ is } \widehat{\mathbf{W}}_N - IC \right\},$$

where $\widehat{\mathbf{W}}_N$ is an $N \times N$ matrix whose ij^{th} entry is

$$\widehat{w}_{ij} = \begin{cases} 0 & \text{if } a_i > a_j \\ \frac{1}{2} & \text{if } a_i = a_j \\ 1 & \text{if } a_i < a_j \end{cases}$$

Implications

Winner is determined the same way as in the case of complete information

Knowing $\widehat{\mathbf{W}}_N$, voter characteristics are irrelevant in the determination of equilibrium policies

Proof Sketch

Take any $\mathbf{a}_{ij} = (-a_i, a_j)$ where $i > j$:

Step 1 By symmetry,

$$\begin{aligned}\int m_t^*(\mathbf{a}_{ij}) dP(t) &= \int_{t < 0} 1 - m_{-t}^*(\mathbf{a}_{ji}) dP(t) \\ &\quad + \int_{t > 0} m_t^*(\mathbf{a}_{ij}) dP(t) \\ &= \int_{t > 0} m_t^*(\mathbf{a}_{ij}) - m_t^*(\mathbf{a}_{ji}) dP(t) + \frac{1}{2}\end{aligned}$$

Step 2 By FOC,

$$\operatorname{sgn} m_t^*(\mathbf{a}_{ij}) - m_t^*(\mathbf{a}_{ji}) = \operatorname{sgn} v(\mathbf{a}_{ij}, t) - v(\mathbf{a}_{ji}, t)$$

Proof Sketch (Cont'd)

Step 3 By concavity, the following holds true for all $i > j$ and t :

$$\begin{aligned} & v(\mathbf{a}_{ij}, t) - v(\mathbf{a}_{ji}, t) \\ &= u(a_j, t) + u(-a_j, t) - [u(a_i, t) + u(-a_i, t)] \\ &\geq 0 \end{aligned}$$

Combining Steps 1-3 yields $\int m_t^*(\mathbf{a}_{ij}) dP(t) \geq \frac{1}{2}$ for all $i > j$

Step 4 Show that median voter always pay attention

Baseline Model

- ① Setup
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Attention vs. Ideology

Definition 3.

Voter t acts based on ideology if

$$m_t^* = \begin{cases} 0 & \text{if } t < 0, \\ 1 & \text{if } t > 0, \end{cases}$$

and he pays active attention to politics if $m_t^ \in (0, 1)$.*

Attention Set

For any prob. matrix Σ , $t < 0$ and $\mu > 0$, define

$$\mathcal{A}_t(\Sigma, \mu) = \left\{ \mathbf{A} : \mathbb{E}_{[\mathbf{A}, \Sigma]} \left[\exp \left(\mu^{-1} v(\tilde{\mathbf{a}}, t) \right) \right] > 1 \right\}$$

Then

$$\mathcal{E}\mathcal{A}_t(\Sigma, \mu) = \mathcal{A}_t(\Sigma, \mu) \cap \mathcal{E}(\Sigma)$$

is the set of equilibrium policy matrices that draws t 's attention to politics, and

$$\mathcal{E}\mathcal{I}_t(\Sigma, \mu) = \mathcal{A}_t^c(\Sigma, \mu) \cap \mathcal{E}(\Sigma)$$

is the set of equilibrium policy matrices that leads t to act based on ideology

Regularity Conditions

Assumption 4.

$u(a', t) - u(a, t)$ is strictly increasing in t for all a, a' .

Assumption 5.

There exist $t < 0$ and $\kappa > 0$ such that $|v(\mathbf{a}, t) - v(\mathbf{a}, 0)| > \kappa|t|$ for all \mathbf{a} .

E.g., $u(a, t) = -|t - a|$, $u(a, t) = -(t - a)^2$, \dots

Attention-Driven Extremism

Theorem 2.

Assume Assumption 1-4. Fix any probability matrix Σ such that $N \geq 2$ and $\mathcal{E}(\Sigma) \neq \emptyset$.

Then for any $t < 0$ satisfying Assumption 5 and $v(\mathbf{a}, t) > 0$ for some $\mathbf{a} \in \mathbf{A} \in \mathcal{E}(\Sigma)$, as μ increases from zero to infinity,

- 1 $\mathcal{E}\mathcal{I}_t(\Sigma, \mu)$ expands and $\mathcal{E}\mathcal{A}_t(\Sigma, \mu)$ shrinks;
- 2 $\min \{u(a_1, 0) - u(a_N, 0) : \mathbf{A} \in \mathcal{E}\mathcal{A}_t(\Sigma, \mu)\}$ is increasing in μ ;
- 3 the above stated variables do not always stay constant.

Proof Sketch

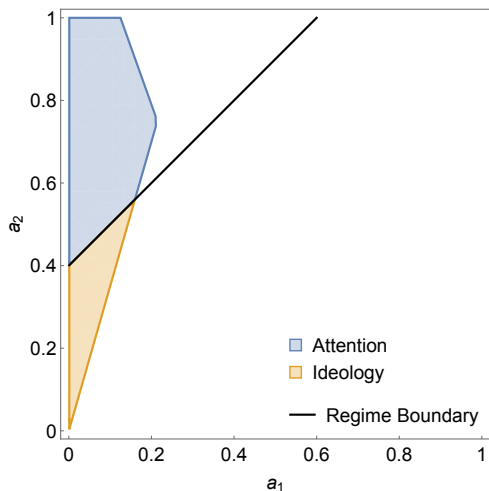


Figure 4: Equilibrium outcomes: $\gamma_+ = 9$, $\gamma_- = 1$, $R = 6$. The regime boundary is drawn for $t = -.001$.

Evidence

- Hamilton vs. Madison
- Bush's position on women's rights in 1984 Republican primary
- The conformity in the 50's led to the failure of many voters to perceive any party difference on critical issues

Discussions

- Preference for attention, equilibrium selection and beyond
- Equilibrium purification
- Limited commitment and campaign message

Agenda

- 1 Baseline model
- 2 **Extensions**
- 3 Discussions

Multiple Issues

Two issues a and b , both take values in Θ ; pareto frontier $\mathcal{B}(a)$:
 $\mathcal{B}' < 0$, $\mathcal{B}'' < 0$, $\lim_{a \rightarrow -1} \mathcal{B}'(a) = 0$ and $\lim_{a \rightarrow 1} \mathcal{B}'(a) = +\infty$

A unit mass of infinitesimal voters and two candidates

Single-dimensional type representing preference weight on b ; pro- a types belong to $\Theta_a = [-1, 0]$ and pro- b types $\Theta_b = [0, 1]$

Payoffs are $u(a, b, t)$, $u_+(a, b, t)$ and $u_-(a, b, t)$, all strictly increasing and smooth in (a, b)

Assumption 6.

$u(a, b, t)$ is strictly concave in (a, b) and $-\frac{u_a(a,b,t)}{u_b(a,b,t)}$ is increasing in t for all (a, b) .

Multiple Issues (Cont'd)

Define $\hat{u}(a, t) = u(a, \mathcal{B}(a), t)$, $\hat{u}_+(a, t) = u_+(a, \mathcal{B}(a), t)$ and $\hat{u}_-(a, t) = u_-(a, \mathcal{B}(a), t)$

Corollary 1.

The augmented economy satisfies Theorem 1 under Assumptions 2 and 6, as well as Theorem 2 under Assumptions 2, 4, 5 and 6.

Issue ownership, e.g., democratic candidate's issue position during the era of hyper-inflation (Popkin (1994); Petrocik (1996))

Noisy News

$\omega = (\omega_\alpha, \omega_\beta) \sim f(\cdot | \mathbf{a})$ with support Ω :

- $\Omega = \Omega_\alpha \times \Omega_\beta$
- $f(\omega | \mathbf{a}) = f_\alpha(\omega_\alpha | a_\alpha) \times f_\beta(\omega_\beta | a_\beta)$

Timeline:

- 1 Nature draws types
- 2 Candidate c observes t_c and proposes a_c
- 3 The press draws ω from Ω according to $f(\cdot | \mathbf{a})$
- 4 Voters attend to politics and cast votes
- 5 Winner is determined by simple majority rule with even tie breaking and implements his policy proposal in Step 2

Attention Rule and Expected Utility

$m_t : \Omega \rightarrow [0, 1]$: prob. that voter t supports candidate β in each news state

For given $x = (f, \sigma)$, define

- $\nu_x(\omega, t) = \mathbb{E}_x[v(\tilde{a}, t) \mid \omega]$
- $V_t(m_t, x) = \mathbb{E}_x[m_t(\tilde{\omega}) \nu_x(\tilde{\omega}, t)]$

Voter t 's expected utility is $V_t(m_t, x) - \mu_t \cdot I(m_t, x)$

Candidate c 's expected utility is

$$V_c(m, x) = \mathbb{E}_x[w_c(\tilde{\omega}) u_+(\tilde{a}_c, \tilde{t}_c) + (1 - w_c(\tilde{\omega})) u_-(\tilde{a}_{-c}, \tilde{t}_c)]$$

Symmetry

Assumption 7.

$f_c(\omega | a) = f_{-c}(-\omega | -a)$ for all a and ω .

Symmetric equilibria:

- 1 $\sigma_c(a | t) = \sigma_{-c}(-a | -t)$ for all a and t
- 2 $m_t(-\omega, \omega') = 1 - m_{-t}(-\omega', \omega)$ for all t and $(-\omega, \omega') \in \Omega$

Matrix Representation

Let $-\omega_K < \dots < -\omega_1 < 0 < \omega_1 < \dots < \omega_K$ be news signals, and write $\omega_{mn} = (-\omega_m, \omega_n)$ for $m, n = 1, \dots, K$

Let \mathbf{A} and Σ be as above, and \mathbf{W} be a $K \times K$ matrix whose mn^{th} entry $w_{mn} \in \{0, 1/2, 1\}$ represents candidate β 's winning probability in news state ω_{mn}

$\langle \mathbf{A}, \Sigma, \mathbf{W} \rangle$ can be attained in a symmetric equilibrium under f if

- 1 $[\mathbf{A}, \Sigma]$ is $\langle f, \mathbf{W} \rangle$ -IC
- 2 \mathbf{W} is $\langle f, \mathbf{A}, \Sigma \rangle$ -rationalizable

Equilibrium Policy

For any prob. matrix Σ and f , define

$$\mathcal{E}(\Sigma, f) = \left\{ \mathbf{A} : \exists \mathbf{W} \text{ s.t. } \begin{array}{l} [\mathbf{A}, \Sigma] \text{ is } \langle f, \mathbf{W} \rangle - \text{IC} \\ \mathbf{W} \text{ is } \langle f, \mathbf{A}, \Sigma \rangle - \text{rationalizable} \end{array} \right\}$$

Assumption 8.

For all c and all $a, a' \in \Theta_c$ and $\omega, \omega' \in \Omega_c$ such that $a < a'$ and $\omega < \omega'$,

$$\frac{f_c(\omega' | a)}{f_c(\omega | a)} < \frac{f_c(\omega' | a')}{f_c(\omega | a')}.$$

Equilibrium Policy (Cont'd)

Theorem 3.

Assume Assumptions 2, 3, 7 and 8. Then for any probability matrix Σ with $N \geq 2$,

$$\mathcal{E}(\Sigma, f) = \left\{ \mathbf{A} : [\mathbf{A}, \Sigma] \text{ is } \langle f, \widehat{\mathbf{W}}_K \rangle - IC \right\}.$$

Implications:

- Knowing $\langle f, \widehat{\mathbf{W}}_K \rangle$, voter characteristics are still irrelevant in the determination of eqm. policies
- News technology matters (and the effect is subtle)

Blackwell-Informativeness

Definition 4.

f is more Blackwell-informative than f' (f' is a garble of g , $f \succeq f'$) if there exists a Markov kernel ρ such that for all \mathbf{a} and ω' ,

$$f'(\omega' | \mathbf{a}) = \sum_{\omega \in \Omega} f(\omega | \mathbf{a}) \rho(\omega' | \omega).$$

Examples of garbling and degarbing:

- News papers became more informative and less partisan during 1870-1920 (Gentzkow et al. (2004))
- Rise of partisan media and fake news (Levendusky (2013); Barthel and Holcomb (2016); Lee and Kent (2017))

Media-Driven Extremism

For any prob. matrix Σ , $t < 0$ and f , define

$$\mathcal{A}_t(\Sigma, f) = \left\{ \mathbf{A} : \mathbb{E}_{\langle f, [\mathbf{A}, \Sigma] \rangle} \exp(\nu_x(\omega, t)) > 1 \right\}$$

Theorem 4.

Assume Assumptions 1, 2, 5, 7 and 8. Fix any probability matrix Σ with $N \geq 2$ and any $f \succeq f'$.

Then for any $t < 0$ such that $\mathcal{A}_t(\Sigma, f), \mathcal{A}_t(\Sigma, f') \neq \emptyset$,

- 1 $\mathcal{A}_t(\Sigma, f') \subset \mathcal{A}_t(\Sigma, f)$;
- 2 $\min_{\mathbf{A} \in \mathcal{A}_t(\Sigma, f')} \nu_{\langle f'', \mathbf{A}, \Sigma \rangle}(\omega_{K1}, 0) > \min_{\mathbf{A} \in \mathcal{A}_t(\Sigma, f)} \nu_{\langle f'', \mathbf{A}, \Sigma \rangle}(\omega_{K1}, 0)$ for all $f'' = f, f'$.

Interpretation

$$\begin{aligned} \nu_{\langle f, \mathbf{A}, \Sigma \rangle}(\omega_{K1}, 0) &= \underbrace{\mathbb{E}_{\langle f, \mathbf{A}, \Sigma \rangle} [u(\tilde{a}_\beta, 0) \mid \omega_\beta = \omega_1]}_{(1)} \\ &\quad - \underbrace{\mathbb{E}_{\langle f, \mathbf{A}, \Sigma \rangle} [u(\tilde{a}_\beta, 0) \mid \omega_\beta = \omega_K]}_{(2)} \end{aligned}$$

where

$$(1) = \frac{\sum_{i=1}^N f_\beta(\omega_1 \mid a_i) u(a_i, 0) \sigma_i}{\sum_{i=1}^N f_\beta(\omega_1 \mid a_i) \sigma_i}$$

and

$$(2) = \frac{\sum_{i=1}^N f_\beta(\omega_K \mid a_i) u(a_i, 0) \sigma_i}{\sum_{i=1}^N f_\beta(\omega_K \mid a_i) \sigma_i}$$

Proof Sketch

Garbling adds mean-preserving spreads to voter's expected gain from choosing one candidate over another:

Lemma 2.

Fix any t, σ and $f \succeq f'$, and write $x = (f, \sigma)$ and $x' = (f', \sigma)$. Then,

- (i) $\mathbb{E}_x [\nu_x(\omega, t)] = \mathbb{E}_{x'} [\nu_x(\omega', t)];$
- (ii) for any $\omega' \in \Omega$, there exist probability weights $\{\pi(\omega', \omega)\}_{\omega \in \Omega}$ such that

$$\nu_{x'}(\omega', t) = \sum_{\omega} \pi(\omega', \omega) \nu_x(\omega, t).$$

Proof Sketch (Cont'd)

A policy matrix \mathbf{A} belongs to the attention set only if

$$v_{\langle f, \mathbf{A}, \Sigma \rangle}(\omega_{K1}, 0) \geq \text{a constant independent of } f$$

Garbling reduces the informativeness of extreme signals and hence the left-hand side of the above inequality:

Lemma 3.

For any $f \succeq f'$ and $[\mathbf{A}, \Sigma]$, $v_{\langle f, \mathbf{A}, \Sigma \rangle}(\omega_{K1}, 0) \geq v_{\langle f', \mathbf{A}, \Sigma \rangle}(\omega_{K1}, 0)$.

Example

News report centrist ($\omega = \pm\omega_1$) or extreme ($\omega = \pm\omega_2$), where $0 < \omega_1 < \omega_2 < 1$

News technology $f_\xi = f_{\alpha,\xi} \times f_{\beta,\xi}$, where $f_{\beta,\xi}(\omega_2 | a) = a + \xi(1 - a)$

$\xi \in (0, 1)$ degree of slanting, $f_\xi \succeq f_{\xi'}$ if $\xi < \xi'$

Example (Cont'd)

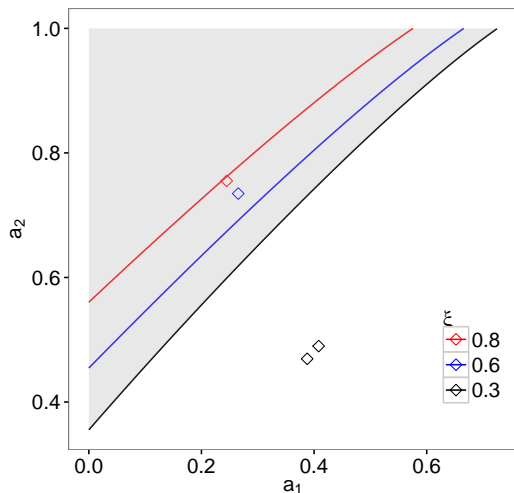


Figure 5: Equilibrium outcomes: $\gamma_+ = 3$, $\gamma_- = 1$, $R = 8$. Diamonds represent policy profiles, and shaded areas to the northwest of solid lines represent attention sets of voter $t = -0.001$.

Agenda

- 1 Baseline model
- 2 Extension
- 3 **Discussions**

Literature

Rational inattention: Sims (1998, 2001); Woodford (2008); Matějka and McKay (2015); Yang (2016)

Voting with uncertainty:

- Probabilistic voting: Wittman (1983); Calvert (1985); Groseclose (2001); Martinelli (2001); Aragonés and Palfrey (2002); Duggan (2005); Gul and Pesendorfer (2009)
- Signaling: Callander and Wilkie (2007); Kartik and McAfee (2007); Callander (2008)

New probabilistic voting models:

- Bounded rationality: Yuksel (2014); Matějka and Tabellini (2015); Nunnari and Zapal (2017)
- District election; primary-general ...

Literature (Cont'd)

Other voting models predicting policy divergence:

- Entry deterrence: Palfrey (1984); Callander (2005)
- Citizen-candidate: Osborne and Slivinski (1996); Besley and Coate (1997); Grober and Palfrey (2014)
- ...

Committee voting with costly information acquisition: Persico (2004); Martinelli (2006); Gerardi and Yariv (2008); Che and Kartik (2009); Gershkov and Szentes (2009); Chen and Yang (2011)

Monotone comparative statics: Milgrom (1981); Milgrom and Shannon (1994); Edlin and Shannon (1998)

Conclusion

An equilibrium theory of attention and politics

Attention- and media-driven extremism and exaggeration

Historical evidence and modern implications

Future work:

- Self-interested media
- Explain polarization?
- Product differentiation with rationally inattentive consumers

Voter Uncertainty

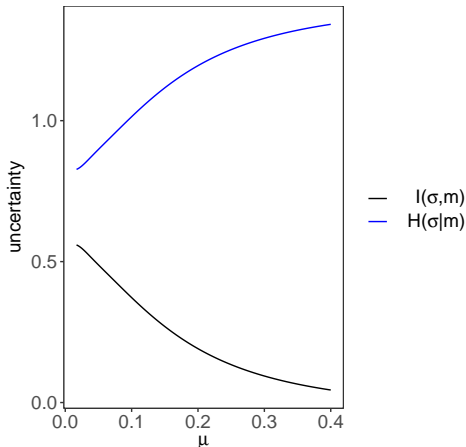


Figure 6: Plot mutual information and conditional entropy against μ for $t = -.05$: policies equal $\pm \frac{1}{4}$ and $\pm \frac{3}{4}$ with equal probability and $u(a, t) = -|t - a|$.

Opinion Polarization

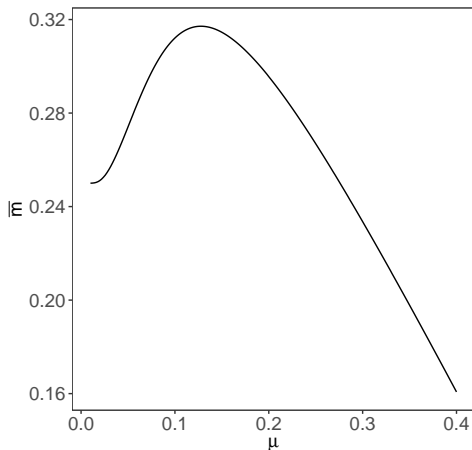


Figure 7: Plot $\mathbb{E}_{\sigma^*} [m_t^*(\mathbf{a})]$ against μ for $t = -.05$: policies equal $\pm \frac{1}{4}$ and $\pm \frac{3}{4}$ with equal probability, $u(a, t) = -|t - a|$.

Equilibrium Purification

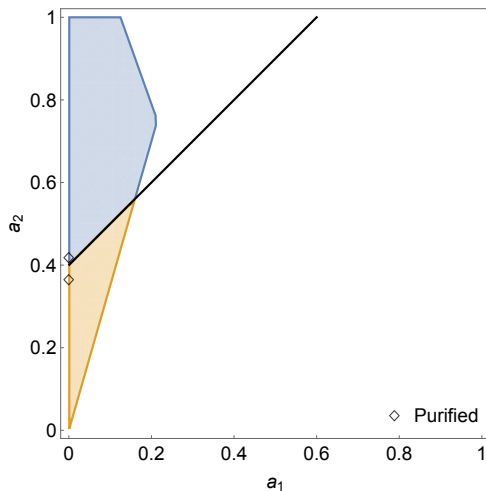


Figure 8: Equilibrium outcomes before and after purification: $\gamma_+ = 9$, $\gamma_- = 1$, $R = 6$.

Limited Commitment and Campaign Messages

Winning candidate fulfils campaign promise with prob. γ and adopts his most preferred policy with prob. $1 - \gamma$

Evidence:

- The 1976 campaign portrayed Carter as being “outside and honest,” though subsequent conversation between Humphrey revealed that he was closer to the party’s “default value”
- Gary Hart’s “new ideas” and Mondale’s criticism of “where is beef?”
- Roger Ailes described his role as campaign strategist: “every single thing I did was designed to push candidates further apart...”