



Mobilization, Voting, & Policy

An Agent Based Model of the Political Process

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Overview: Dynamics of Policy Production

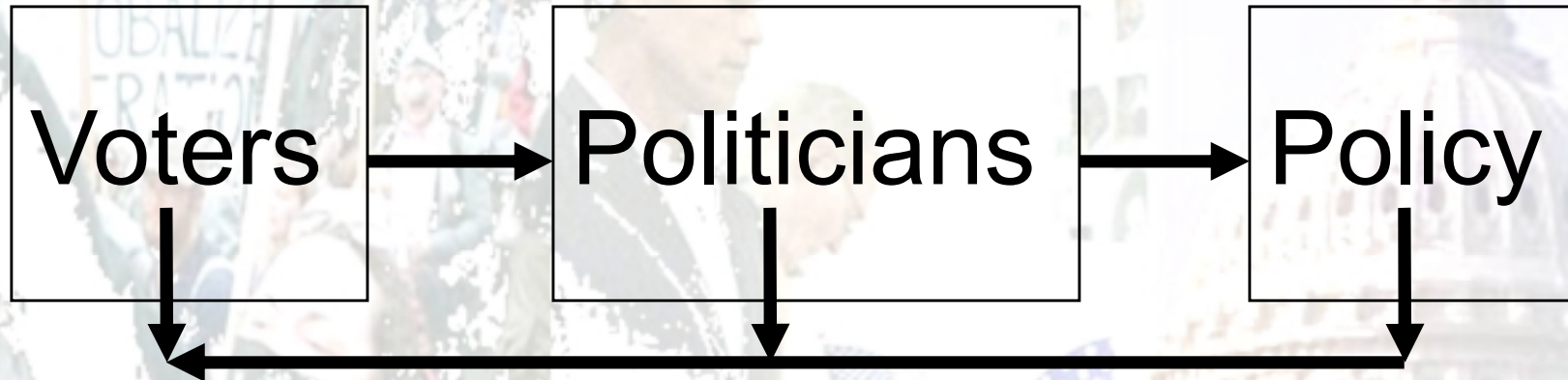
- Motivational Questions:
 - How do voters influence each other?
 - How does voter interaction influence politician behavior?
 - How do politicians interact to produce policy?
 - How do voters react to politicians and policy outcomes?
 - Does initial distribution matter?

- Why use an Agent-Based Model?
 - Levels of analysis and feedback among levels
 - Emergence:
 - Voter types
 - Community profiles
 - Policy outcomes
 - Calibration and empirical testing

- Literature: Preference Exchange, Information Diffusion
 - Zaller
 - Miller & Stokes
 - Median Voter Theory

Theory

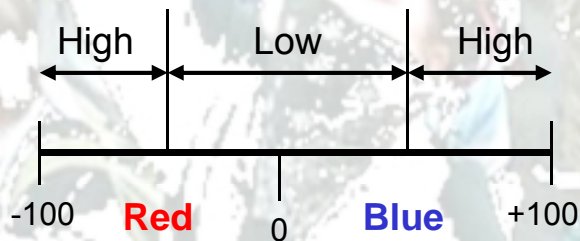
Three Arenas:



- **Voters**, divided into districts, have *initial* policy preferences and power
- **Politicians** have *initial* policy preferences and information levels
- If the *policy* is different than the *median voter* preference, the *voter* becomes *disillusioned*
- The *initial* preference, combined with the *median voter* preference, produces a *political preference*
- **Politicians** interact, changing policy preferences
- **Voters** interact, changing preferences
- Every 4 iterations, the *politicians* vote
- Every 16 iterations, a *poll* is taken
- This vote produces a *policy*
- Disillusioned voters lose 10 points of information and move 10 points towards the middle in preference
- This poll gives the *median district preference* to the *politicians*

Voter Types

- Policy Preference
 - High absolute value=strong preference
 - (-) = **Red** , (+)= **Blue**
 - Drawn from distribution chosen by user



- Information
 - Information can increase or decrease, depending on interaction and “disillusionment”

Policy Preference

0 **Low** 50 **High** 100

Information

High

66

Med

33

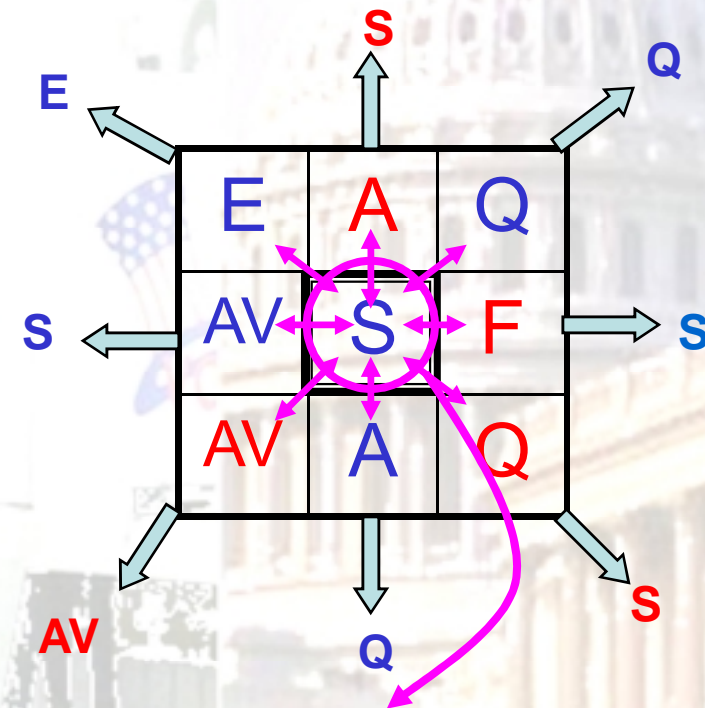
Low

	Elite (E)	Activist (A)
Swing (S)	Quasi-Activist (Q)	
Apathetic (AV)	Fanatic (F)	

Voter Environment & Interaction

- ❑ Voters on 2-D grid
- ❑ Interaction neighborhood of 8 surrounding voters
- ❑ Information and preferences exchanged (CAN cross districts)
- ❑ Blue S moves toward each of her friends depending on *her* willingness to receive information and *the interaction between her* “type” and their “type”
- ❑ Each interaction moves her preference/info specific distance
- ❑ At the end of the “party” (1 iteration), Blue S has a new position (or not) based on the *sum* of her interactions.

A =Activist Q=Quasi-Activist
 S=Swing Voter F=Fanatic
 E=Elitist AV=Apathetic Voter



SUM of interactions produces a new level of information and preference for Blue S, possible new voter type

Politician Types

□ **Policy Preference** is the weighted average of the

- Median voter position
- Politician's original preference

□ **Power** determined by:

- Membership in majority party
- Tenure

PERSONAL POLICY PREFERENCE

	Low	High
Low	Receptive Politician (may switch vote)	Marginal "radical" - No Switching (strong preferences "cancel" low power)
High	Non-Receptive Politician (No Switching)	Power Player (Influences preference neighbors)

Politician Environment & Interaction

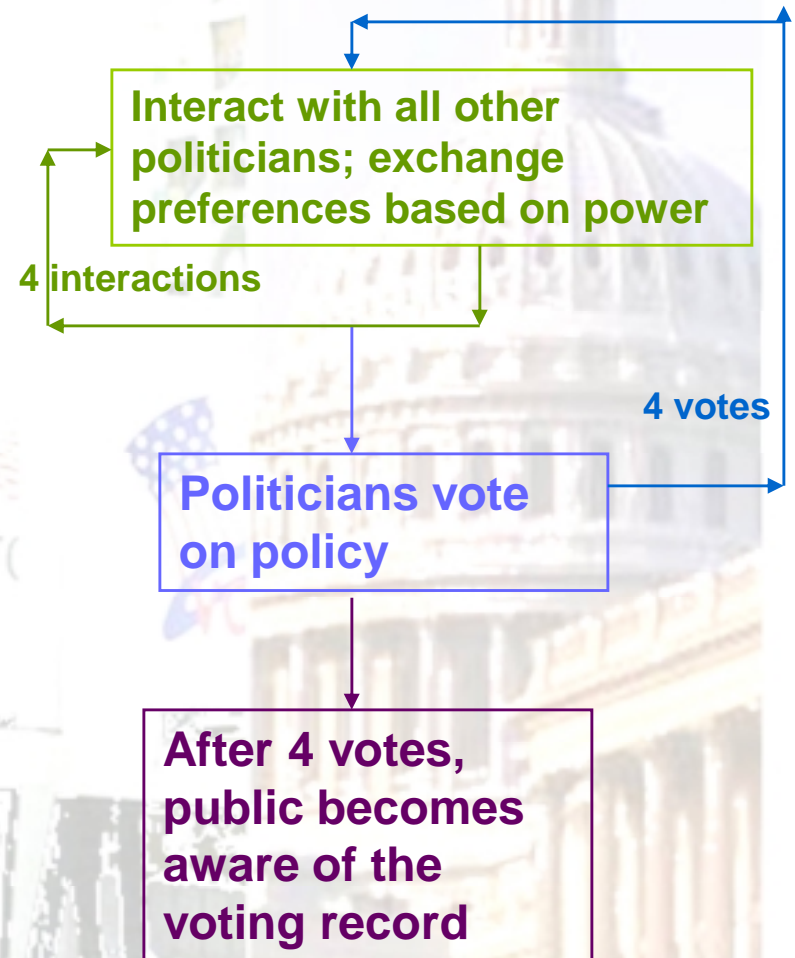
□ Spatial environment



- » District = 10x10 grid
- » 1 representative per district
- » 99 voters in district
- » Total districts=25 (2475 voters)

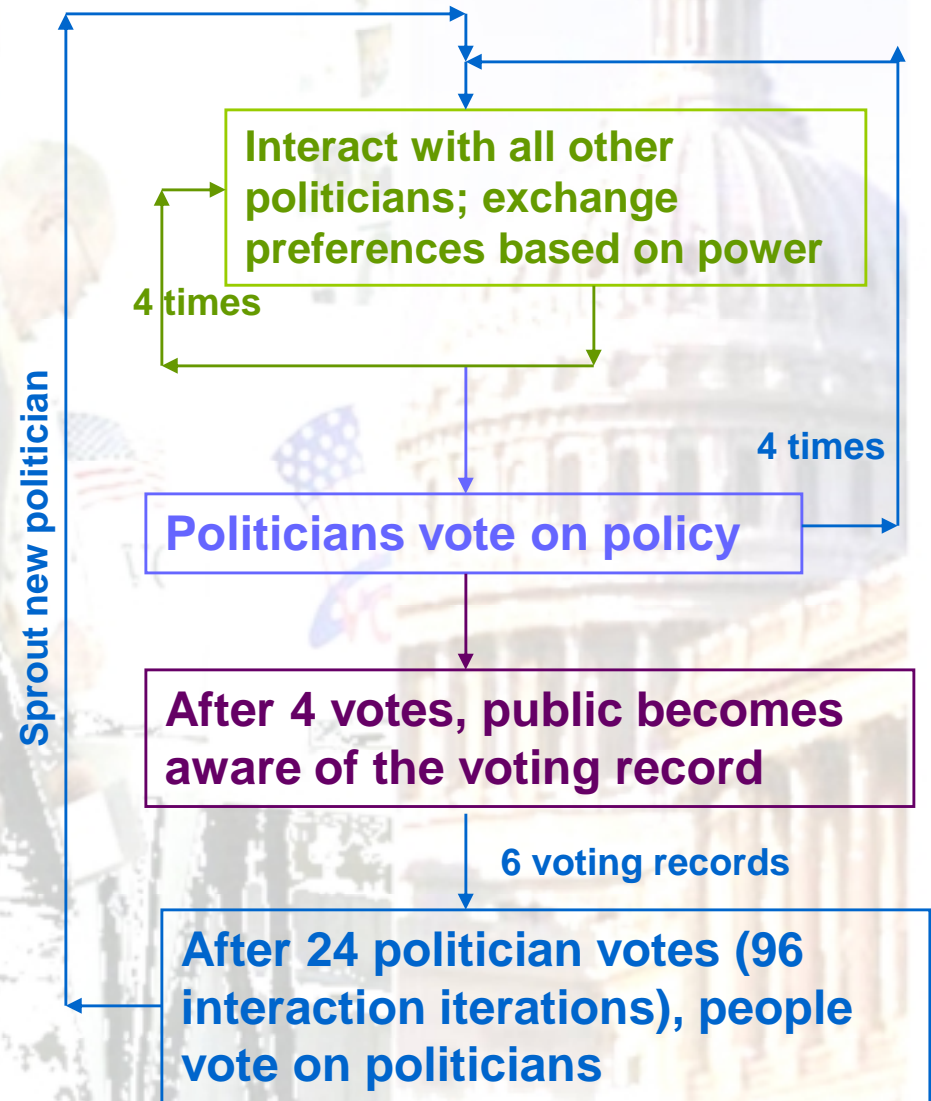
□ Preference environment

- Politicians interact with all 24 other politicians before deciding how to vote
- How much the politician moves is based on relative power

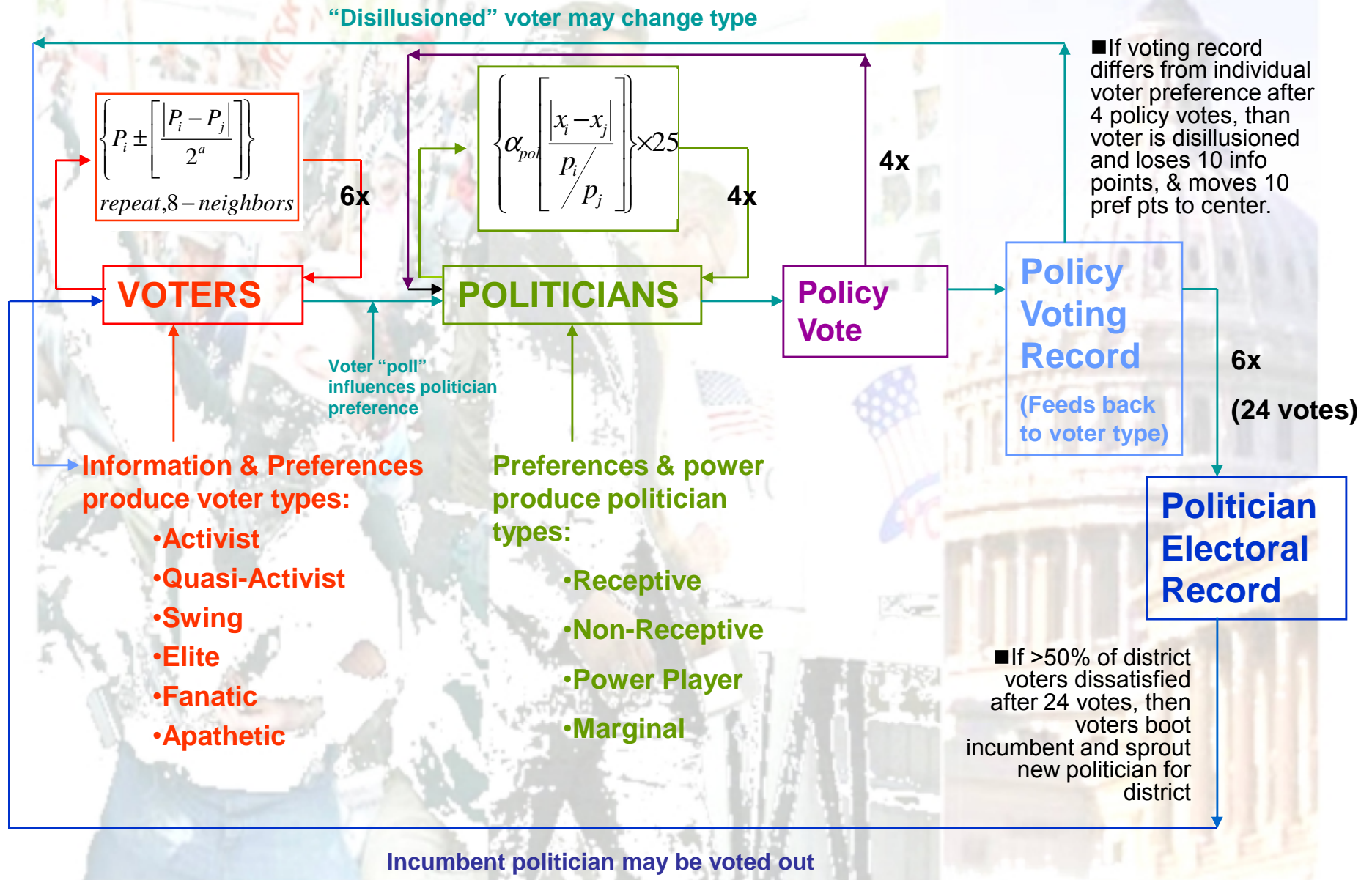


Elections: Voting Incumbents Out

- After 96 politician interactions, people vote
 - Basic majority voting:
 - if average politician vote (6 voting records) = median voter preference,
 - then politician stays in office
 - If the average vote by the politician does NOT match median voter preference, the politician is kicked out of office
 - The new politician will have less power, because will not have any tenure in office



MODEL BLUEPRINT - "THE LOOPS": VOTERS, POLITICIANS, POLICY



Mobilization, Policy, and Voting

Let's go to the model...

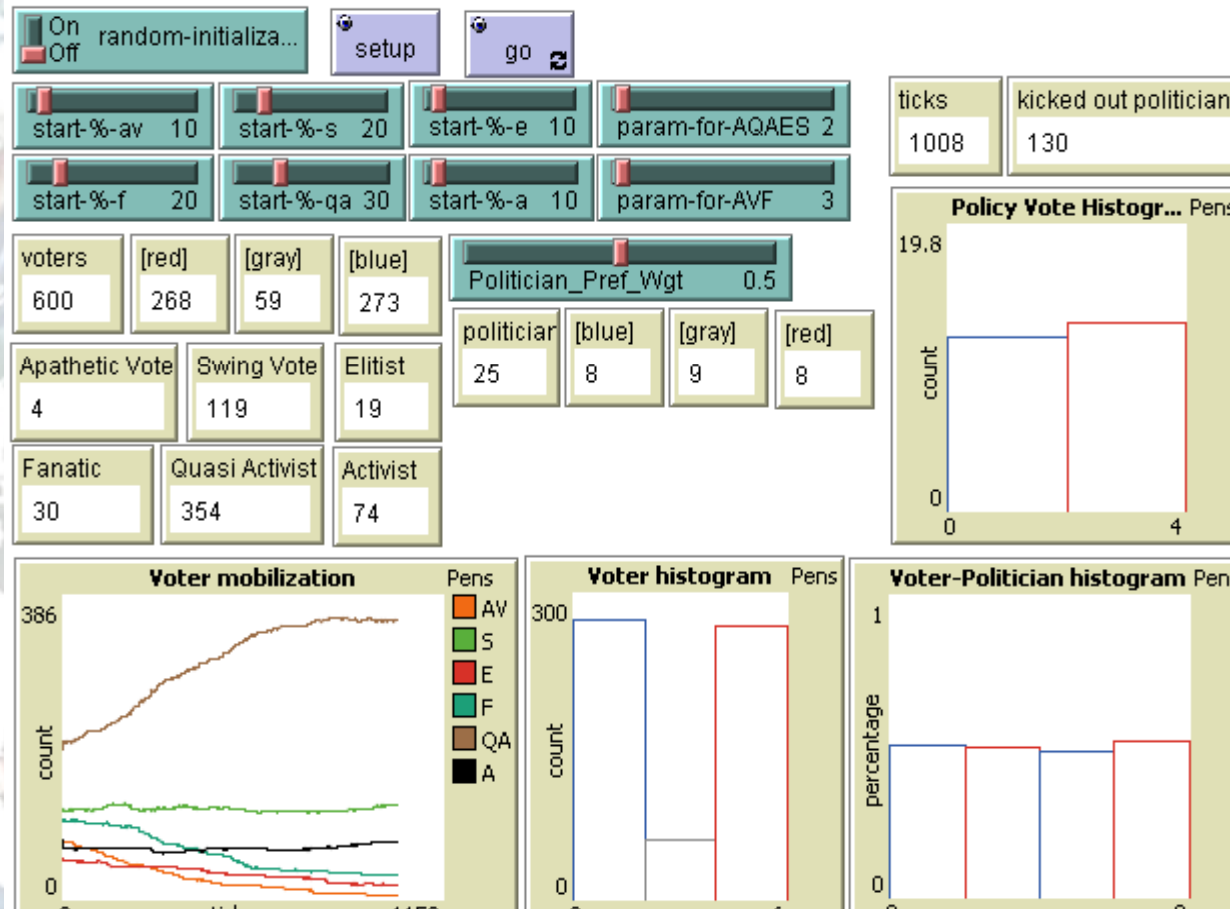


The Baseline Model

□ Baseline Assumptions:

- Voters determined by a normal distribution
- Initial Policy Preference (i.e., red or blue) is randomly assigned
- Information and preferences flow freely across voters
- Politicians use $\frac{1}{4}$ of the median preference of voters to set their initial policy position.

Results: The Baseline Model



Is the Baseline Model Consistent with Empirics?

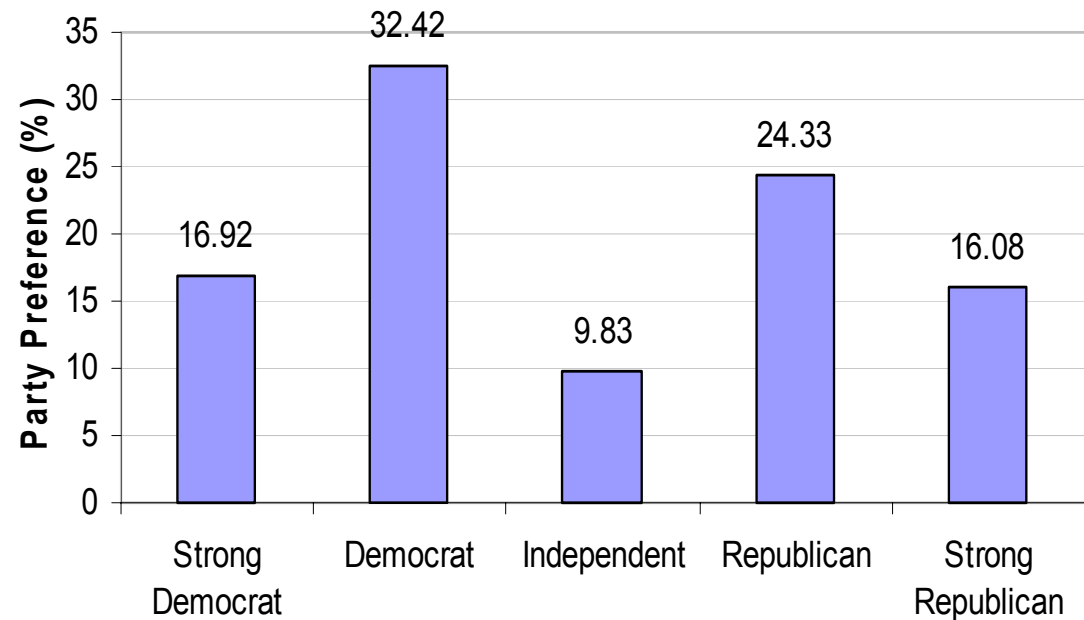
Voters?

NES data indicates that the model is capturing the correct voter types.

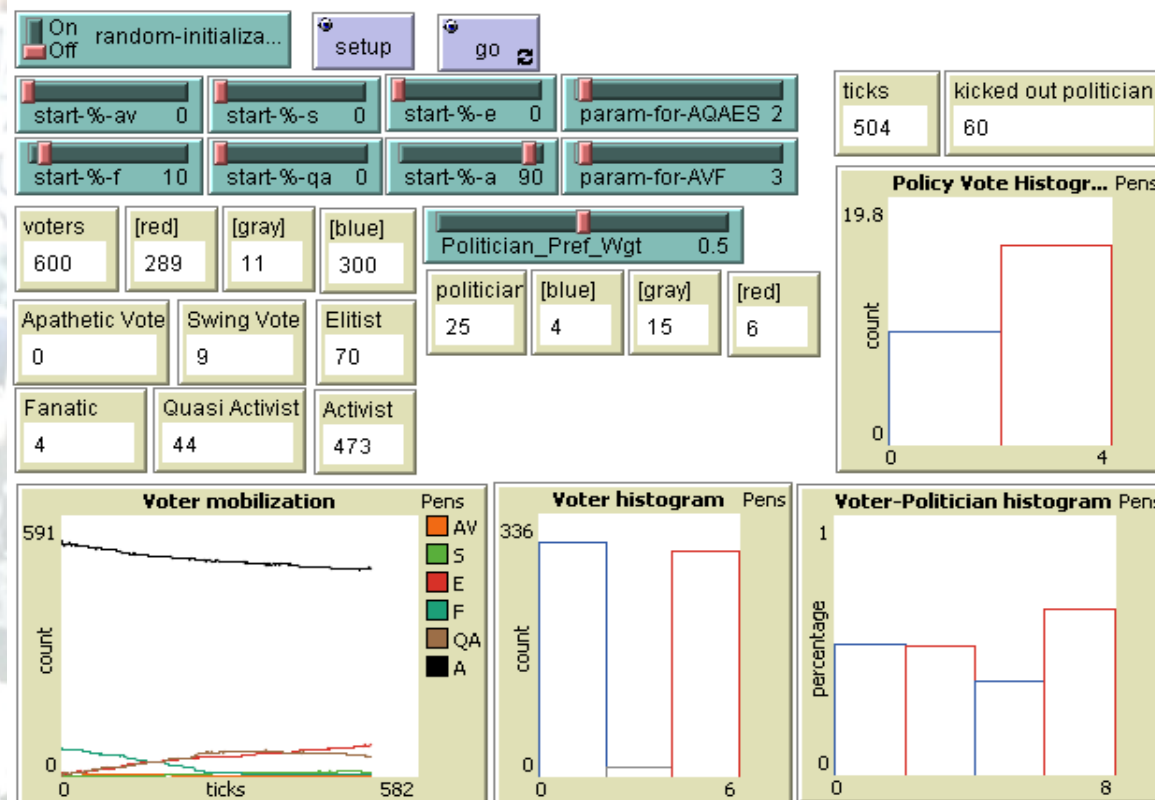
Politicians?

The model predicts an approximate 80% incumbent reelection rate, which is a little low.

National Elections Study Data, 2004



Scenario 1: "Polarization"

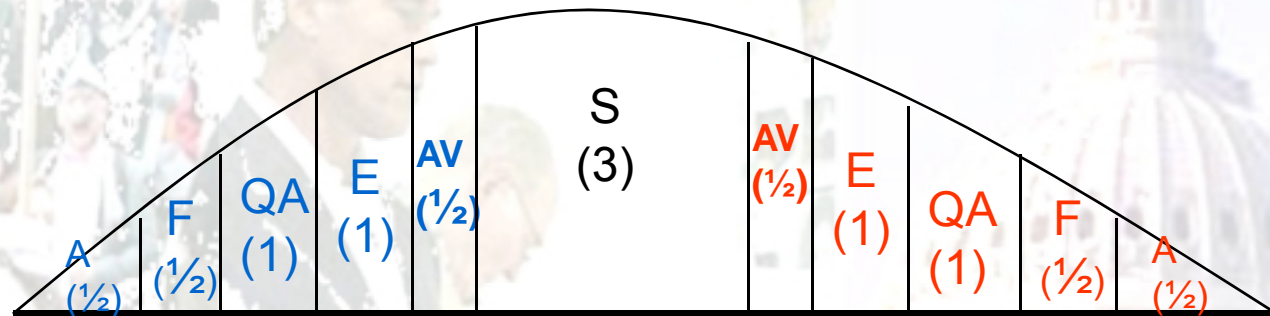


Key Finding: Low information Fanatics and isolated Activists provide some movement to the middle.

Initial Population Settings

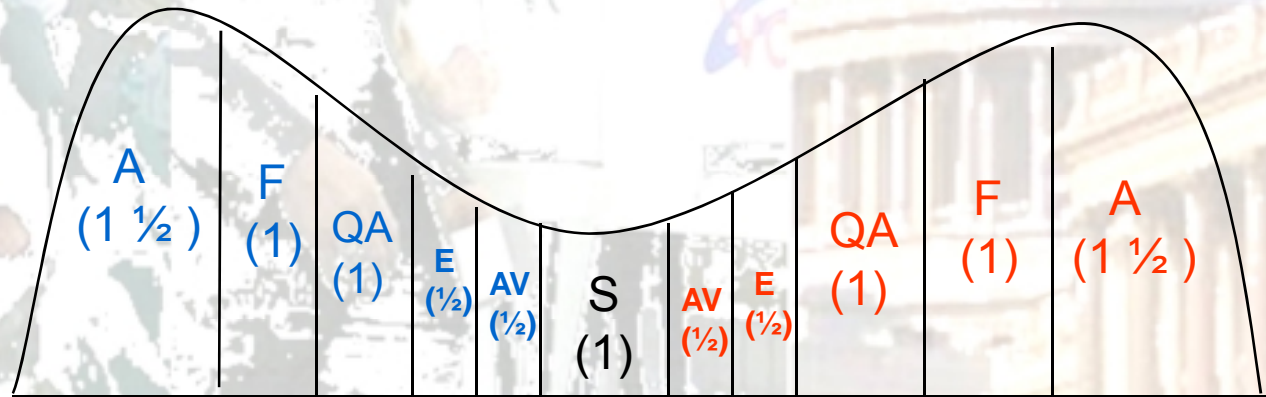
Normal case :

A:F:QA:S:E:AV
1: 1: 2: 3: 2: 1

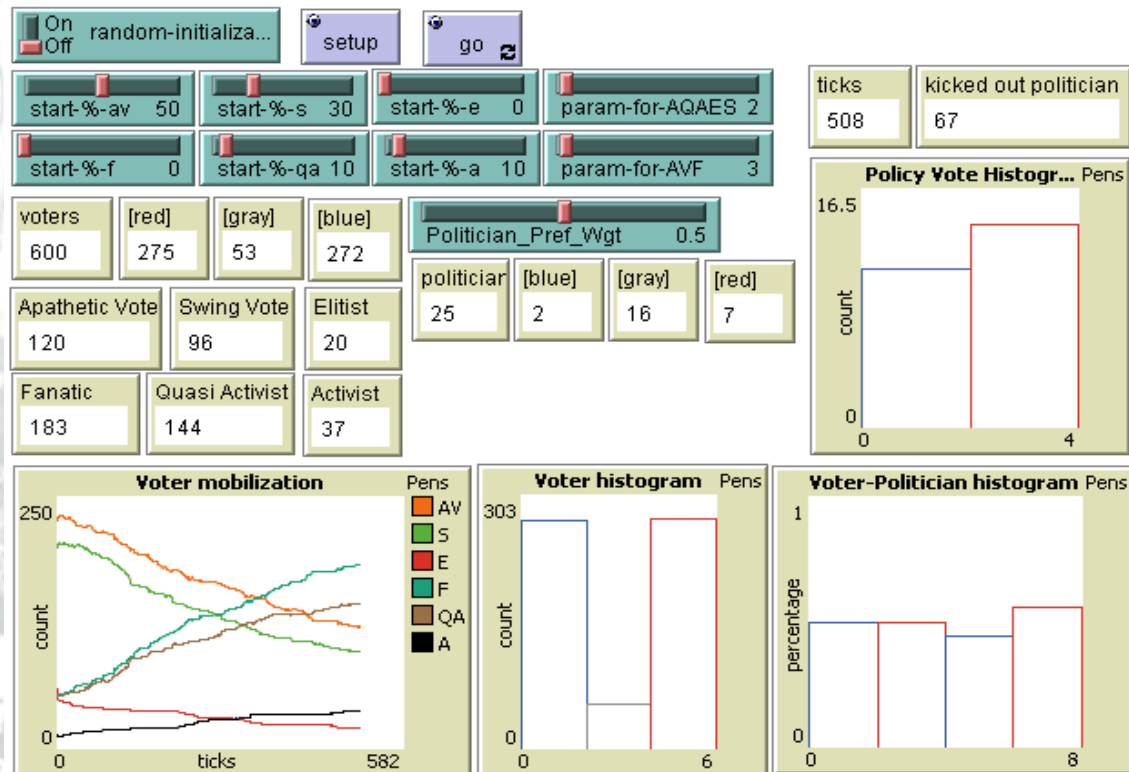


Polarized case :

A:F:QA:S:E:AV
3: 2: 2: 1: 1: 1



Scenario 2: “Sticky” Preferences and Information



Key Finding: With less fluid information and preferences, the model displays behavior similar to the American System today—that is, high levels of apathetic voters. However, politics “goes on as usual,” with similar incumbency rates.

Conclusions and Extensions

□ Conclusions:

- Agent Based Models offer a useful method in examining dynamic voting behavior – steady state mimics distribution of voter types.
- The interaction of information and political preference is crucial to understanding actual behavior.
- Power dynamics at the politician level impact the levels of representation.

□ Extensions:

- Voter level? Complicating the information and preference exchange process: socioeconomic resources, etc.
- Politician level? More effectively capturing the importance of institutions



Thank you!

Questions? Comments?
Suggestions?

(appendix with further detail on rules for
preference/info exchange follows)

Voters



INTERACTIONS:

Voters interact with each other and exchange preferences and information, based on:

- Voter type of P_i
- Voter type of P_j

If $P_i < P_j$,

$$\left\{ P_i + \left[\frac{|P_i - P_j|}{2^a} \right] \right\}$$

If $P_i > P_j$,

$$\left\{ P_i - \left[\frac{|P_i - P_j|}{2^a} \right] \right\}$$

Voters – further rules

For Agents A, Q, S, E

- a is based on the distance between the agents

$$\text{If } |P_i - P_j| \leq 33, a = 1$$

$$\text{If } 33 < |P_i - P_j| \leq 67, a = 2$$

$$\text{If } 67 < |P_i - P_j| \leq 100, a = 3$$

$$\text{If } 100 < |P_i - P_j| \leq 133, a = 4$$

$$\text{If } 133 < |P_i - P_j| \leq 167, a = 5$$

$$\text{If } 167 < |P_i - P_j|, a = 6$$

For Agents AV, F

$$\text{If } |P_i - P_j| \leq 33, a = 2$$

$$\text{If } 33 < |P_i - P_j| \leq 67, a = 3$$

$$\text{If } 67 < |P_i - P_j| \leq 100, a = 4$$

$$\text{If } 100 < |P_i - P_j| \leq 133, a = 5$$

$$\text{If } 133 < |P_i - P_j| \leq 167, a = 6$$

$$\text{If } 167 < |P_i - P_j|, a = 7$$

Information

- Information exchange is the weighted distance between the information of the two agents
- β depends on the I_i , or the information possessed by the first agent

$$I_i + \beta \left(\frac{I_j - I_i}{2} \right)$$

$$\text{If } I_i > 67, \beta = .1$$

$$\text{If } 33 \leq I_i < 67, \beta = .3$$

$$\text{If } 0 \leq I_i < 33, \beta = .1$$

Politicians

INTERACTIONS:

Politicians interact with each other, based on x_i

- Policy Preference
- Power p

Interactions produce:

- New Policy Preferences

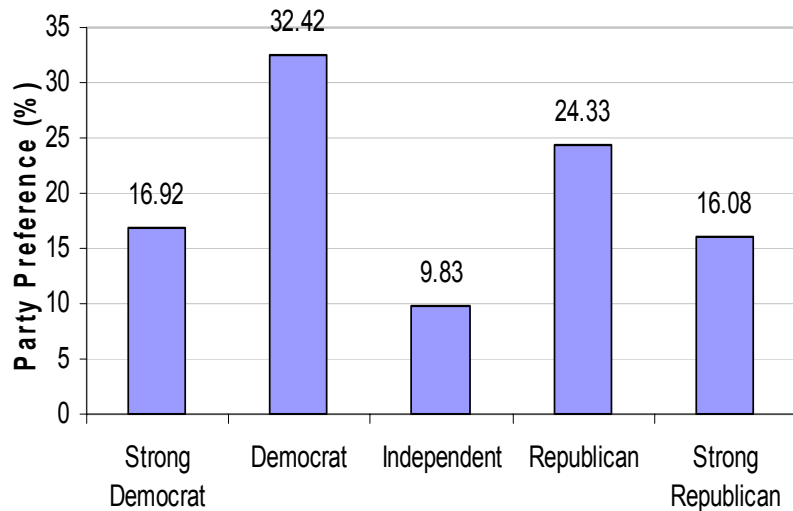
New Policy Preferences feed back to into Policy Preference equation

$$\left[\frac{(\lambda \hat{P} + x_{per})}{2} \right] = x_i$$

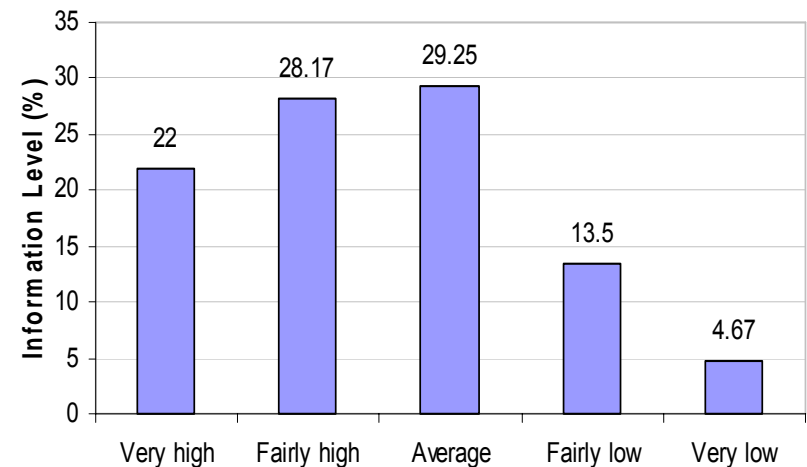
$$p = m\gamma + t(1 - \gamma)$$

$$\alpha_{pol} \left[\frac{|x_i - x_j|}{p_i / p_j} \right] = x_{per+1}$$

Empirical Data (2004 National Election Survey)



Party identity



Information level

Party preference for the U.S. overall seems to display a bimodal relationship.

An example...

Agent Type	Preference Position	Position Movement by Agent S	Information Position	Information movement by Agent S
Agent S (-25, 35) interacts with Agent E (-15, 90)				
A	$-25 - \left[\frac{ -10 }{2^2} \right] = -27.98$	9.125	90	3
F	85	7.5	10	1
QA	$30 + .1 \left(\frac{90 - 30}{2} \right) = 33$	15	60	4.5
AV	8	-8.25	5	-1.25
A	-90	-4.0625	80	-2.5
QA	-65	-5	55	3.75
S	-20	-1.25	25	-0.25
E	-15	-2.5	95	3.25
Total Move ment		10.56		14.5

