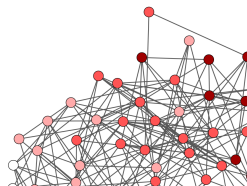
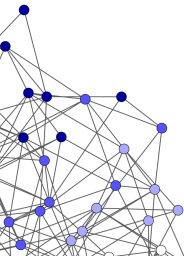


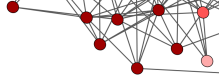
Choice Homophily in Political Discussion Networks:

Evidence from Formal Dynamic Models of the Selectivity Function

Matthew D. Sweitzer

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Graduate Technical Intern, Sandia National Laboratories

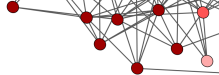




Goals:

1. Develop a formal dynamic theory of choice homophily
2. Assess the degree of selectivity necessary to produce robust homophily
3. Lay the foundations for a human-subjects study which isolates the selection mechanism

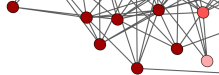




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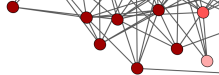




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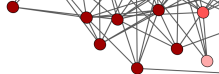


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Choice Homophily



Homophily:

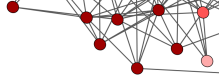
A tendency for relationships to form between those who are alike in some respect.

“...[T]hey tend to *over-select* similars as friends and, at the extreme, to confine their friendships to individuals of like kinds.”

- Lazarsfeld & Merton, 1954, pp. 23 & 27



Choice Homophily



Choice (Selection)

The individual preference to opt into relationships with similar others – or avoid relationships with dissimilar others

Influence

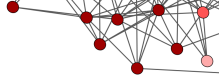
Over time, a person affects the attitudes of their social contacts (and vice versa) to lower the level of dissimilarity

Structural

Homogeneity on other characteristics (place of work, neighborhood, etc.) increase the likelihood of interaction



Choice Homophily



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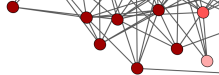
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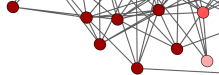
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Choice Homophily



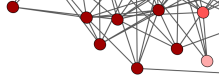
These mechanisms are confounded in observational and cross-sectional network studies (Shalizi & Thomas, 2011)

Selection & Influence:

Aral, Muchnik, & Sundararajan, 2009; Eckles, Kizilcec, & Bakshy, 2016; Lewis, Gonzalez, & Kaufman, 2012; Steglich, Snijders, & Pearson (2010)



Choice Homophily



Selection is an inherently communicative process. We convey information about ourselves; others use that information to inform their decisions about our relationship.

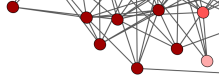
Participation (Mutz, 2002; Nir, 2011)

Knowledge (Eveland & Hively, 2009)

Information flow (Bakshy, Messing, & Adamic, 2015;
Feezell, 2016)



Choice Homophily



A person considering a political discussion tie with another:

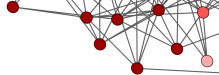
Present = Discussion

Absent = Avoidance

Selectivity: the extent to which tie status is associated with the person's perception of similarity with their alter



Choice Homophily



Selective Exposure: People select sources of social information which they anticipate will reaffirm their beliefs in future interactions (Zillman & Bryant, 1985)

Issue Publics: People's political behaviors are guided by the issues which they deem most salient or important (Krosnick, 1990)

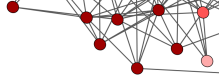
Kim, 2009: People are more selective when the information pertains to an issue that is of high importance to them



Weighted Perceived Difference

$$\frac{\sum_{t=1}^k (|A_{it} - A_{jt}| * S_{it})}{k}$$

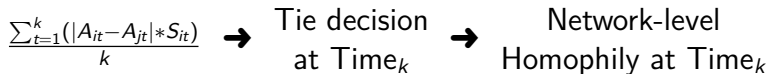
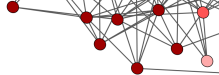
Selectivity



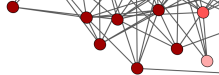
$$\frac{\sum_{t=1}^k (|A_{it} - A_{jt}| * S_{it})}{k} \rightarrow \text{Tie decision at Time}_k$$



Emergent Homophily



Agent-Based Modeling

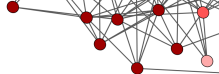


Agent-Based Models: a computational simulation of individuals, programmed with simple interaction rules; assess the effects of changes in rules on the system as a whole

Very useful tool for assessing emergent processes, substituting for human-subjects designs when mechanisms are difficult to observe, or when exploring a theoretical space



Agent-Based Modeling



$N=50$ agents in each model

Random party id score, 1-7 scale

- ▶ Used for homophily measure; not shared with other agents

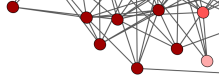
Ten opinion scores, Gaussian ($M=\text{partyID}$, $SD=1$), 1-7

- ▶ $r=.79$, higher among strong partisans (Jacoby, 1988; Peterson, Slothuus, & Togeby, 2010)
- ▶ Shared with other agents in discussion rounds

Ten importance scores, 1-7



Agent-Based Modeling



Erdős-Rényi random graph, 20% connected

- ▶ networks not homophilous at the outset

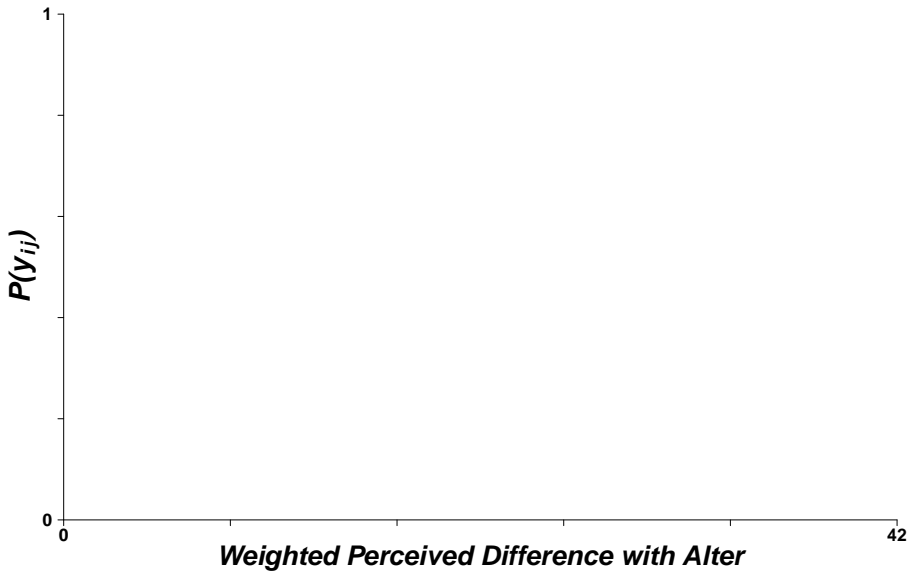
Ten discussion rounds (1 per topic):

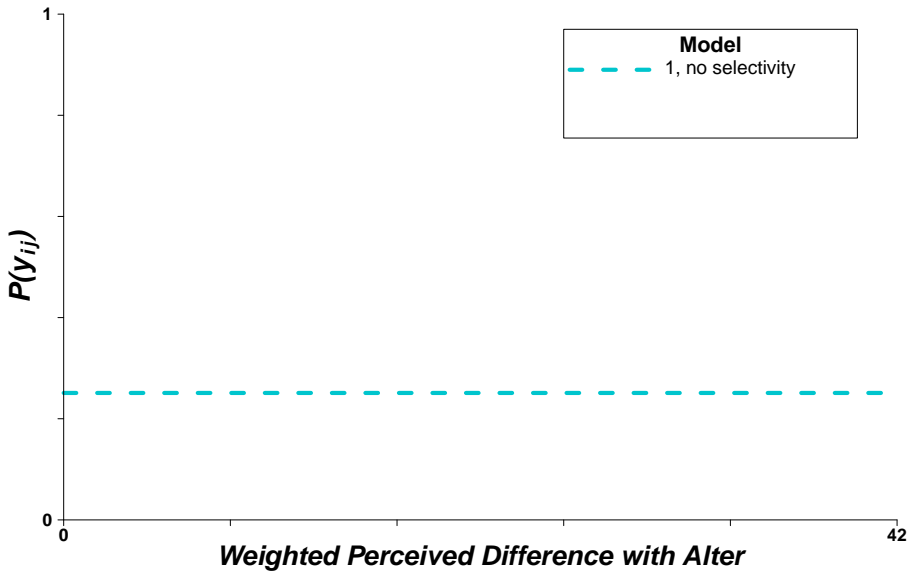
- ▶ Connected dyads share opinions
- ▶ 40% of **ALL** dyads selected randomly to update
- ▶ 1 agent makes a tie choice about the other
- ▶ the same dyad can be selected twice
- ▶ tie choices use selection strategies of the current model

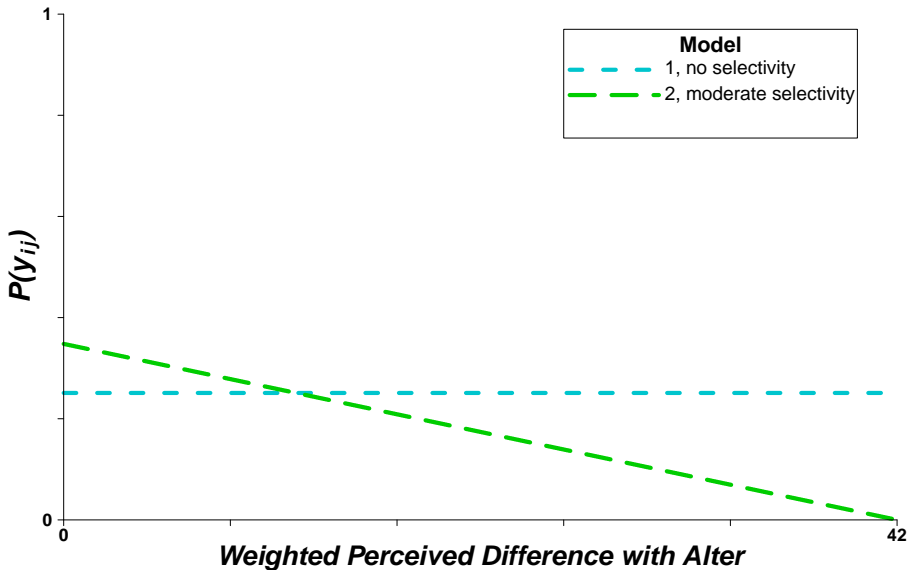
Tie choices: associative or dissociative

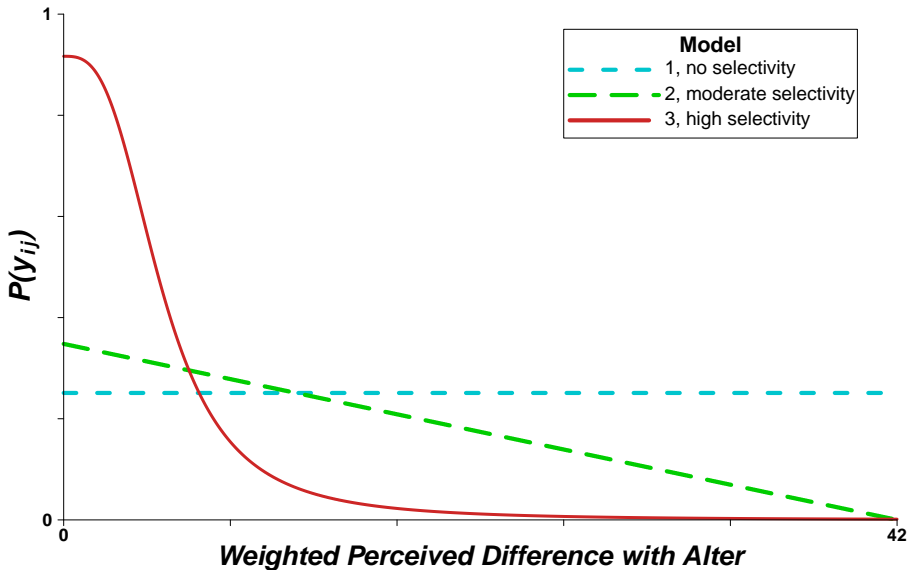
- ▶ Affect the status of the relationship going forward





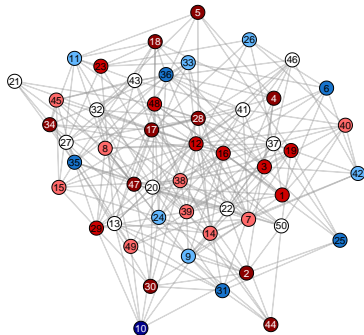




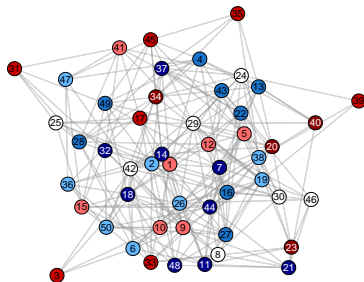


Results - Time 0

Model 1

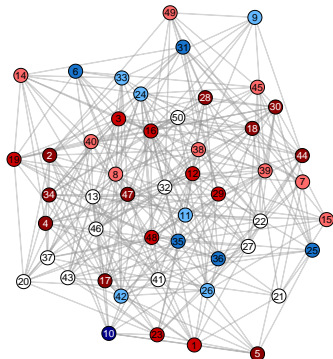


Model 3

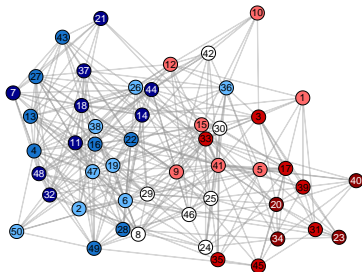


Results - Time 5

Model 1

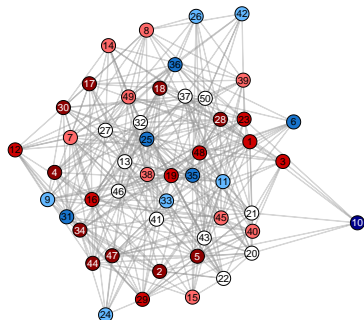


Model 3

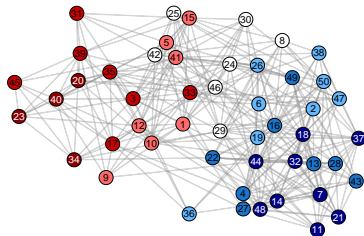


Results - Time 10

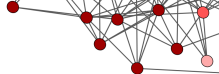
Model 1



Model 3



Results



Individual selectivity alone can produce network-level homophily; without selectivity, no homophily

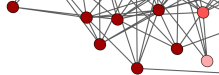
Reaffirms choice homophily as a mechanism

(in the paper:) High selectivity is required to produce levels of homophily that are robust to BTERGM respecification

- modest reductions in selectivity reduce network-level homophily

May assist future research on interventions





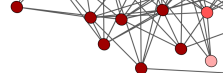
References and more methodological details are available in the full paper:

<https://mattsweitzer.com/NCA2019>


Thank You



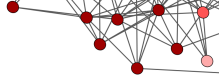
Results - Transitivity



	Model 1	Model 3
Time ₀	0.19	0.19
Time ₁	0.21	0.26
Time ₂	0.25	0.29
Time ₃	0.25	0.31
Time ₄	0.26	0.31
Time ₅	0.27	0.35
Time ₆	0.27	0.36
Time ₇	0.28	0.37
Time ₈	0.33	0.38
Time ₉	0.29	0.34
Time ₁₀	0.28	0.33



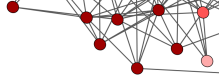
Results - Assortativity



	Model 1	Model 3
Time ₀	-0.06	-0.03
Time ₁	-0.15	0.10
Time ₂	-0.11	0.27
Time ₃	-0.09	0.38
Time ₄	-0.09	0.45
Time ₅	-0.12	0.54
Time ₆	-0.10	0.59
Time ₇	-0.04	0.63
Time ₈	-0.05	0.63
Time ₉	-0.06	0.65
Time ₁₀	-0.06	0.68



Results - BTERGM



	Model 1		Model 3	
	θ	CI	θ	CI
Homophily	0.02	[-0.01, 0.04]	-0.35	[-0.44, -0.29]
Edge Memory	1.62	[1.59, 1.65]	1.79	[1.73, 1.85]
2-Stars	>-0.01	[-0.05, 0.06]	-0.02	[-0.06, 0.01]
Triangles	0.04	[-0.03, 0.11]	0.10	[0.02, 0.16]
4-Cycles	<0.01	[-0.01, 0.01]	<0.01	[-0.01, 0.01]

