

When Information Is Both Costly and Empowering

Equilibrium Selection Under Strategic Complementarities

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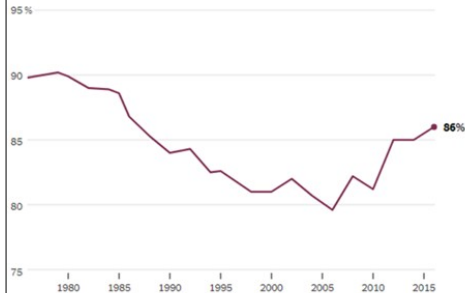
Central Bureau of Statistics

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Based on: "Before Ties Form" - Under Review, Information Systems Research.

A Natural Laboratory

More Women Have Become Mothers
The percentage of women ages 40 to 44 who have ever given birth.



Source: Pew Research Center analysis of census data

Now, 80 percent of women with professional degrees or doctorates have a child by the time they are 44, compared with 65 percent two decades ago, perhaps indicating that [fewer women](#) see long educations or demanding careers as a bar to having a family. And motherhood among women who have [never married](#) has risen across racial and educational groups.

The New York Times

TheUpshot

Comments 1053

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NYT Picks Reader Picks All

- cbarber**
 San Pedro | 42m ago Times Pick

This is the President of the United States making these claims! The President! Am I in a Twilight Zone episode involving parallel worlds?

1 Reply 83 Recommended Share Flag
- Stephen**
 New Haven | 44m ago Times Pick

People can chose to believe and or read this or not. Don't censor.

32 Replies 35 Recommend Share Flag
- Chris Wildman**
 Alaska | 46m ago Times Pick

I subscribed to Twitter primarily to read Trump's tweets, but then I began to comment on his tweets as a way of blowing off steam. I'm sure that he never reads my tweets - and that's not important to me. It's just that when I read HIS despicable tweets - the whining, the lying, the baseless accusations - I feel somewhat better when I get to speak MY piece, even if no one reads them.

Bob Alice Charlie

Two Frameworks, Opposite Predictions

	Rational Inattention	Global Games	This Paper
Signal enters	Cost only	Benefit only	Both sides
Prediction	Suppression	Amplification	Amplification dominates
Tested at scale?	-	-	Yes - 2.4M observations

Neither framework speaks to a setting where the signal is simultaneously costly and coordination-amplifying.

Which mechanism wins when the signal is both costly and coordination-enabling? Can we distinguish the two at scale?

This paper provides a unified framework, identifies the cross-complementarity condition as the selection mechanism, and tests it at scale.

Engagement as a Coordination Game

	Others engage analytically	Others engage superficially
You engage analytically	High, High ✓ Nash <i>Pareto dominant</i>	Low, High (frustrated)
You engage superficially	High, Low (frustrated)	Low, Low ✓ Nash

The selection question: under what conditions does the information environment coordinate agents on the high equilibrium?

The Utility Representation

Cost Structure $C_e(\cdot)$

*Rational inattention microfoundation
(Sims 2003, Matějka & McKay 2015)*

$$\partial C_e / \partial e_i > 0$$

increasing & convex in engagement

$$\partial C_e / \partial c_i < 0$$

lower for higher cognitive capacity

$$\partial C_e / \partial I_j > 0$$

information friction $\uparrow$

Benefit Structure $B(\cdot)$

*Coordination game structure
(Cooper & John 1988, Milgrom & Roberts 1990)*

$$\partial^2 B / \partial e_i \partial \bar{e}_{-i} > 0$$

strategic complementarity

$$\partial^2 B / \partial e_i \partial I_j > 0$$

information complementarity

$$\partial^3 B / \partial e_i \partial \bar{e}_{-i} \partial I_j > 0$$

cross-complementarity $\uparrow$

$$U_i(e_i, \bar{e}_{-i}, I_j) = B(e_i, \bar{e}_{-i}, I_j) - C_e(e_i, c_i, I_j)$$

Cross-complementarity

$$\frac{\partial^3 B}{\partial e_i \partial \bar{e}_{-i} \partial I_j} > 0$$

Information raises the return to engagement more when others engage too.

Analogous to public signal precision in Morris-Shin (2003)

What the Model Delivers

PROPOSITION 1 (monotonicity and decomposition)

Under strategic complementarity, information complementarity, and cross-complementarity:

- (i) extremal equilibrium engagement $e^*(I_j)$ is increasing in I_j ;*
- (ii) the total effect of I_j splits into a direct empowerment term $E_j > 0$ and an indirect composition term C_j operating through the participant pool.*

Monotone comparative statics: Topkis (1978), Milgrom & Roberts (1990). No equilibrium selection mechanism required for (i).

The magnitude ordering of the two terms is not implied by the model.

It is the testable hypothesis the data decide (next slide).

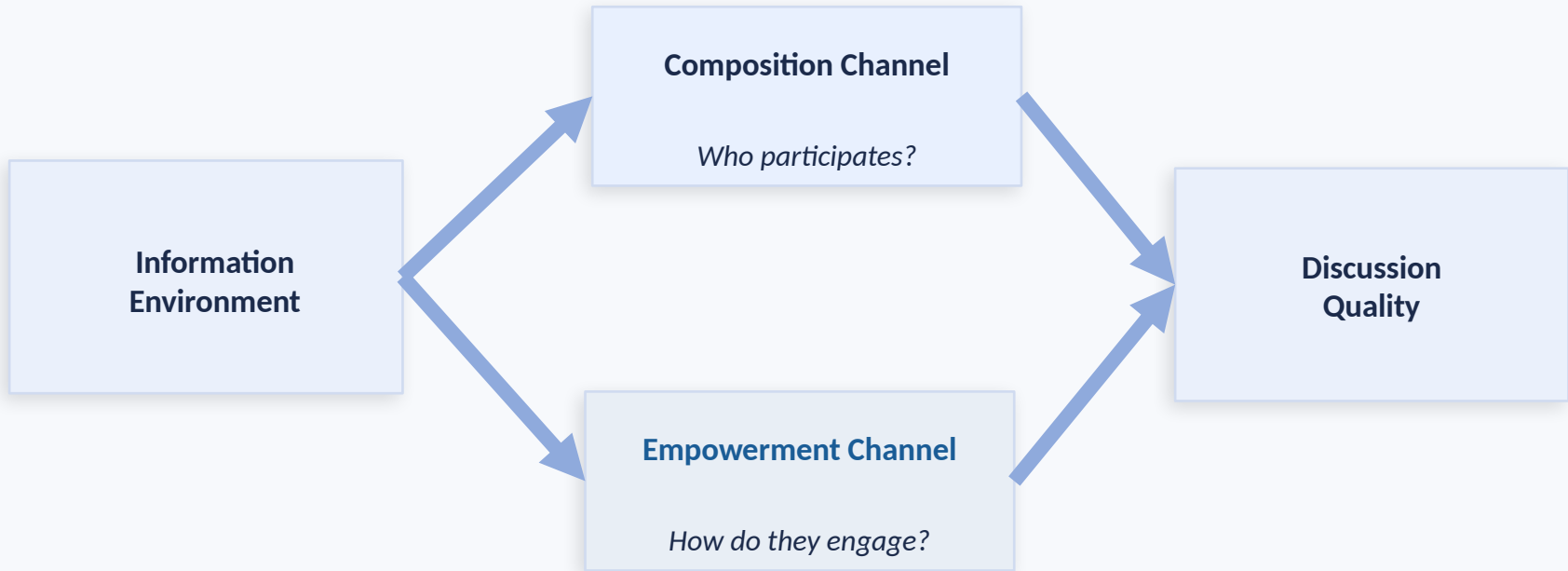
The central decomposition

$$\frac{de^*}{dI_j} = \underbrace{\frac{\partial e^*}{\partial I_j} \Big|_{A_j}}_{\text{Emp}} + \underbrace{\frac{\partial e^*}{\partial A_j} \cdot \frac{\partial A_j}{\partial I_j}}_{\text{Comp}}$$

Empirical hypothesis (H2)

$$|\mathcal{E}_j| > |\mathcal{C}_j|$$

The Empirical Discrimination Strategy



Reply Networks Signatures

A.



B.



Network A (high information): reciprocal replies → coordination equilibrium

Network B (low information): sparse hub-and-spoke → fragmented engagement

Two Predictions

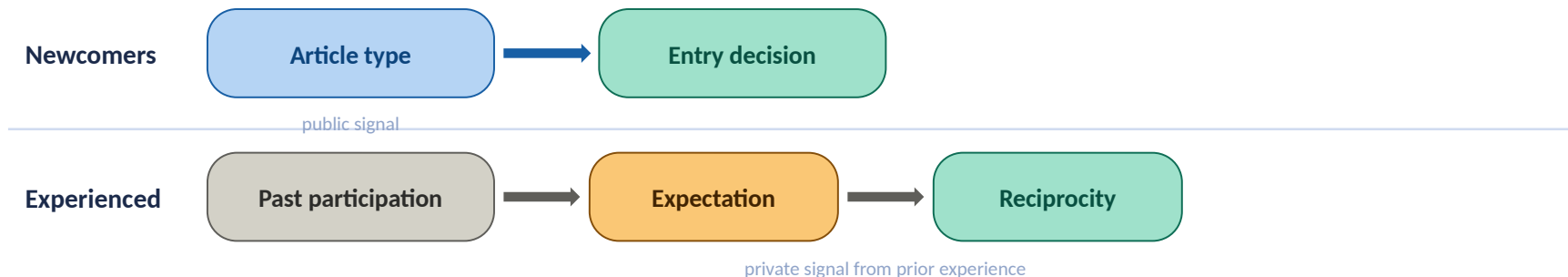
H1**Selective Attraction**

Information-rich environments alter the composition of the participant pool.

H2**Empowerment Dominance**

The direct effect of information availability on engagement substantially exceeds the indirect effect through participant sorting.

Who Participates? H3

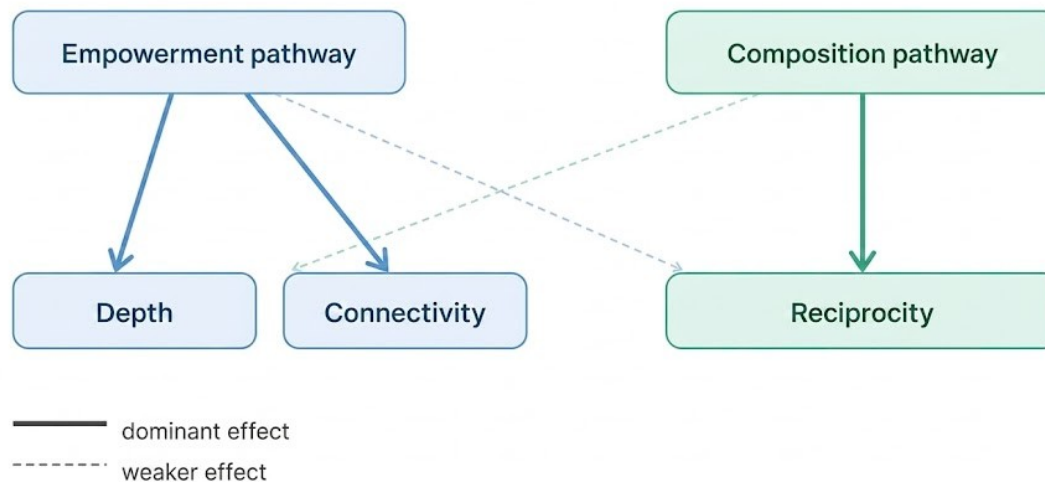


H3

Structural Divergence

Information availability predicts depth and connectivity; participant experience predicts reciprocity.

H4: Pathway Propagation

**H4**

Empowerment pathway dominates for depth and connectivity. Composition pathway dominates for reciprocity.

Not only is empowerment larger overall -- it is larger precisely on the outcomes that cross-complementarity predicts it should dominate.

Data Corpus

10,483 NYT stories • 2,404,945 comments • 2014–2022

N = 2,788 for pool composition analysis (2016–2022; requires commenter history data)

~229 comments per story on average • 67% unique commenters per article

Data, Measures, and Analytical Strategy

Stage 1

Pool Composition

- Proportion experienced
- Prior reply propensity

Stage 2

Engagement Equilibrium

- Audience analytic style
- Audience statistical info
- Audience affect

Stage 3

Network Structure

- Active participation
- Mean depth / Large Connected Component
- Reciprocity

Information features:

statistical information · external sources · static visualizations · analytic style · affective style

MLR estimation · 5,000 bias-corrected bootstrap samples · Section and year fixed effects

Identification: information features vary quasi-exogenously within section and time.

Information-rich environments alter the composition of the participant pool

Data journalism reduces the informational barrier to entry, attracting a broader pool - proportion experienced falls even as total participation rises.

$$\beta = -0.092^{***}$$

Individual features: no independent effect on pool composition.

Agents act on the categorical public signal, consistent with global games logic.

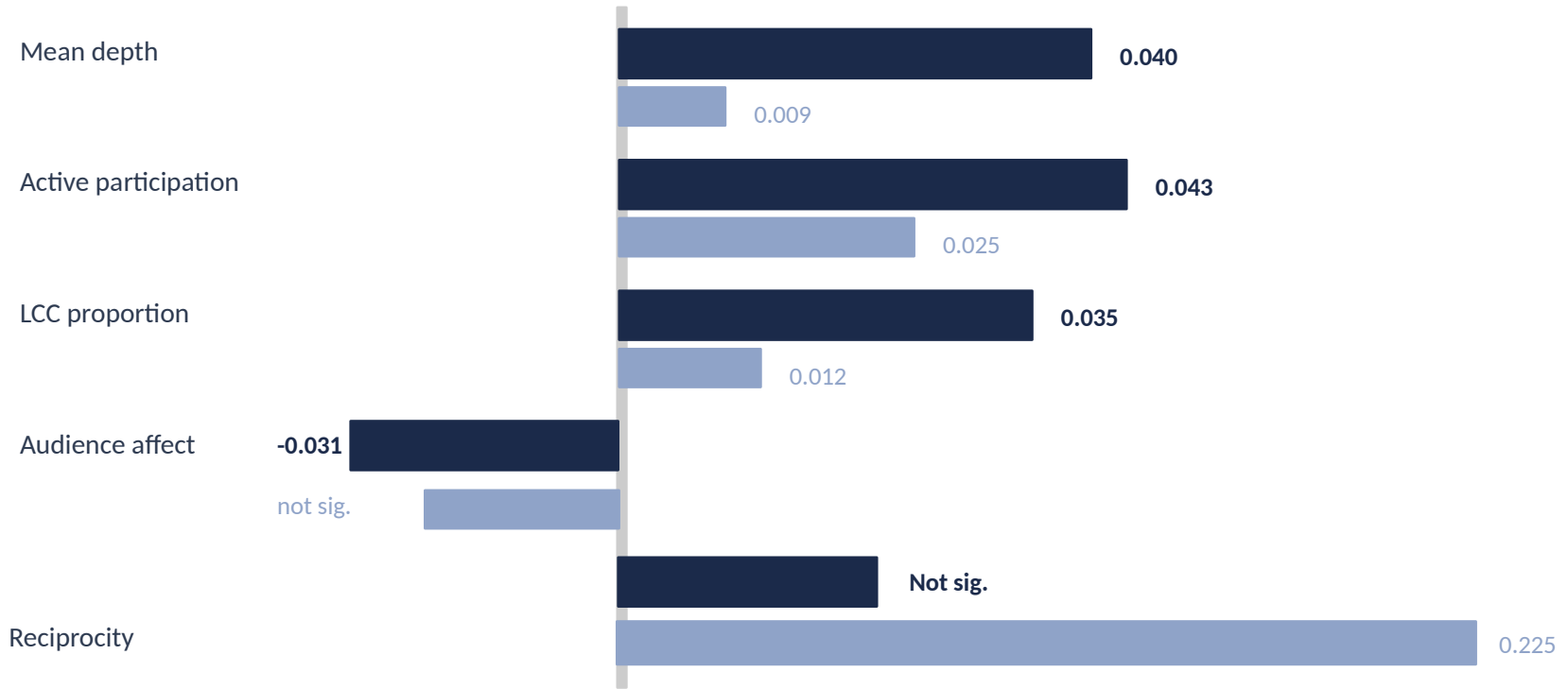
Empowerment Dominates Composition

Empowerment: $\beta = 0.340$

Composition: $\beta = -0.097$

Story analytic style → audience analytic style

Pathway Propagation to Network Structure



Displayed coefficients: $p < .05$, bias-corrected bootstrap

Empowerment pathway

Composition pathway

Discussion

01

Information design has two stages, not one

Existing work focuses on what signal the sender transmits. This paper shows the information environment also determines which equilibrium receivers coordinate on after the signal arrives. The two mechanisms are sequential and interact.

02

Empowerment has a direction, not just a magnitude

Affective content empowers engagement, but toward an emotional-reactive equilibrium that suppresses analytical structure. The environment selects which equilibrium agents coordinate on, not merely whether a high-engagement equilibrium is reached.

03

When is the asymmetry large enough for empowerment to dominate?

Proposition 1 signs the channels; the magnitude ordering is settled here empirically, not analytically. Characterizing the threshold at which cross-complementarity overcomes friction requires structure on the cost and benefit functions. Open.

Thank You

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