

Class 10: Thresholds, cascades, and predictability

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Sociology 204: Social Networks
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1/2 Threshold model



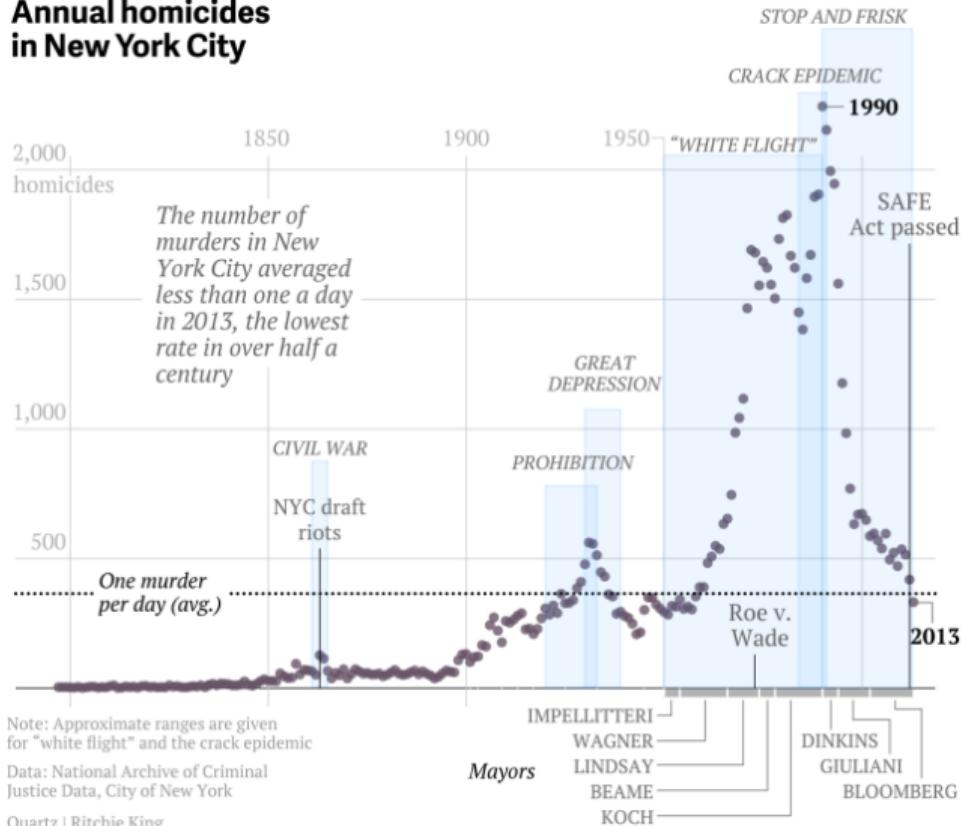
Summary:

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- ▶ when there are interdependent decisions, individual rationality can lead to collective irrationality

Annual homicides in New York City

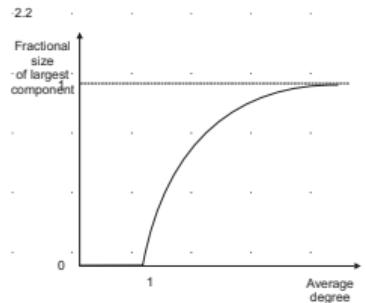


Nonlinear change



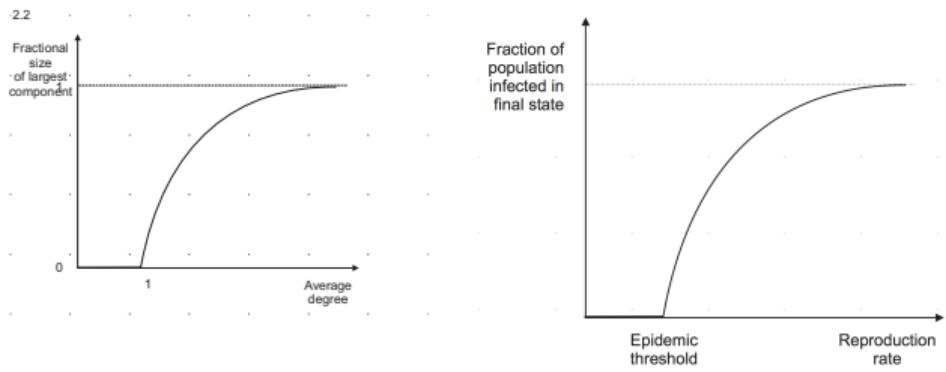
<http://www.davidmelamed.com/2013/07/15/user-testing-ketchup-bottles-leads-to-counter-intuitive-surge-in-profits/>

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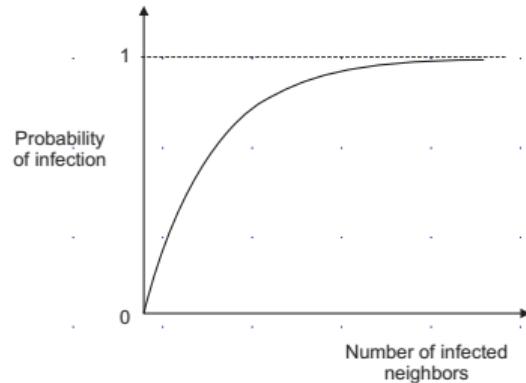
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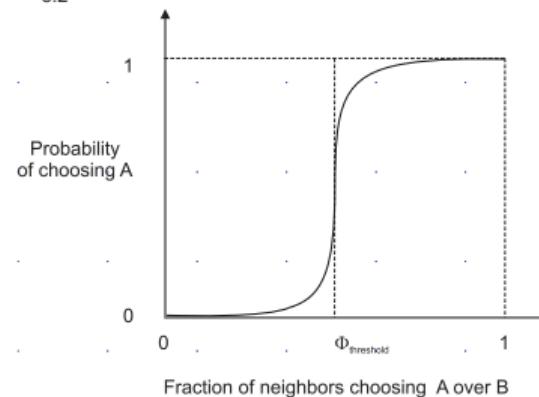
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“What if homicides, which we often causally refer to as an epidemic, actually *is* an epidemic, and moves through the populations the way that the flu bug does.” Malcolm Gladwell

8.1



8.2



(a) Probability of activation in disease spreading (b) Probability of activation in social spreading

For more on why social decisions might involve thresholds, see Lopez-Pintado and Watts (2008) [Social Influence, Binary Decisions and Collective Dynamics](#)

Differences between models of social contagion and biological contagion:

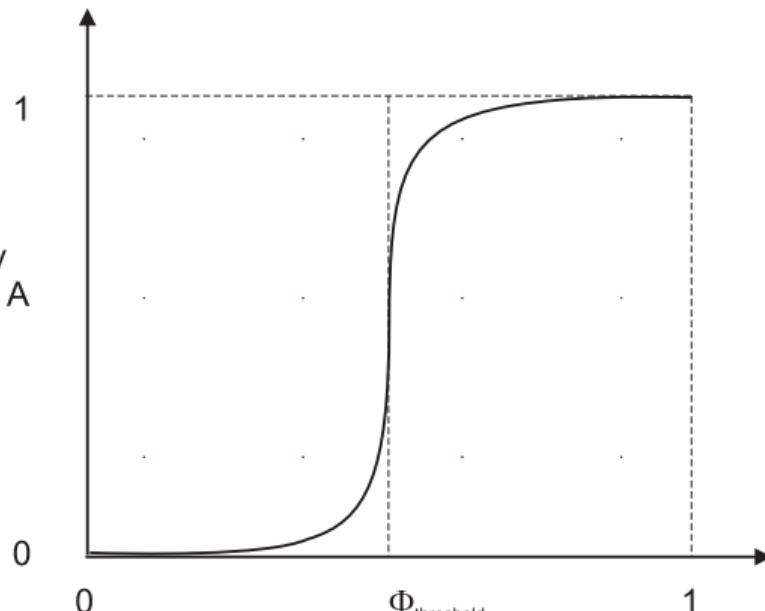
- ▶ social contacts are interdependent and disease contacts are independent

Differences between models of social contagion and biological contagion:

- ▶ social contacts are interdependent and disease contacts are independent
- ▶ social spreading on fraction of neighbors doing some behavior rather than absolute number: diseases depends on absolute number

8.2

Probability
of choosing A



Fraction of neighbors choosing A over B

Standing ovation demo (imagine 100 students in a classroom)

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Person 1, 0

Person 2, 1/100

Person 3, 2/100

Person 4, 3/100

Person 5, 4/100

...

Standing ovation demo (imagine 100 students in a classroom)

Standing ovation demo (imagine 100 students in a classroom)

Person 1, 0

Person 2, 2/100

Person 3, 2/100

Person 4, 3/100

Person 5, 4/100

...

Demo illustrates that

- ▶ hard to predict collective outcome from individual preferences

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- ▶ hard to predict collective outcome from individual preferences
- ▶ hard to infer individual preferences from collective outcomes

For more examples, see Granovetter (1978) [Threshold Models of Collective Behavior](#)



https://www.ted.com/talks/derek_sivers_how_to_start_a_movement#t-169235

Now what happens if we move people using a threshold rule onto a network?