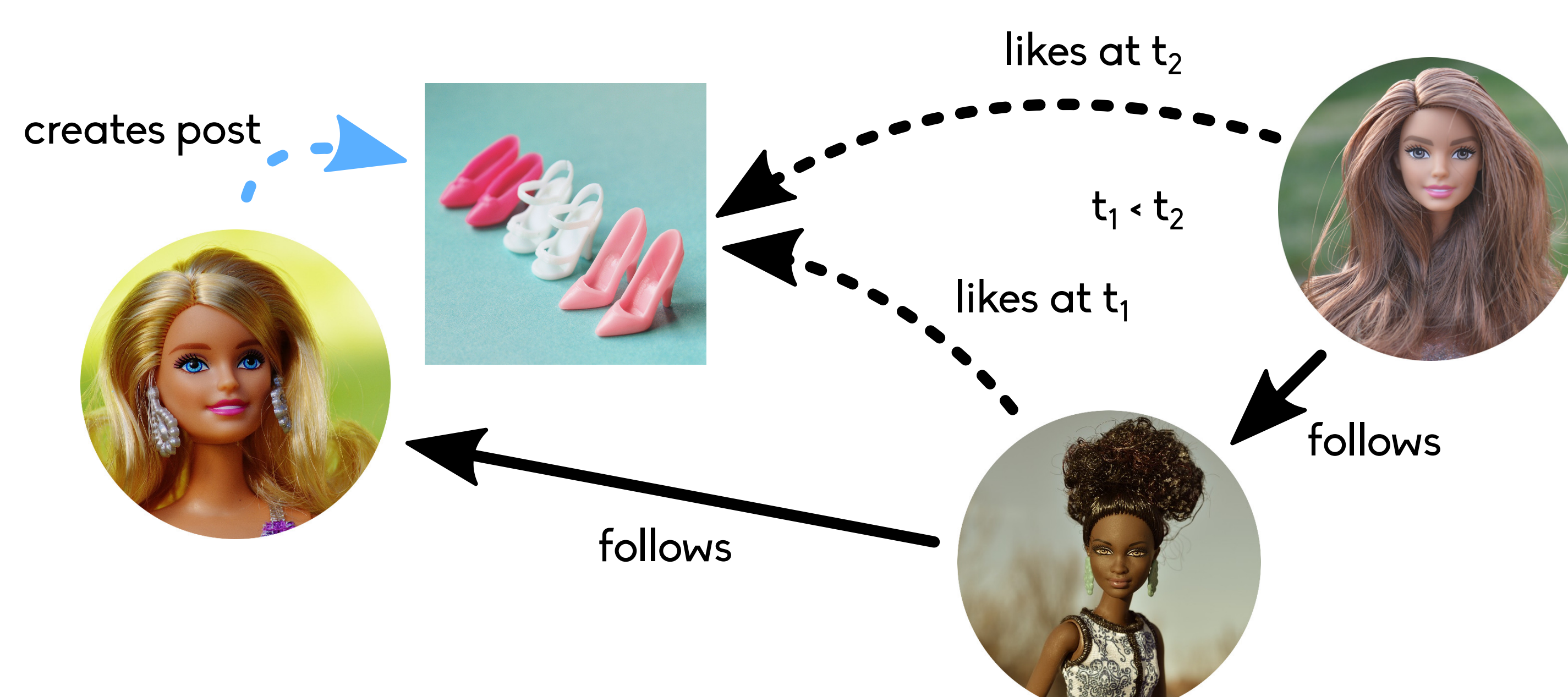


Centrality Measures on a Temporal Fashion Network

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On the global social network *lookbook.nu*, fashion trends are displayed, adopted and modified within a highly dynamic community. Identifying mechanisms of social spreading of information on this network may give insight into the propagation of fashion trends.



Schematics of Information Flow on Follower Graph

Dataset Description

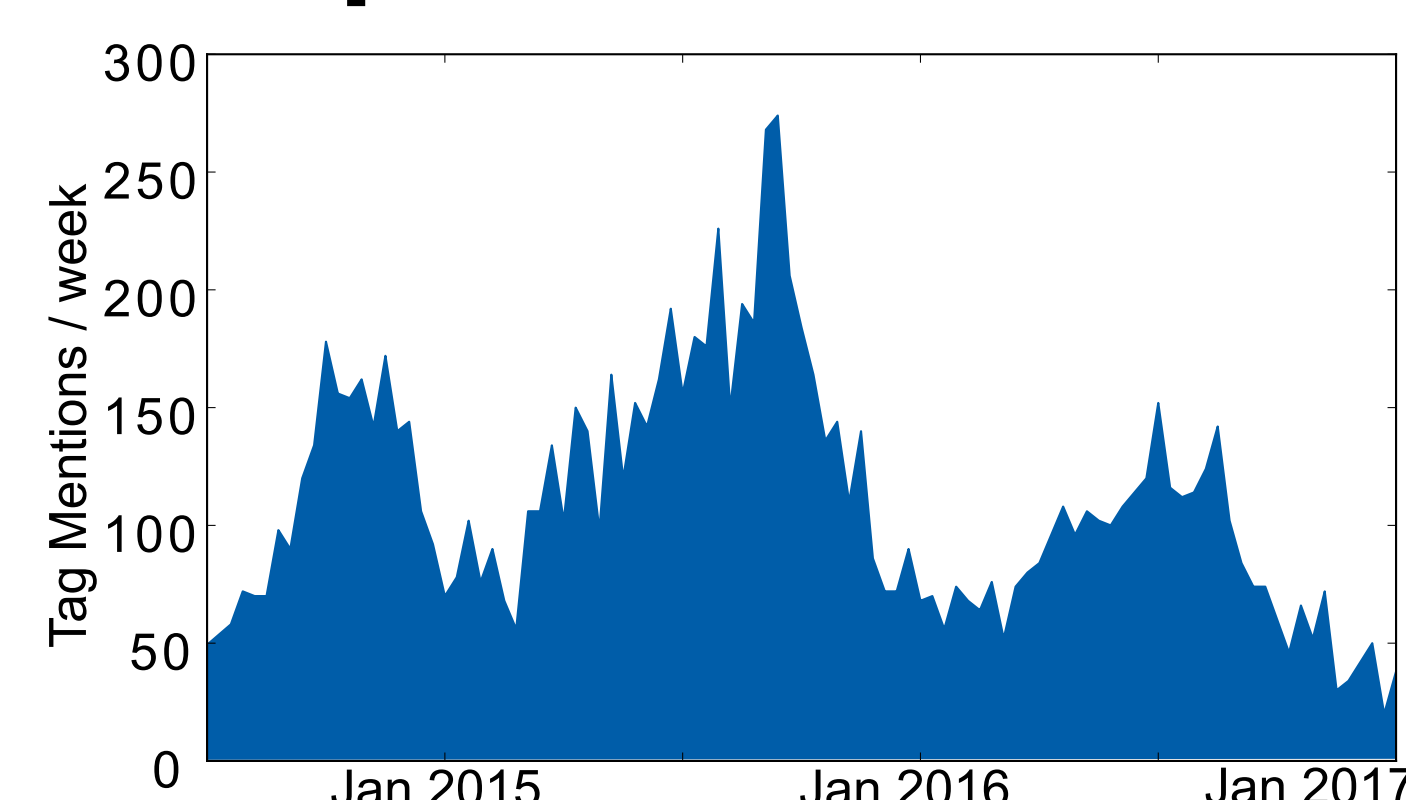
Directed Follower Graph

1.7M Active Users	23M Follower Edges
3.7M Posts	~200M Social Interactions from 2011 — 2017
Average Shortest Path Length	2.36
Clustering Coefficient	0.52
Max. k-Core	80
In- / Out- Degree Correlation	0.12
Scale-free Degree Distribution /w Exponent	1.7

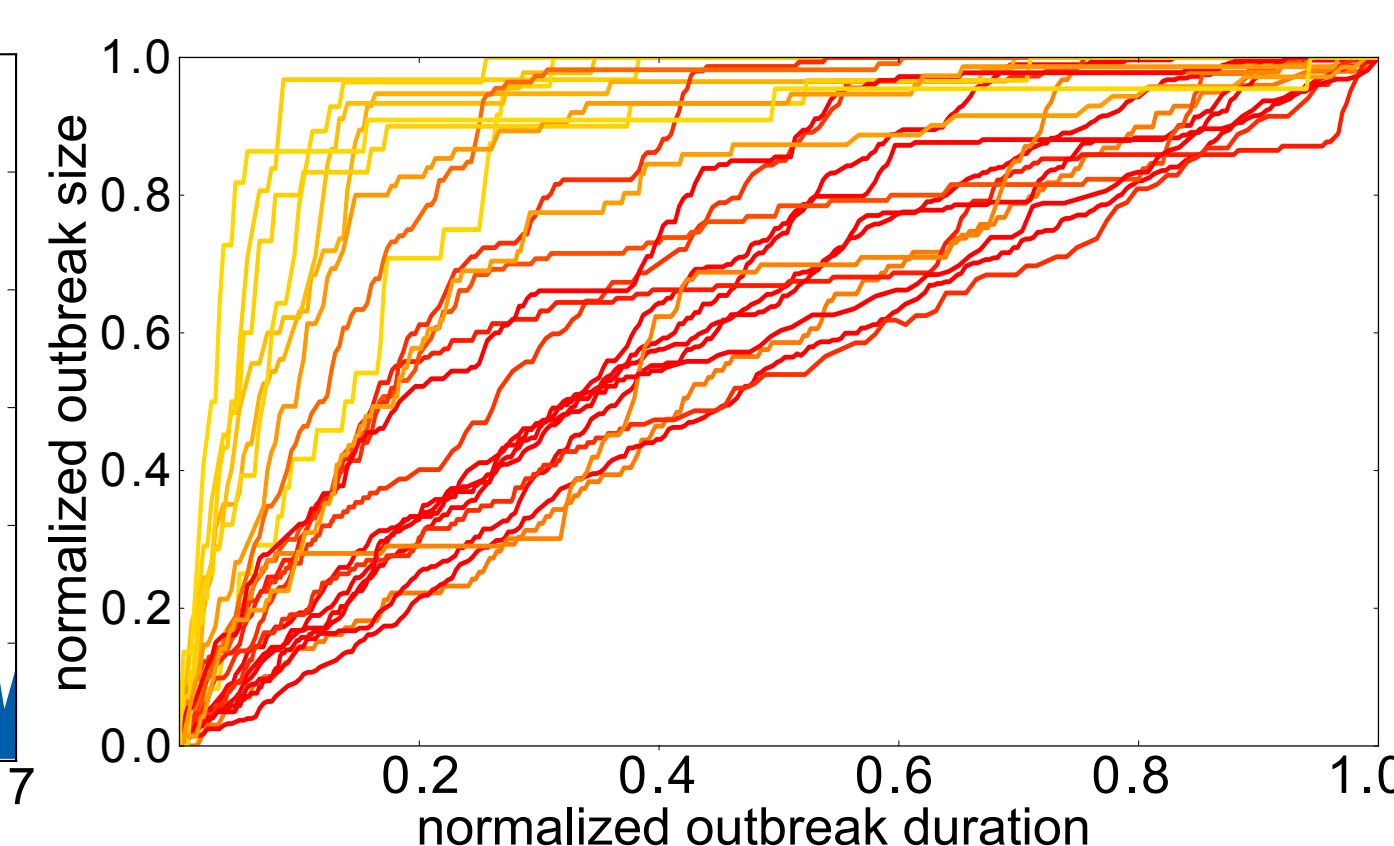
Followers can see what users "liked", so they might be influenced to like similar content, thus spreading information forward to their followers on the graph.

Data Analysis

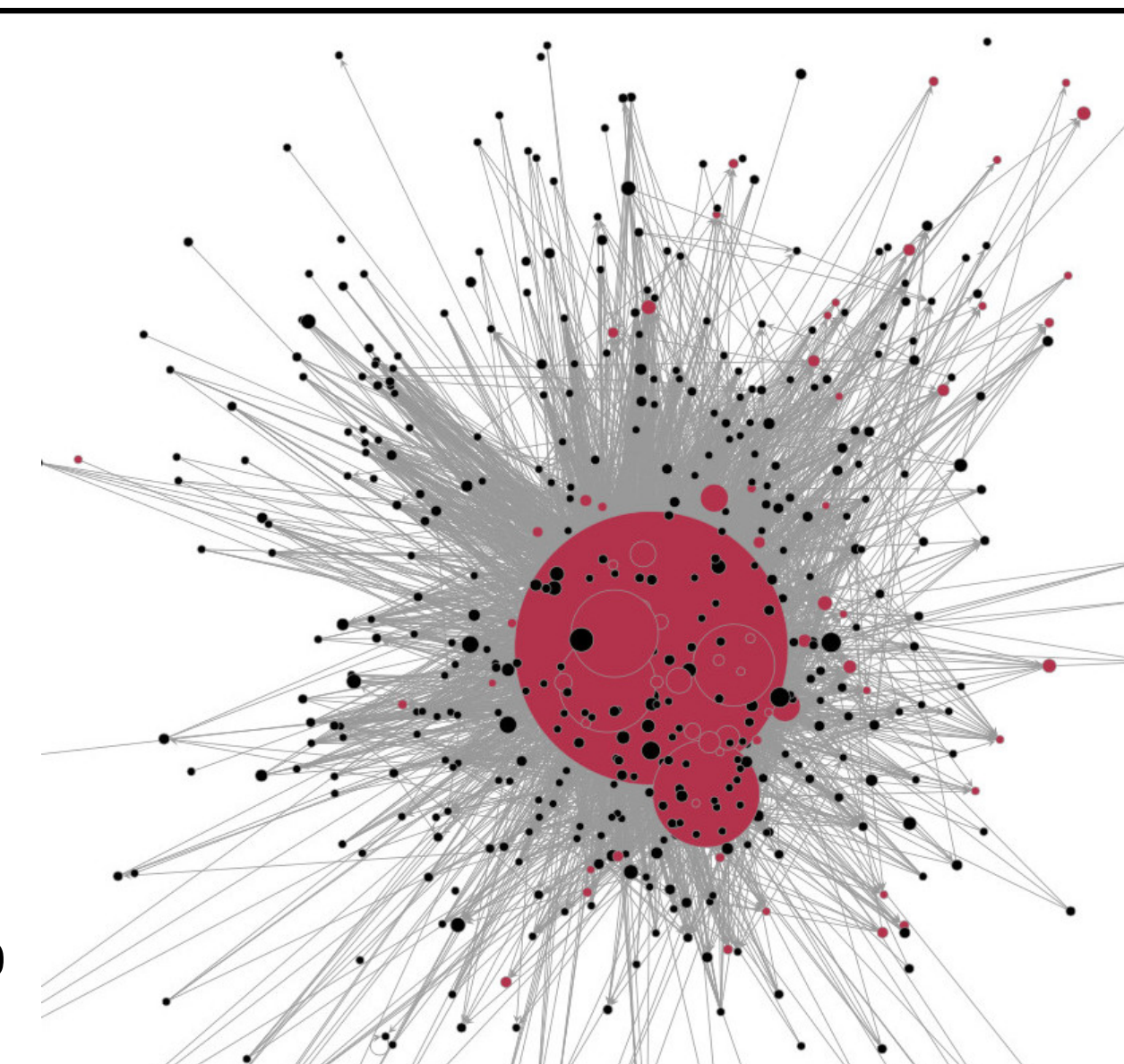
Adoption Curves



Seasonal effects in tag usage
example: #croptop

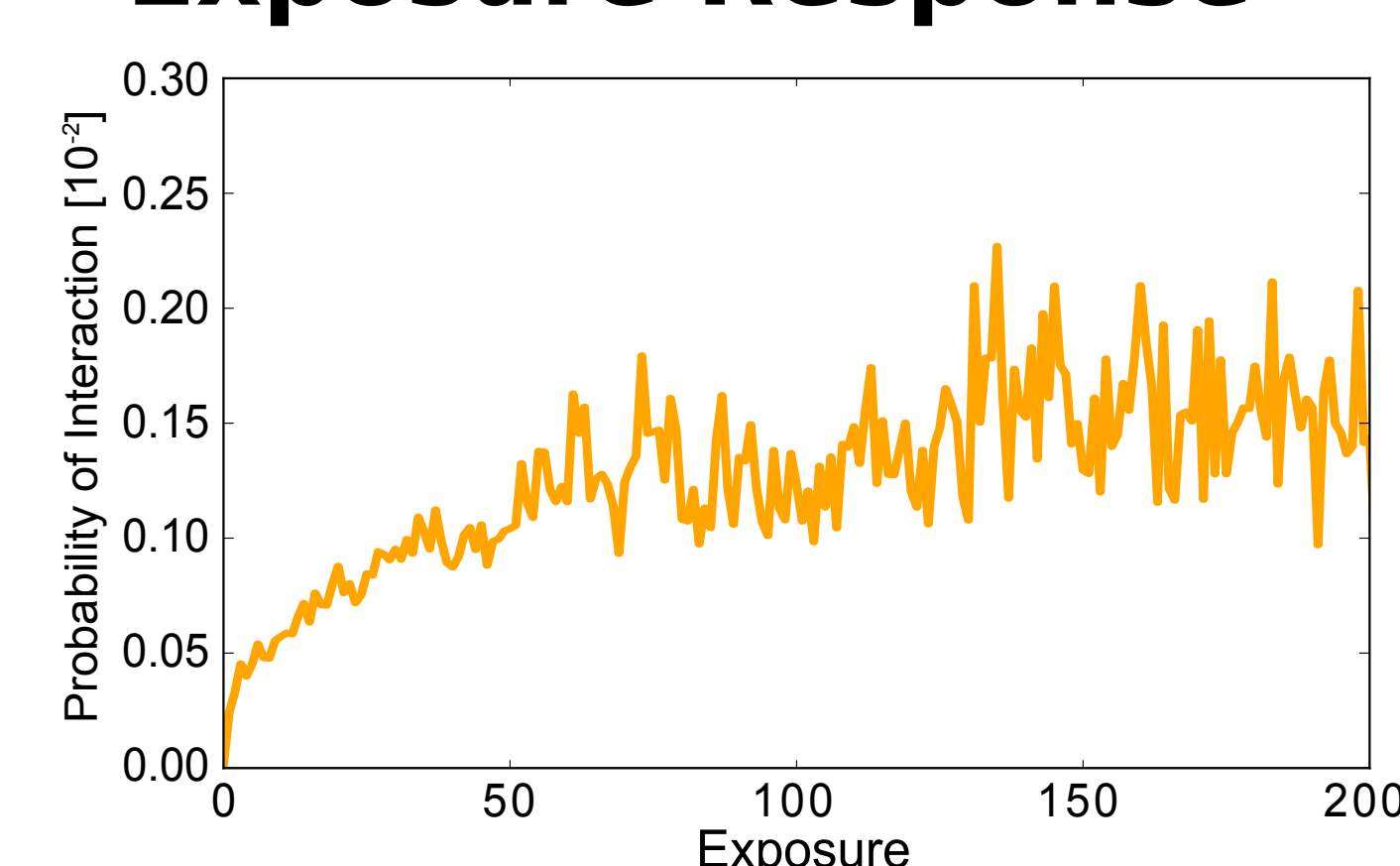


Shapes of outbreak timelines vary depending on the total impact of the trend. (red: bigger outbreaks)



Network view of infection process.
red circles: infected nodes
size: number of interactions

Exposure Response



Exposure Response Function:
For a given exposure (total number of interactions by followed users), how likely is user to interact

Threshold Model

The spreading of information can be viewed as a mixture of several concurrent processes:

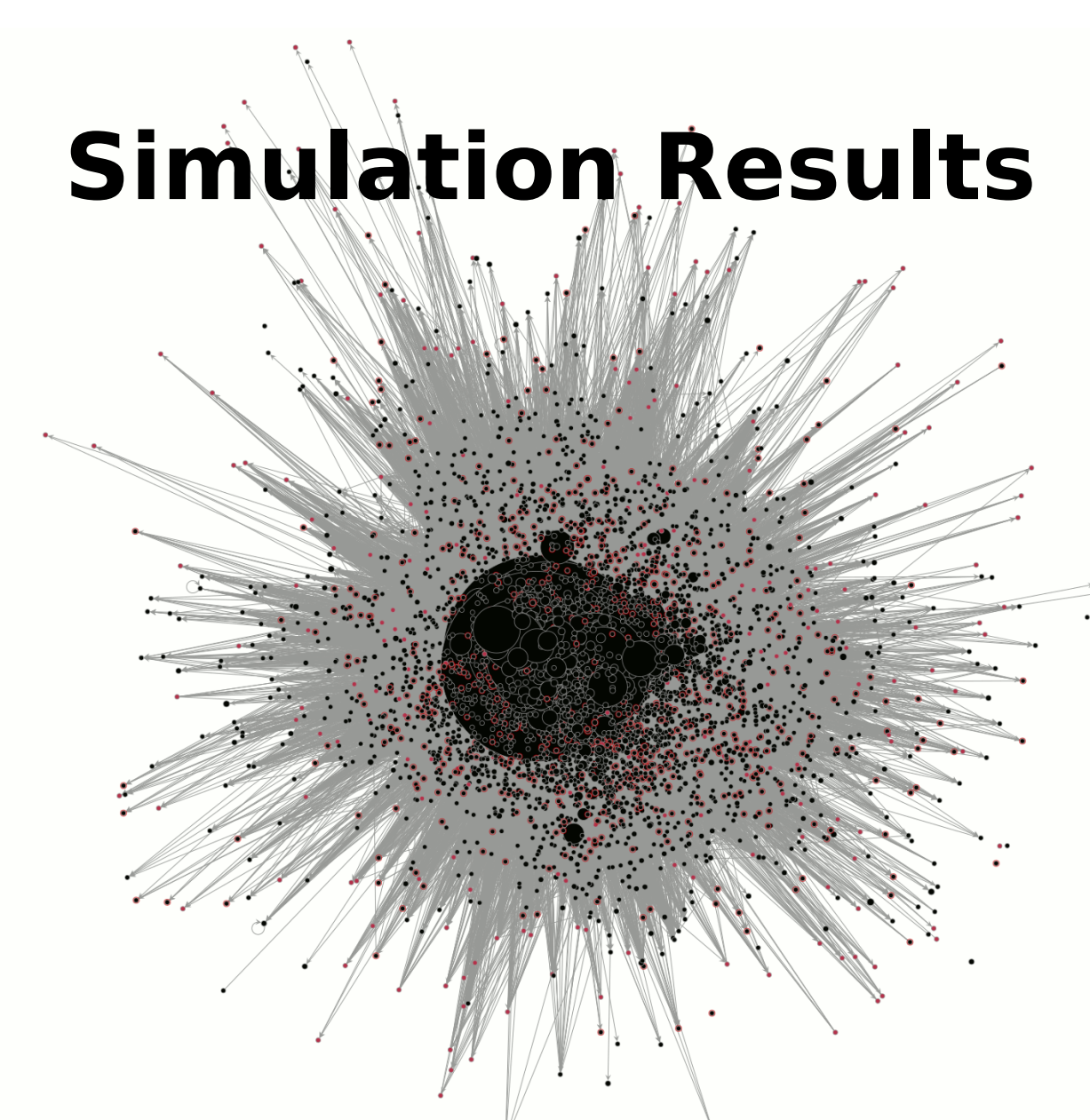
Epidemic Spreading
External (Field) Effects
Random Adoption

To simulate epidemic spreading, we use a threshold model:

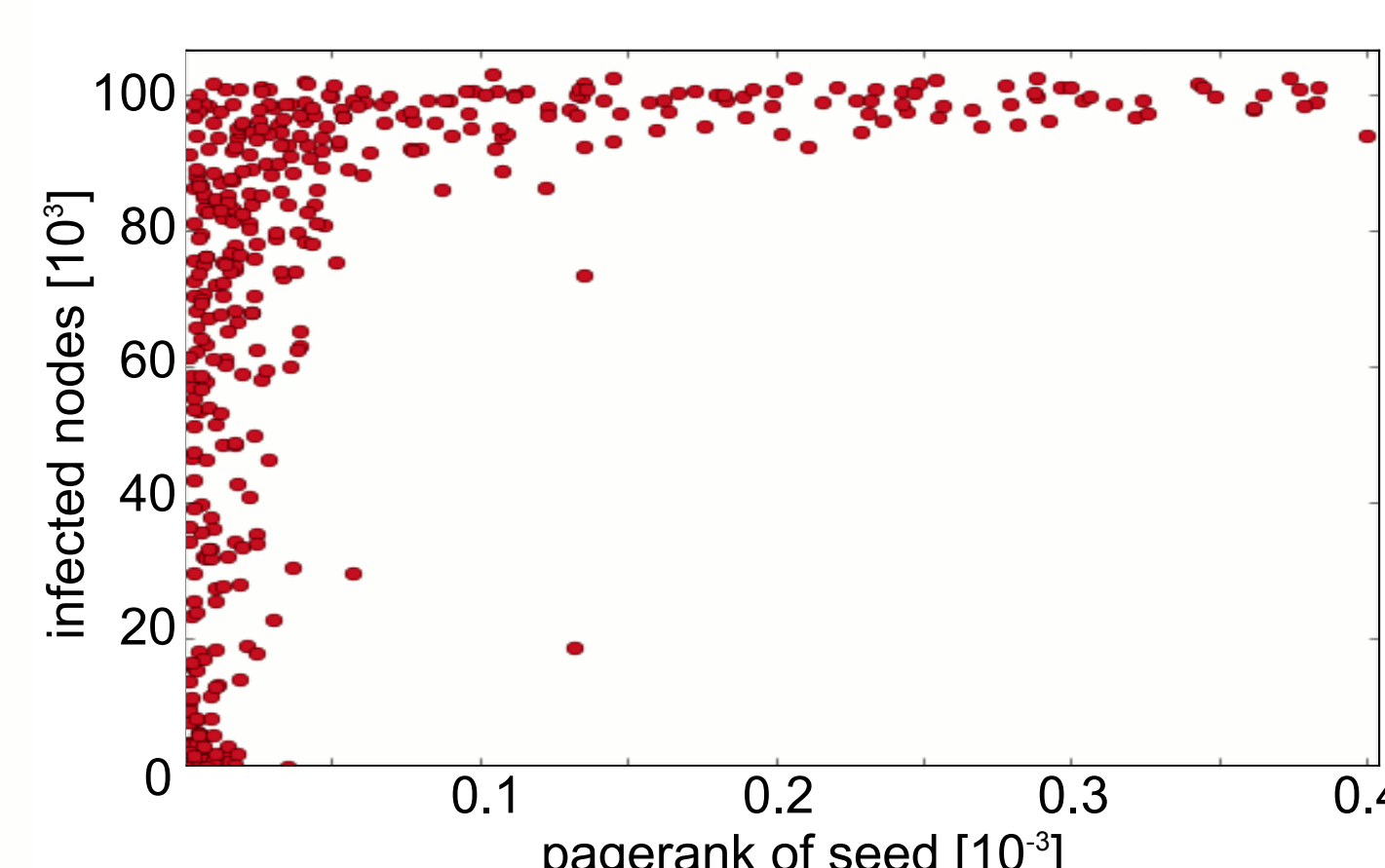
$$P(i, t) = p \cdot \theta \left(\sum_j a_{ij, t} - b_i \right)$$

$P(i, t)$: probability of infection of node i at timestep t
 p : global infection probability
 θ : Heaviside Step Function
 a_{ij} : infection adjacency matrix at time t
 b_i : infection threshold for node i

Simulation Results



simulated spreading on graph
black circles: infected nodes
size: number of interactions



pagerank of infection seed
predicts outbreak size

Summary

- Interactions on social media can be understood as spreading of information.
- Outbreak dynamics are observed in fashion data, showing a saturating exposure response function.
- We develop variations of threshold models to simulate social spreading processes.

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<http://hu.berlin/fashion>

Related Talk: P. Lorenz, SOE 19.2 (Thu 17:15)

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