



The Spread of Behavior in an Online Social Network Experiment

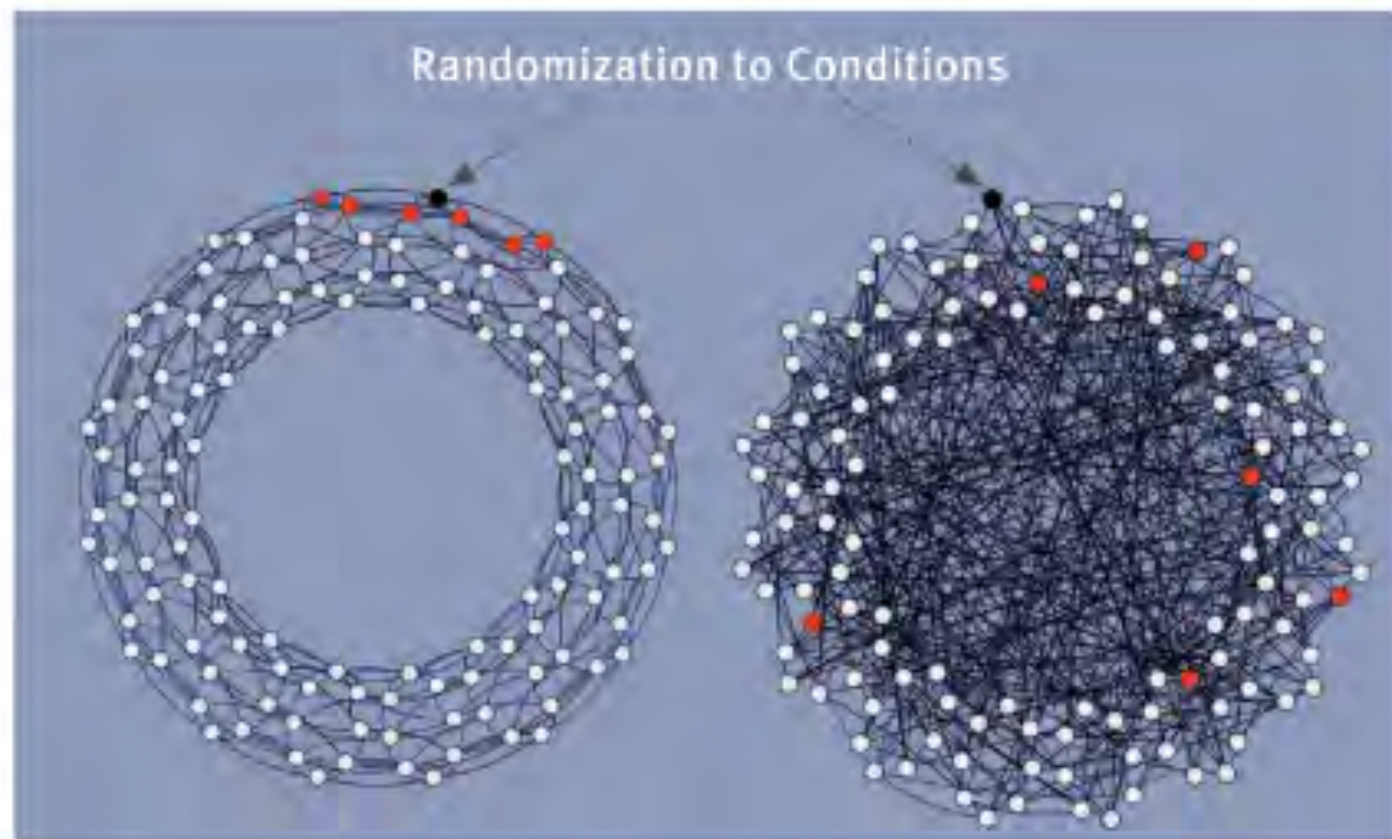
Introduction


- ▶ Online Behavior
- ▶ How the network Structure affects the diffusion of online behavior?
- ▶ A popular hypothesis states that network with long ties spread the social behavior faster and farther.
- ▶ This treats the behavior as a disease. One contact will spread the disease.
- ▶ Another hypothesis believes that the clustered network have more redundant ties which provides social reinforcement.

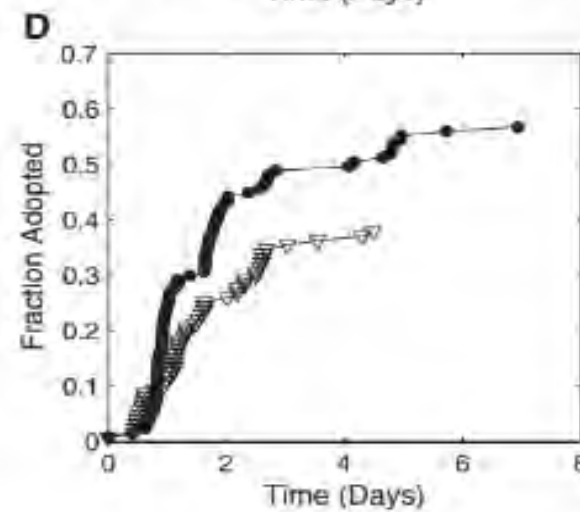
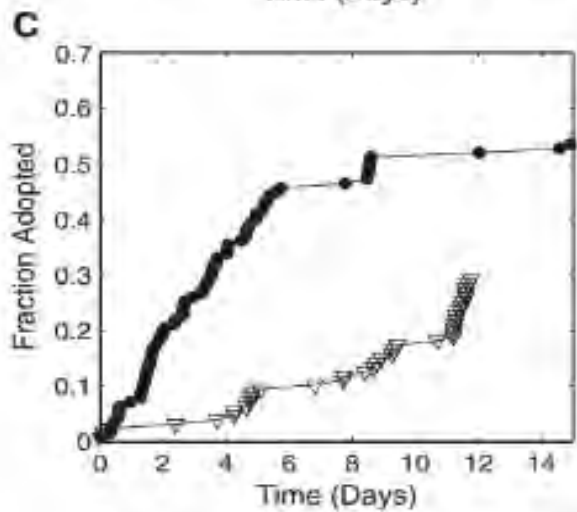
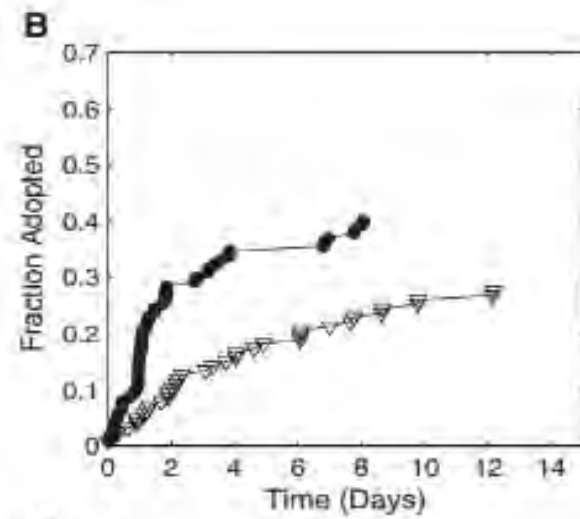
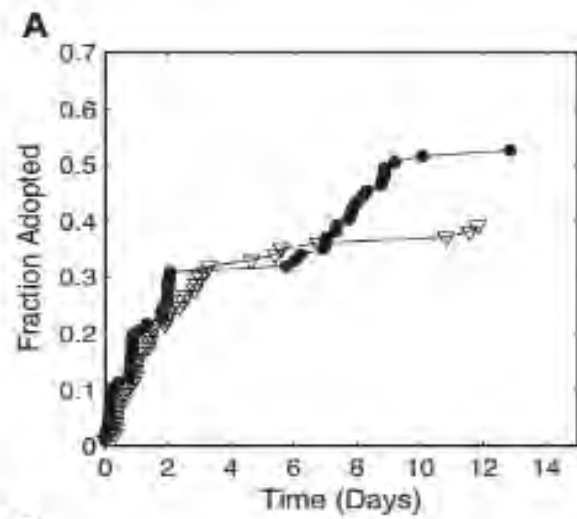
An Experiment

- ▶ Created an internet based health community containing 1528 participants.
- ▶ Study the diffusion of health behavior.
- ▶ They were kept anonymous.
- ▶ They could not contact others, but could just receive emails.
- ▶ Make decisions based on the adoption patterns of health buddy.
- ▶ Health behavior – Decision to register for online health forum.

Fig. 1. Randomization of participants to clustered-lattice and random-network conditions in a single trial of this study ($N = 128$, $Z = 6$). In each condition, the black node shows the focal node of a neighborhood to which an individual is being assigned, and the red nodes correspond to that individual's neighbors in the network. In the clustered-lattice network, the red nodes share neighbors with each other, whereas in the random network they do not. White nodes indicate individuals who are not connected to the focal node.



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- ▶ Participants were assigned to two random networks.
 - ▶ Clustered network had more redundant ties.
 - ▶ Random network was created by rewiring the clustered network based on small work network model.
 - ▶ Maintained same number of neighbors.
 - ▶ Participants had same number of neighbors and they could see only immediate neighbors.
 - ▶ Every aspect was kept similar except the network topology, because any difference in diffusion is the result of network topology.



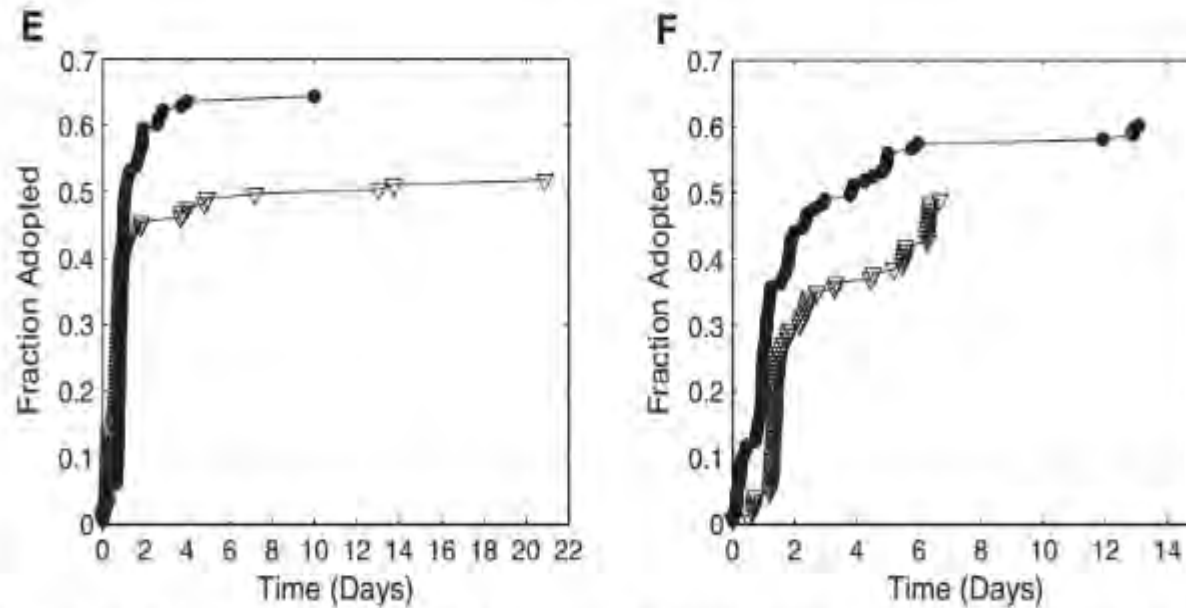


Fig. 2. Time series showing the adoption of a health behavior spreading through clustered-lattice (solid black circles) and random (open triangles) social networks. Six independent trials of the study are shown, including (A) $N = 98$, $Z = 6$, (B to D) $N = 128$, $Z = 6$, and (E and F) $N = 144$, $Z = 8$. The success of diffusion was measured by the fraction of the total network that adopted the behavior. The speed of the diffusion process was evaluated by comparing the time required for the behavior to spread to the greatest fraction reached by both conditions in each trial.

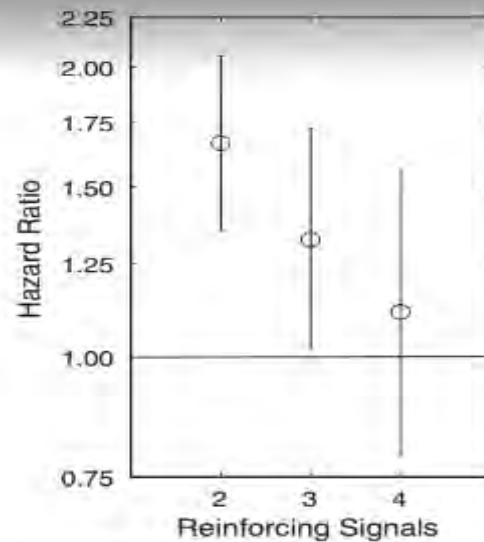


Fig. 3. Hazard ratios for adoption for individuals receiving two, three, and four social signals. The hazard ratio g indicates that the likelihood of adoption increases by a factor of g for each additional signal k , compared to the likelihood of adoption from receiving $k - 1$ signals. The 95% confidence intervals from the Cox proportional hazards model are shown by error bars. The effect of an additional signal on the likelihood of adoption is significant if the 95% confidence interval does not contain $g = 1$ (13).

Results

- ▶ Redundant Signals increased the likelihood of adoption.
- ▶ The level of commitment – returning to the health forum.
- ▶ Participants with more signals were more likely to revisit.
- ▶ Public health interventions aimed at spreading may do better in the clustered network.

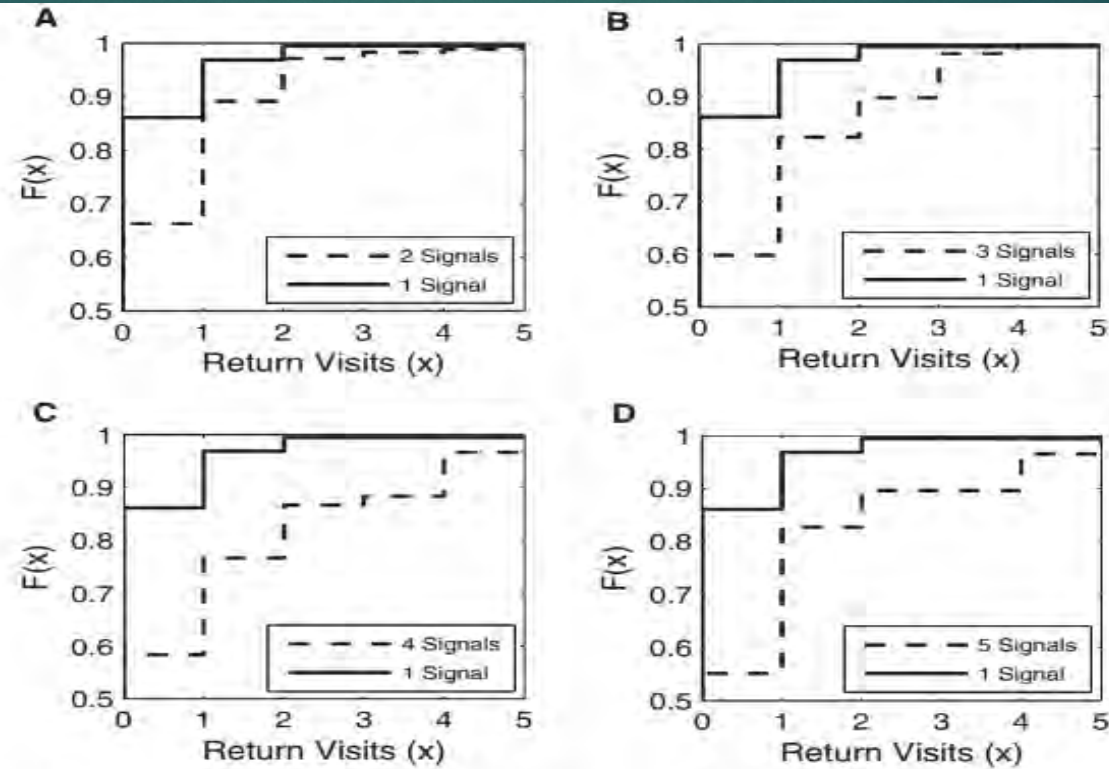


Fig. 4. Cumulative distribution functions of the number of return visits to the health forum (x) for populations of adopters grouped by the number of signals that they received. Comparisons are shown for adopters who received (A) one versus two signals, (B) one versus three signals, (C) one versus four signals, and (D) one versus five signals. All pairwise comparisons showed no significant differences (P values from the two-sample Kolmogorov-Smirnov test) (13).

Thank you!