Diffusion of innovation within an agent-based model: Spinsons, independence and advertising

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Introduction and motivation

Diffusion of innovations is a theory that seeks to explain how, why, and at what rate new ideas and technology spread.

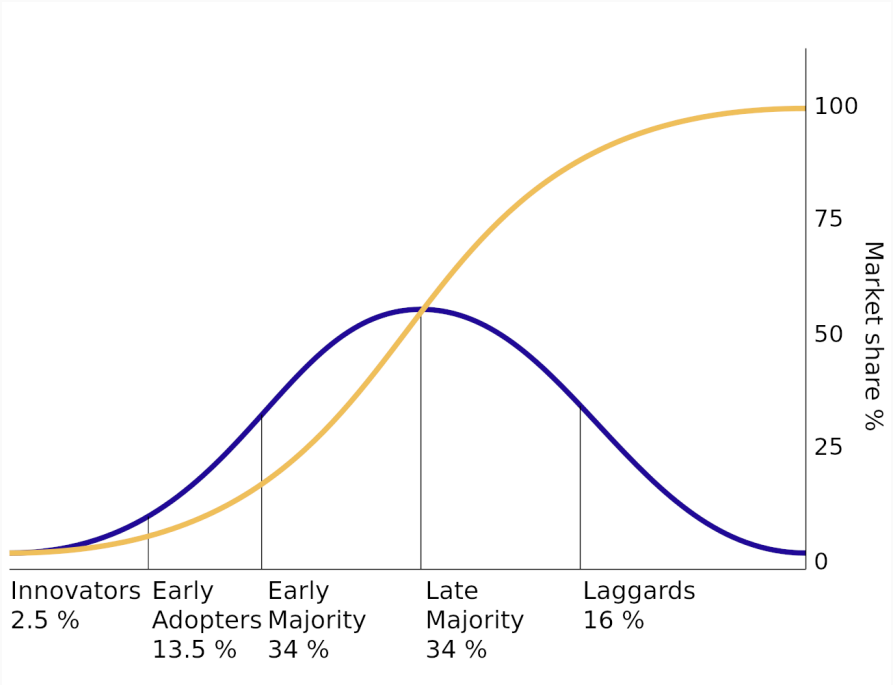


Figure 1: The diffusion of innovations according to E.Rogers. Source: `https://en.wikipedia.org/wiki/Diffusion_of_innovations#/media/File:Diffusion_of_ideas.svg`

Diffusion of innovation model

Model presentation

Model parameters

- Conformity p
- Independence f
- Advertising h

Conformity

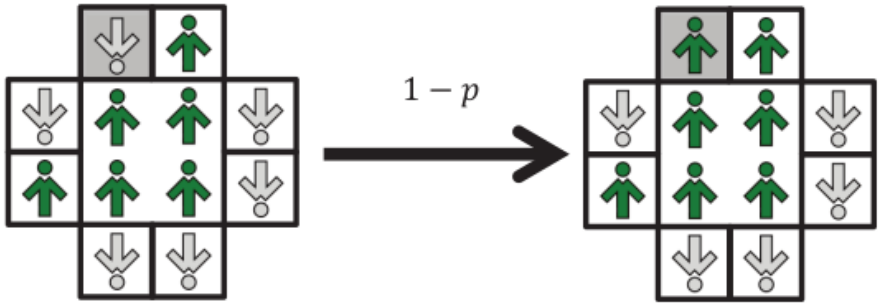


Figure 2: Schema of conformity p. Source: [1].

Independence

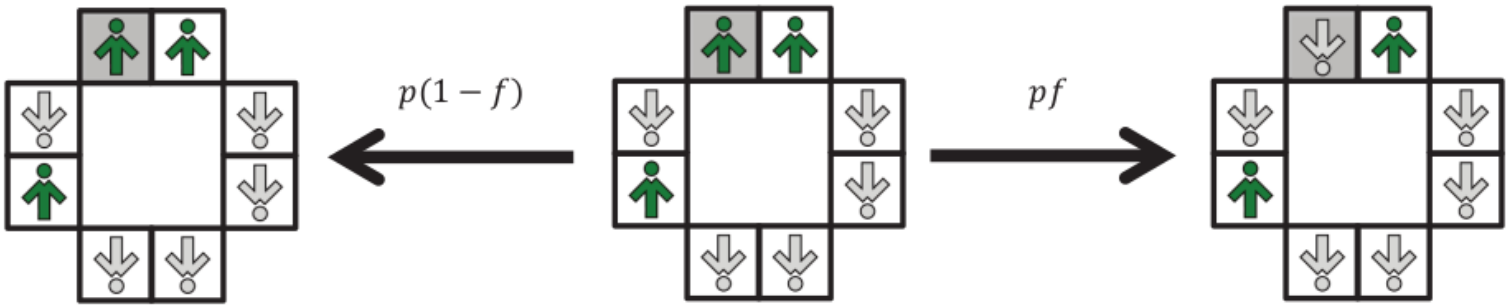


Figure 3: Schema of independence f. Source: [1].

Advertising

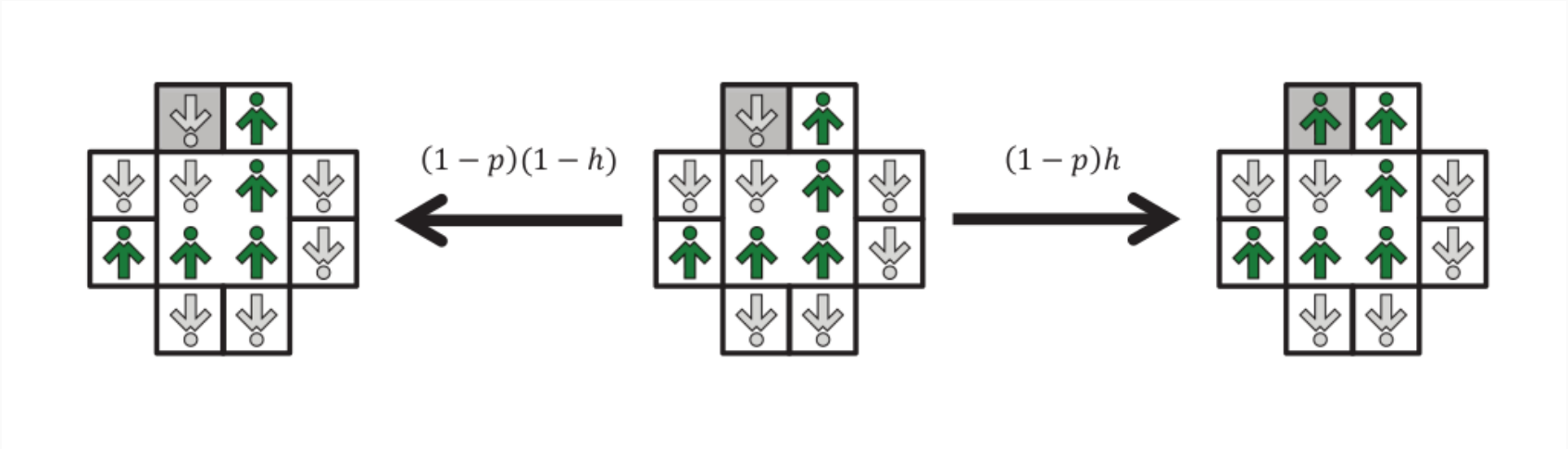


Figure 4: Schema of advertising h. Source: [1].

2D Lattice simulation

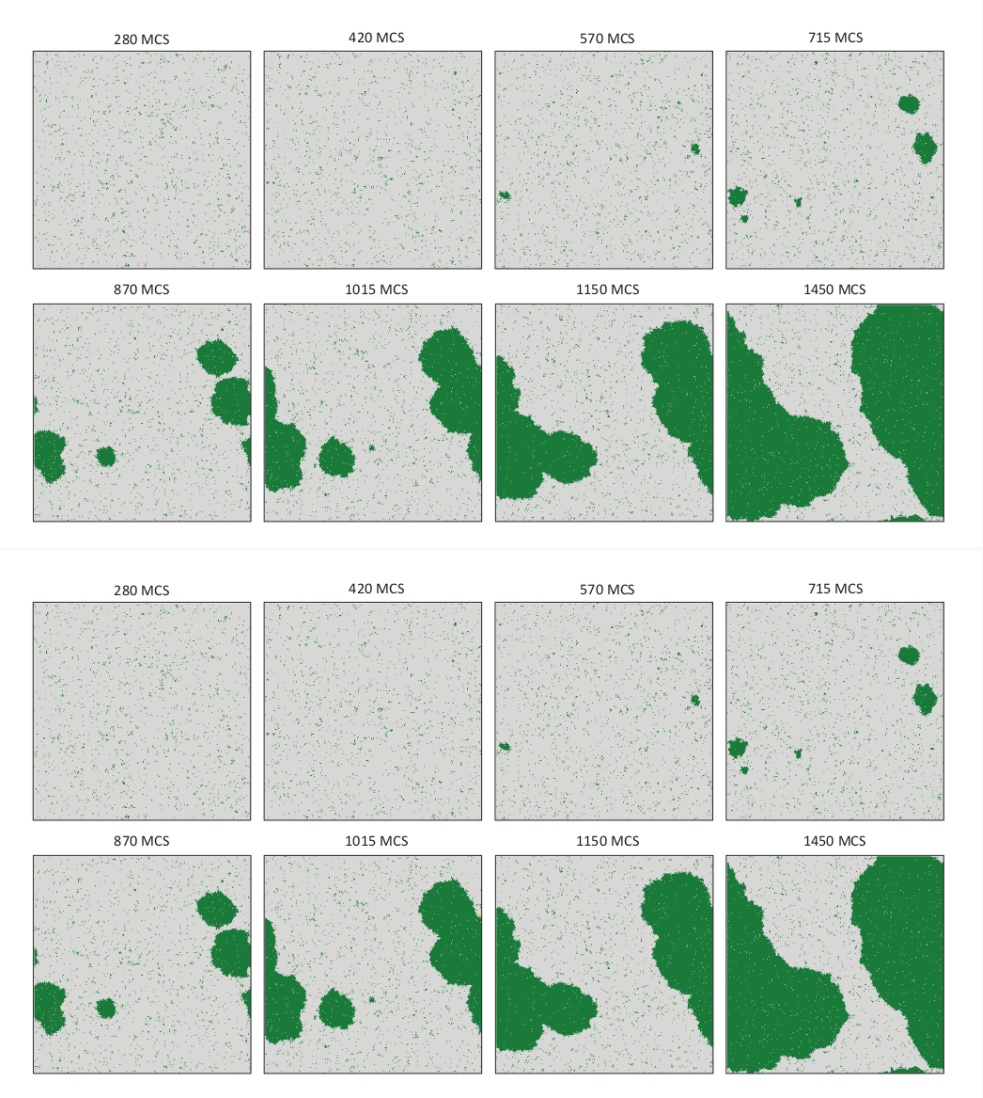


Figure 5: Up - publication; down - ours.

Concentration in time

Concentration

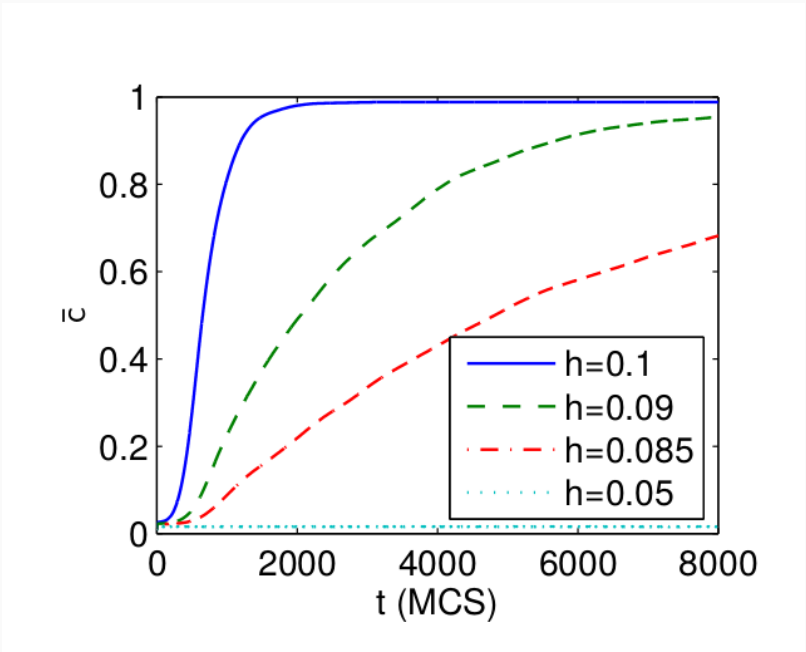
Concentration

$$c_t = \frac{N_{\uparrow}(t)}{N}$$

where

- $N_{\uparrow}(t)$ - number of adopted people, i.e. spinsons with opinion $= 1$
- N - number of people in network

2D Lattice results



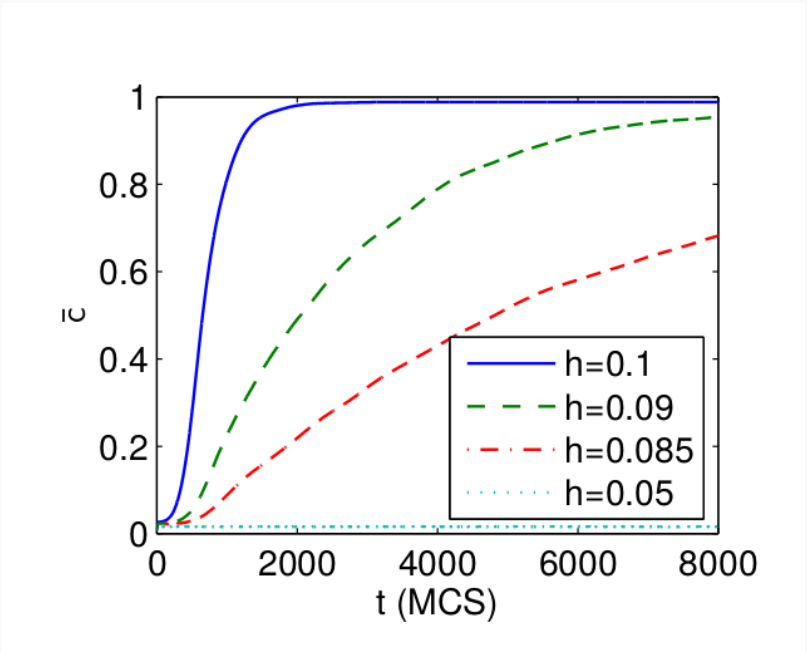
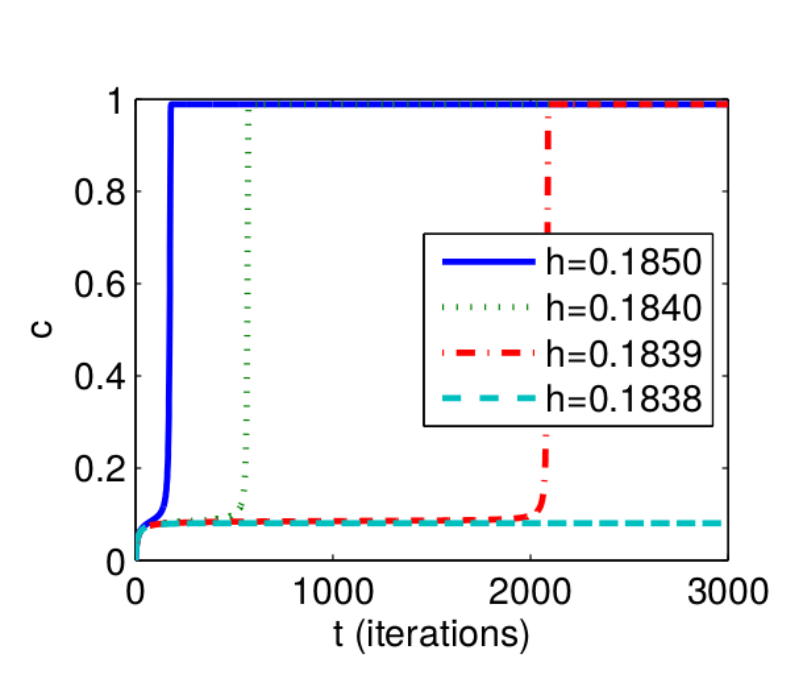


Figure 6: Left - publication; right - ours.

Complete graph results



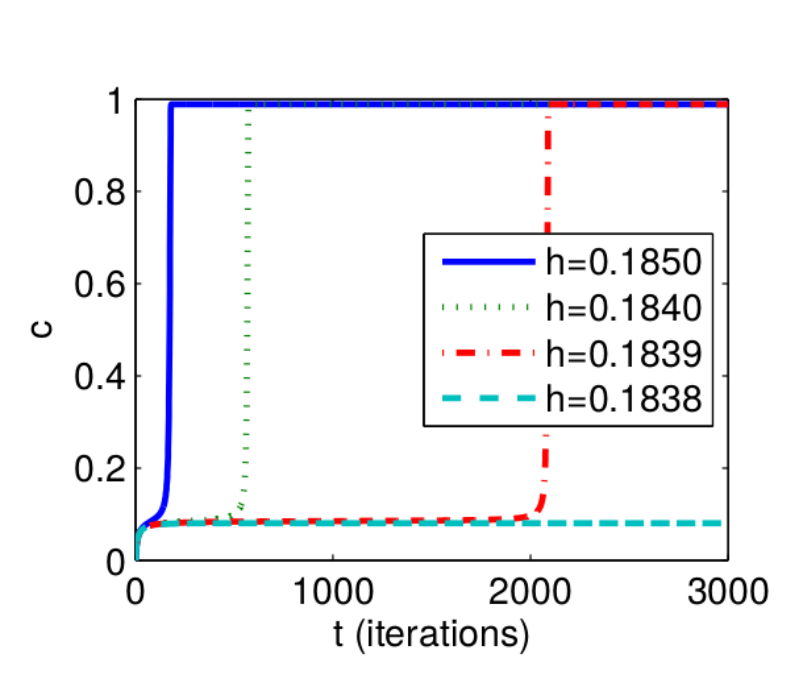


Figure 7: Left - publication; right - ours.

Watts-Strogatz results

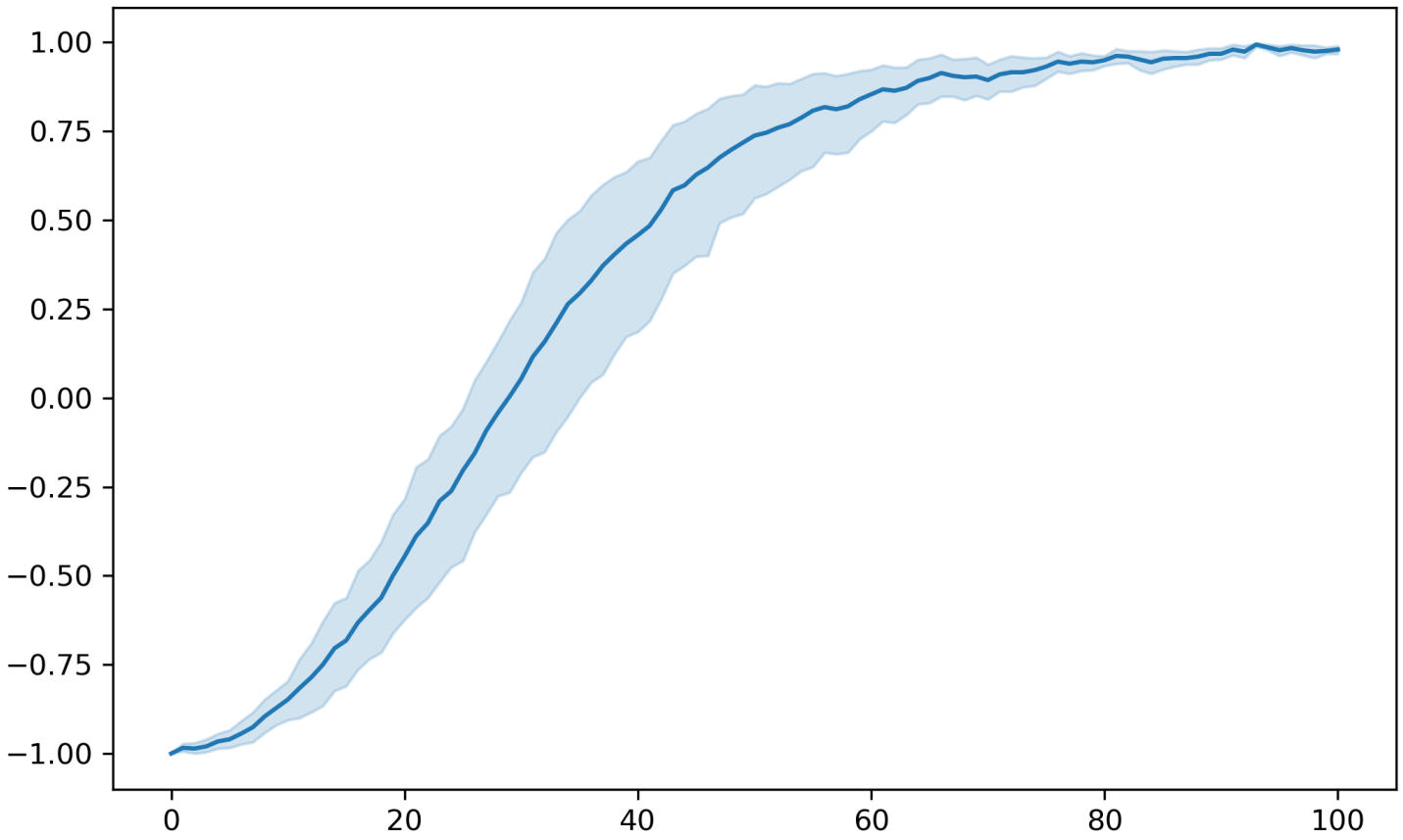


Figure 8: Our work - simulation.

Barabasi-Albert results

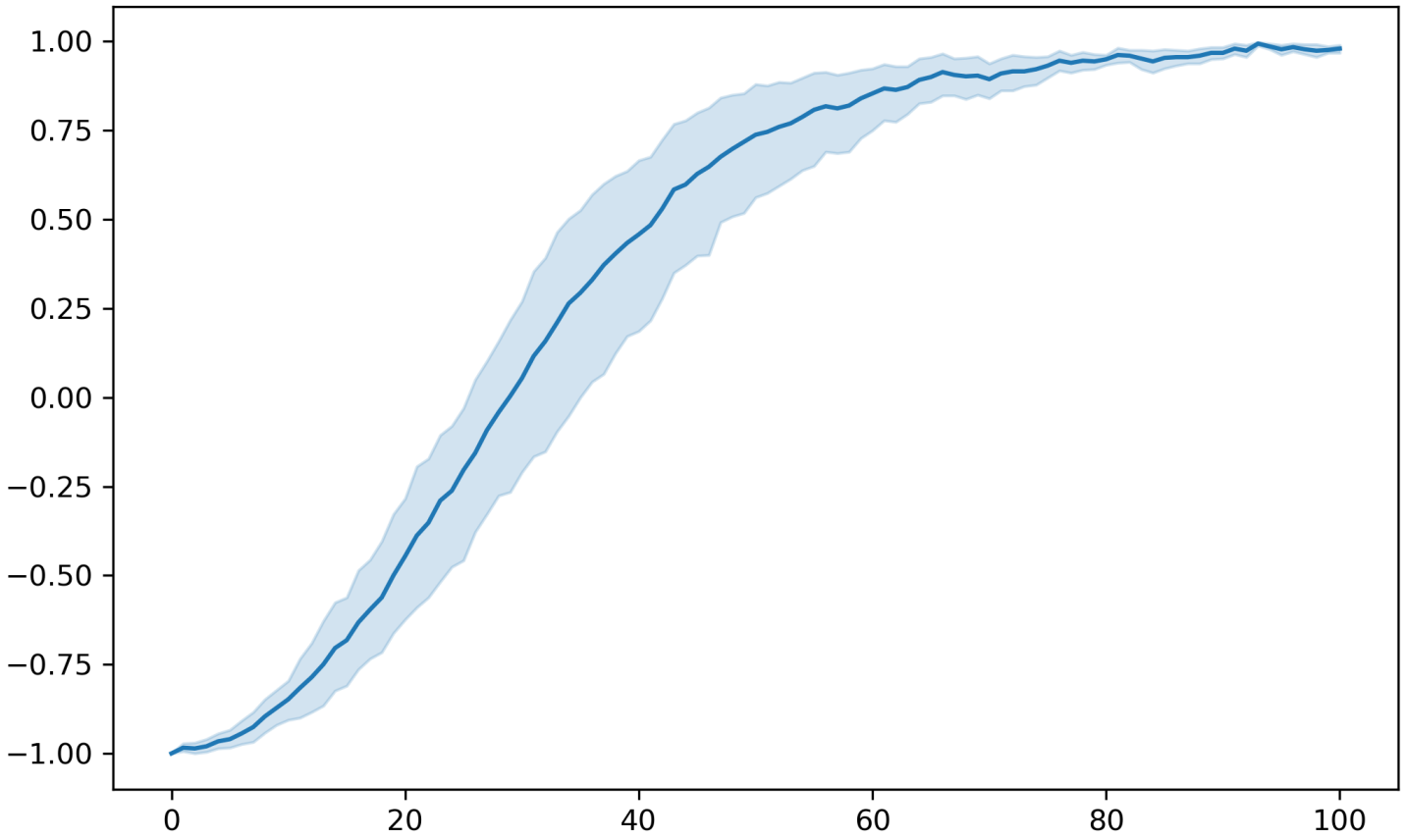


Figure 9: Our work - simulation.

Comparison of models

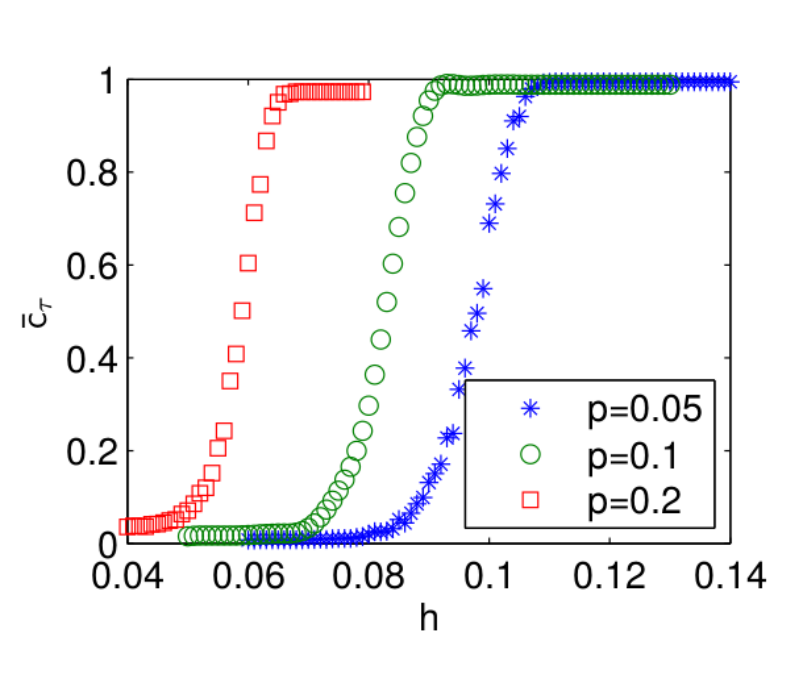
Market penetration level

Valley of death

Valley of death is a metaphor of way from the laboratory to the market when in reality many innovators fail. Contrary to aggregate models, such as Bass model, this kind of phenomena can be explained by agent-based models.

We can observe that phenomenon near the threshold values of p and h.

2D Lattice results



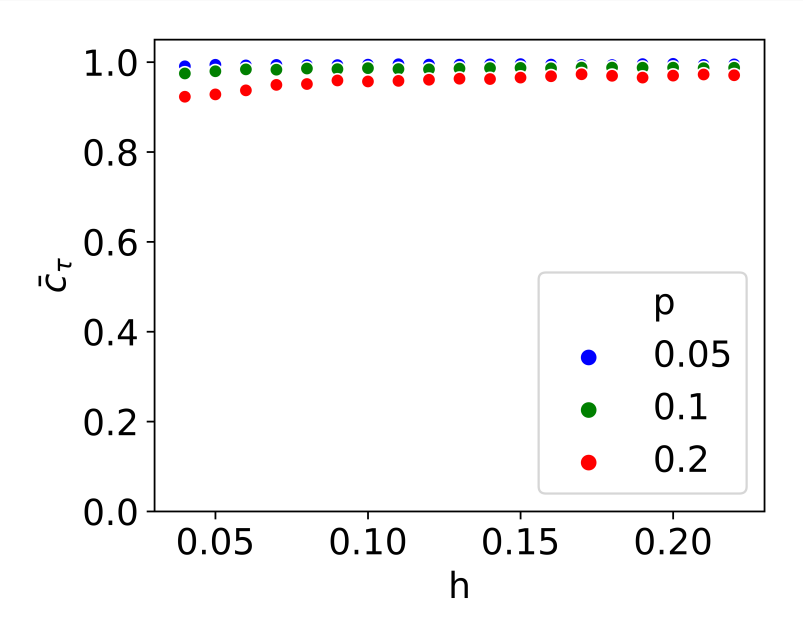
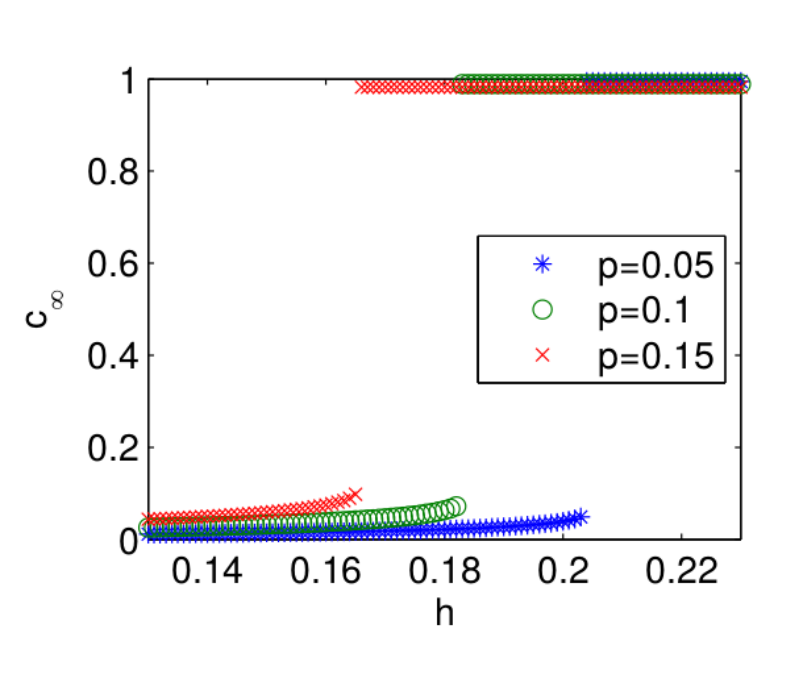


Figure 10: Left - publication; right - ours.

Comparison - Fig. 9 (left) Simulations

Complete graph results



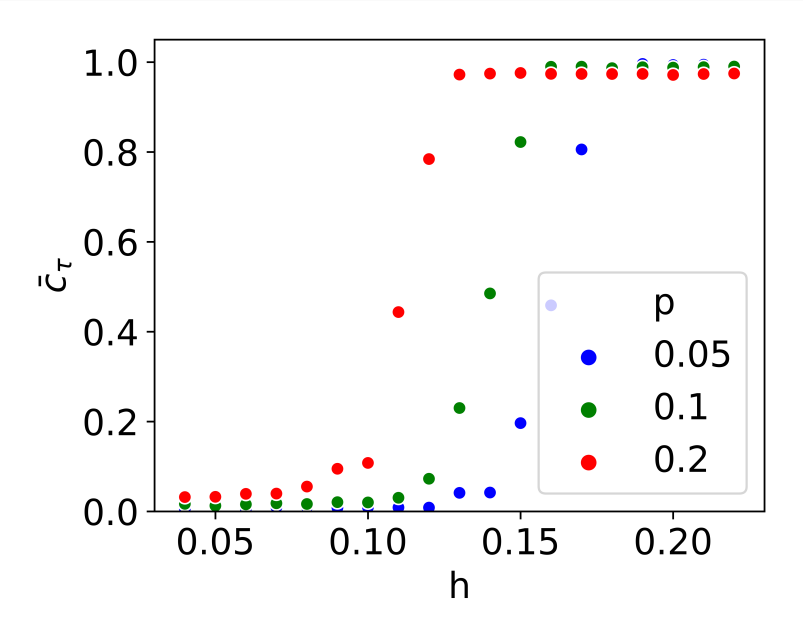


Figure 11: Left - publication; right - ours.

Comparison - Fig. 10 (right) Theoretical results

Watts-Strogatz results

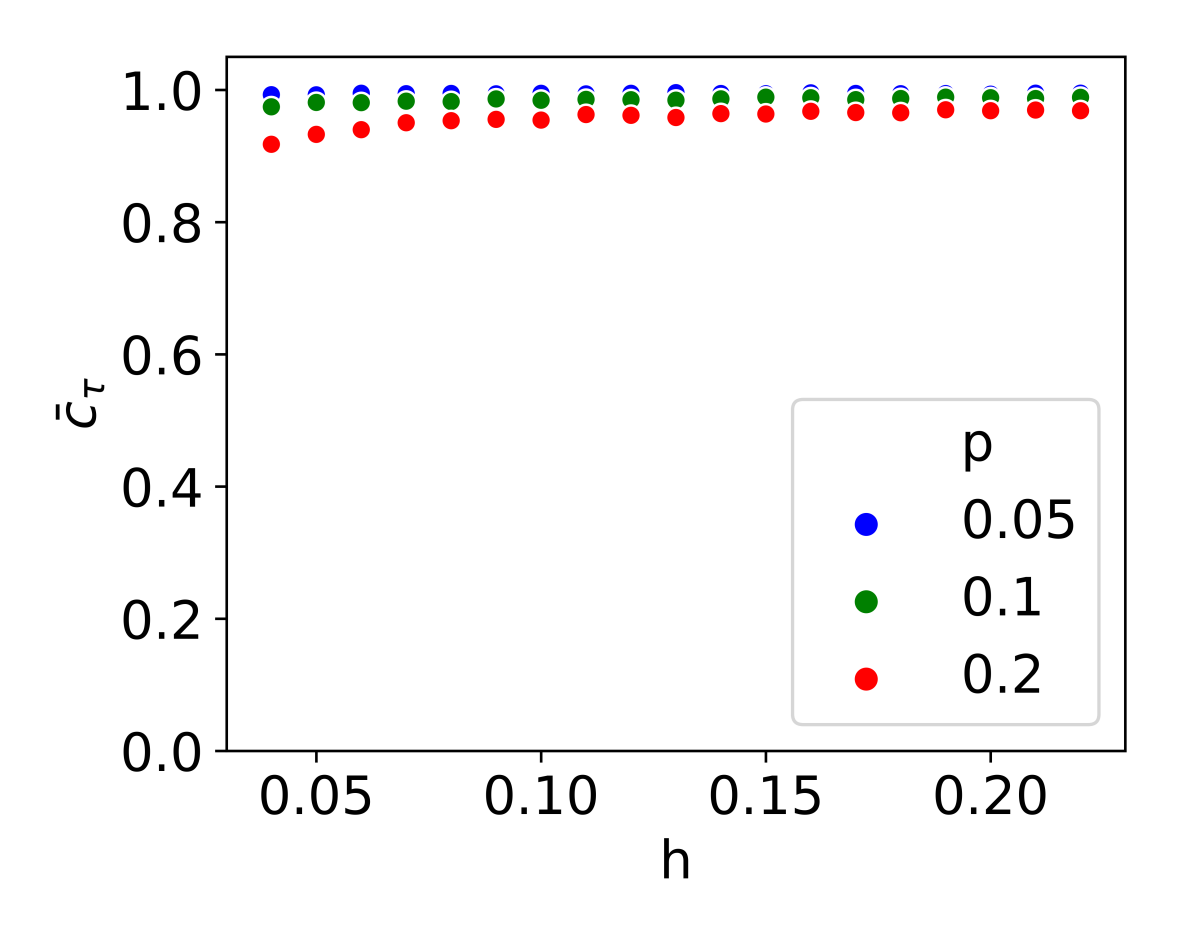


Figure 12: Our work - simulation.

Barabasi-Albert results

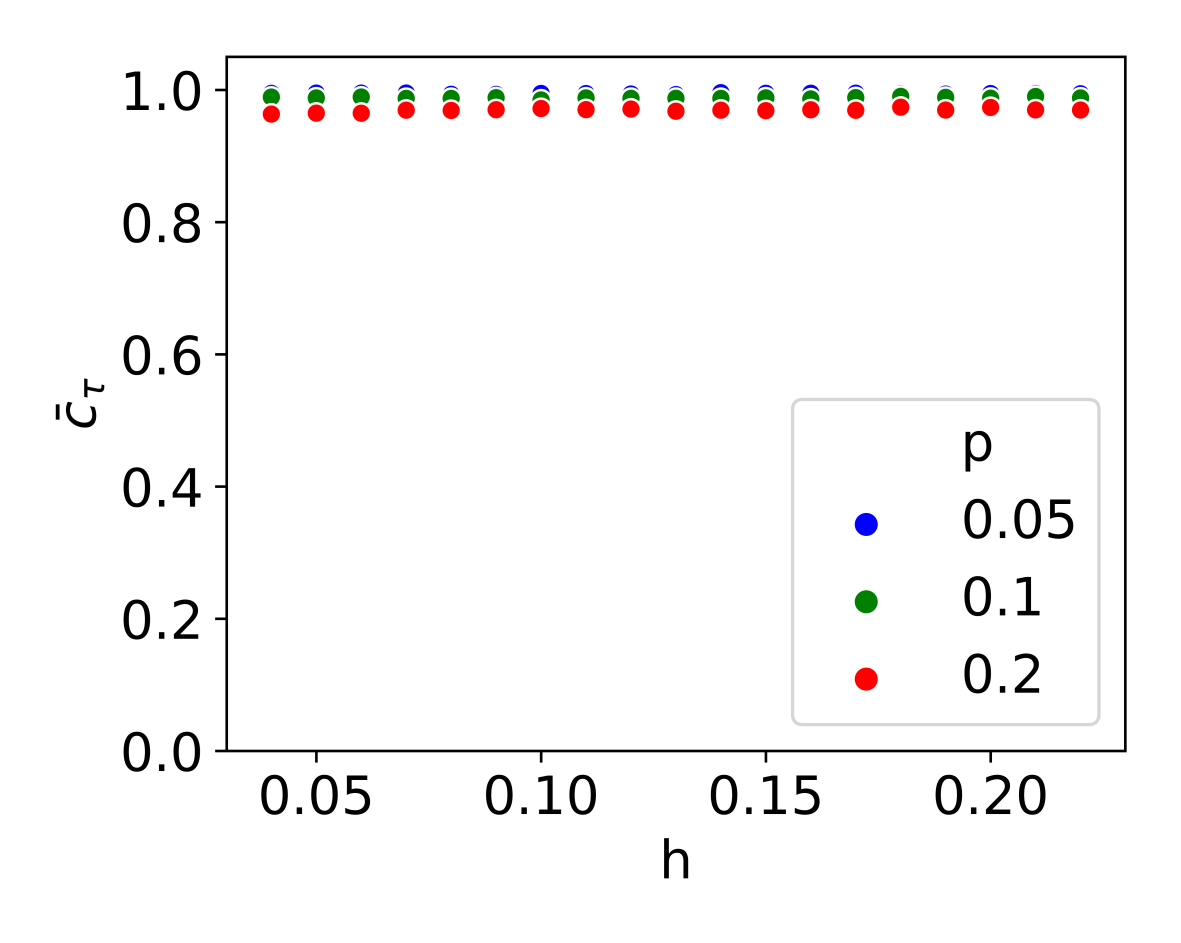


Figure 13: Our work - simulation.

Comparison of models

Try to find universal h

	p		
Graph	0.05	0.1	0.2
2D Lattice grid			
Complete graph			
Watts-Strogatz			
Barabasi-Albert			

Conclusions

Conclusions

content...

Contributions

Presentation:

- Patryk Wielopolski

Plots and analysis:

- Maria Kowalczyk
- Anna Szymanek

Simulations:

- Patryk Wielopolski

References i

P. Przybyła, K. Sznajd-Weron, and R. Weron.
Diffusion of innovation within an agent-based model: Spinsons, independence and advertising.
Advances in Complex Systems, 17, 04 2014.

Thank you for your attention!