



Simulating word-of-mouth influence on individual physical activity

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Motivation



Unilever mission:

Our mission is to add Vitality to life. We meet everyday needs for nutrition, hygiene and personal care with brands that help people look good, feel good and get more out of life.

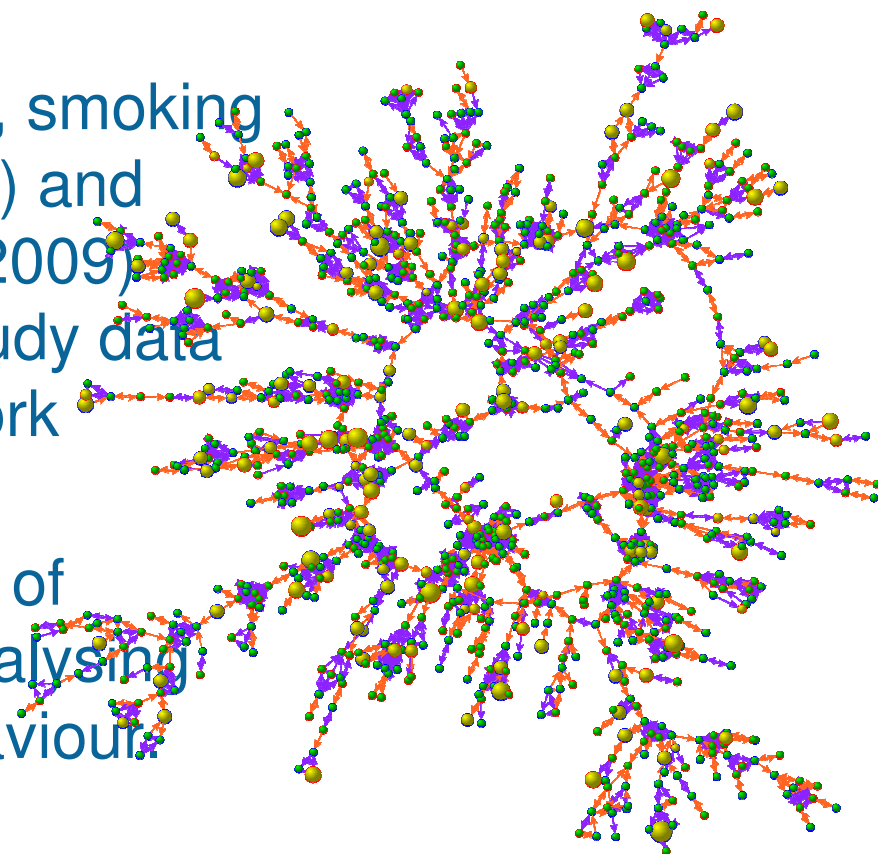


Background

Background:

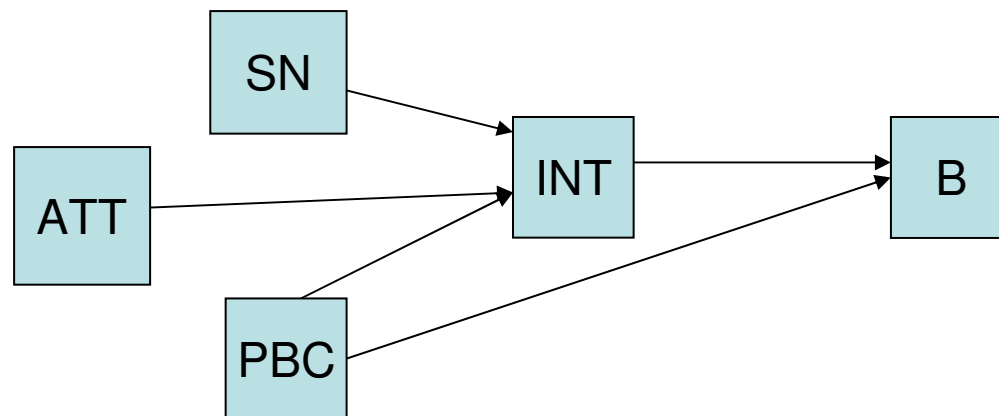
Research about spread of obesity, smoking (Christakis & Fowler 2007, 2008) and happiness (Fowler & Christakis 2009) based on Framingham heart study data shown evidence of social network influence on behaviour

SIENA (Tom Snejders, University of Oxford) models are used for analysing dynamics of networks and behaviour.



Ajzen: Theory of Planned Behaviour

Intention, Attitude, Perceived Behaviour Control, Subjective norms, Behaviour



- Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50, 179-211.
- A micro level simulation for the prediction of intention and behavior Richetin et al., *Cognitive Systems Research*, 2009, forthcoming.

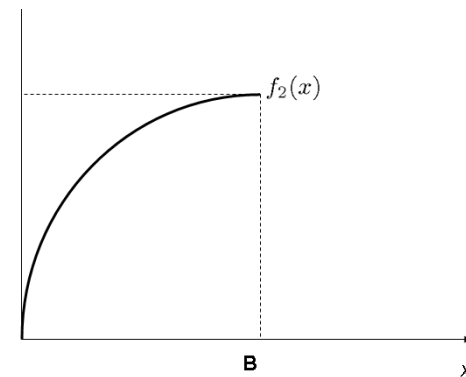
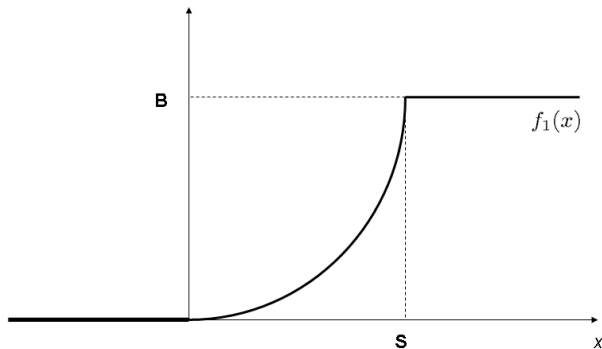
Model

- Difference between ideal and actual self (desired change)

$$\Delta s_i^{\perp}(t) = \tilde{s}_i - s_i^A(t-1)$$

$$B_i(t) = f_1(\Delta s_i(t)).$$

$$s_i^A(t) = s_i^A(t-1) + f_2(B_i(t)) - \rho_i$$



Model (cont'd)



- Others behaviour and (non-behaviour) influences an individual behaviour
- Dual threshold

$$V_i(t) = \begin{cases} 0 & \text{if } \frac{n_i(t)}{K_i} < \pi_i^1 \\ B & \text{if } \frac{n_i(t)}{K_i} > \pi_i^2 \\ B_i(t) & \text{otherwise} \end{cases}$$

Model



Networks are given in advance and are static. We used 4 models:

1. Empirical (M. Newman network analysts collaboration network, main component, 379 nodes,)
2. Erdős-Renyi (random network, $R(n,m)$)
3. Watts-Strogatz (small-world)
4. Barabasi-Albert (preferential attachment)

Igraph: Czardi & Nepusz (2006) The igraph software package for complex network research

Simulations



MyWoM - NetLogo (C:\Program Files\NetLogo 4.0.4\models)

File Edit Tools Zoom Tabs Help

Interface Information Procedures

Edit Delete Add abc Button normal speed view updates on ticks Settings...

import-network People 379 Links 1100

go

PeopleMaxBehaviour 0

alpha 1

beta 1

m1 2

m2 0.5

B 15

ro 1.5

Pi_1 0.7

Pi_2 0.9

links_file Barabasi-links.txt

ticks: 23 3D

ideal-actual

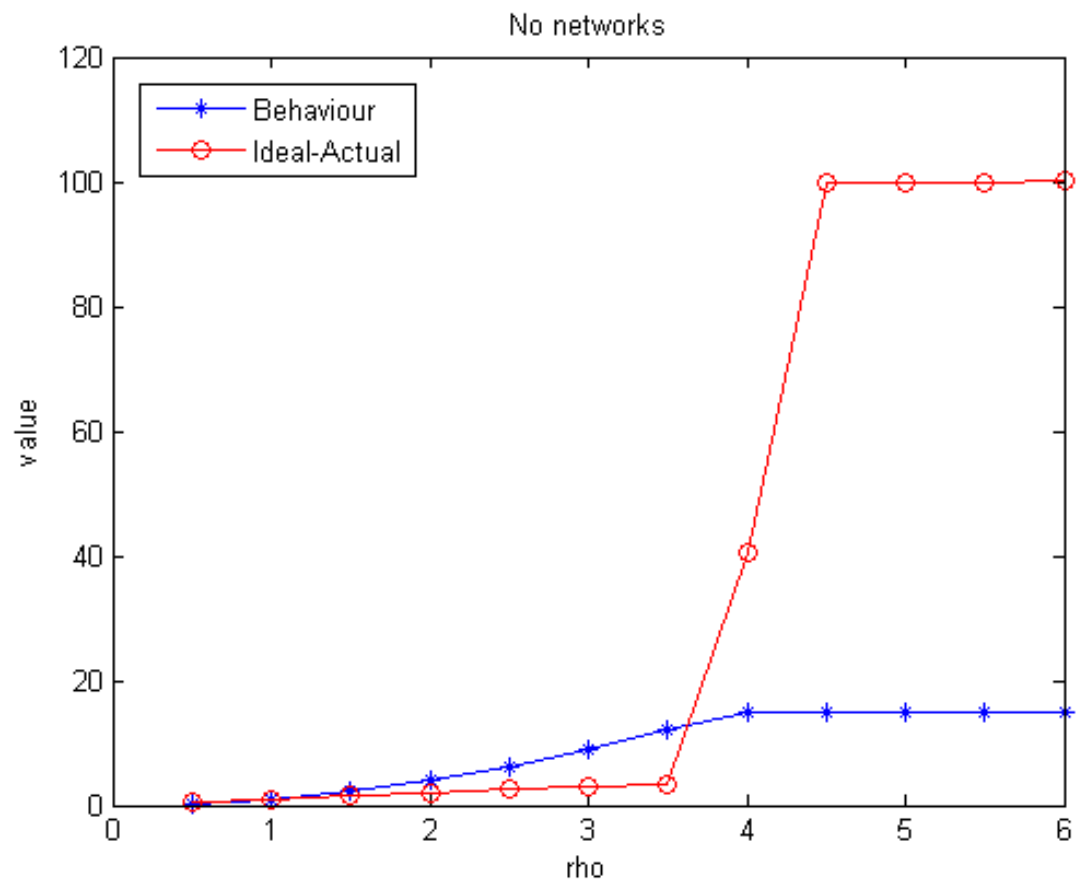
degree distribution

histogram

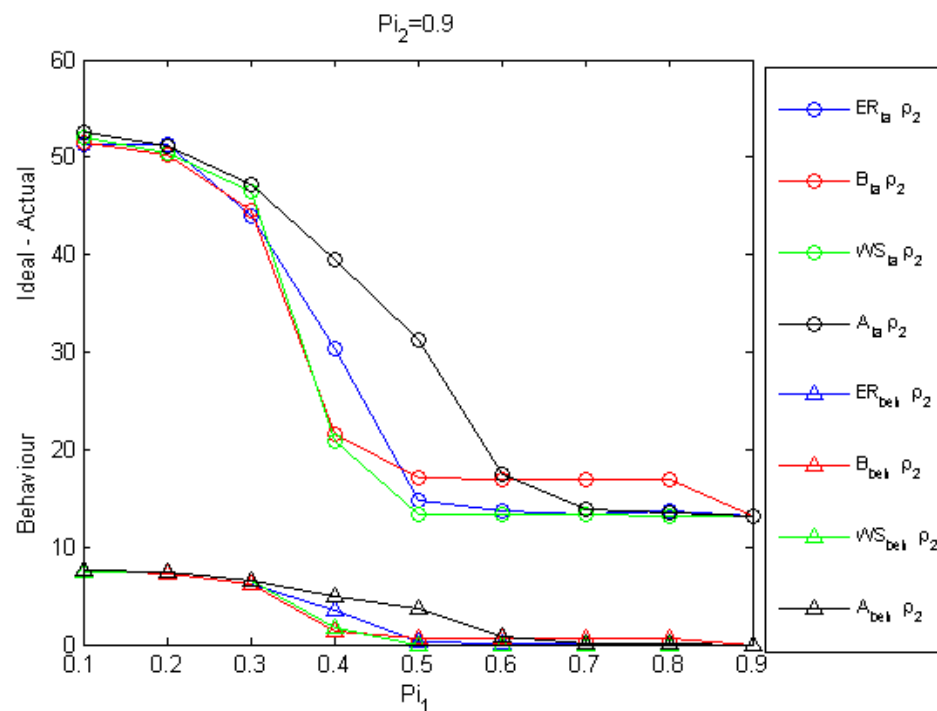
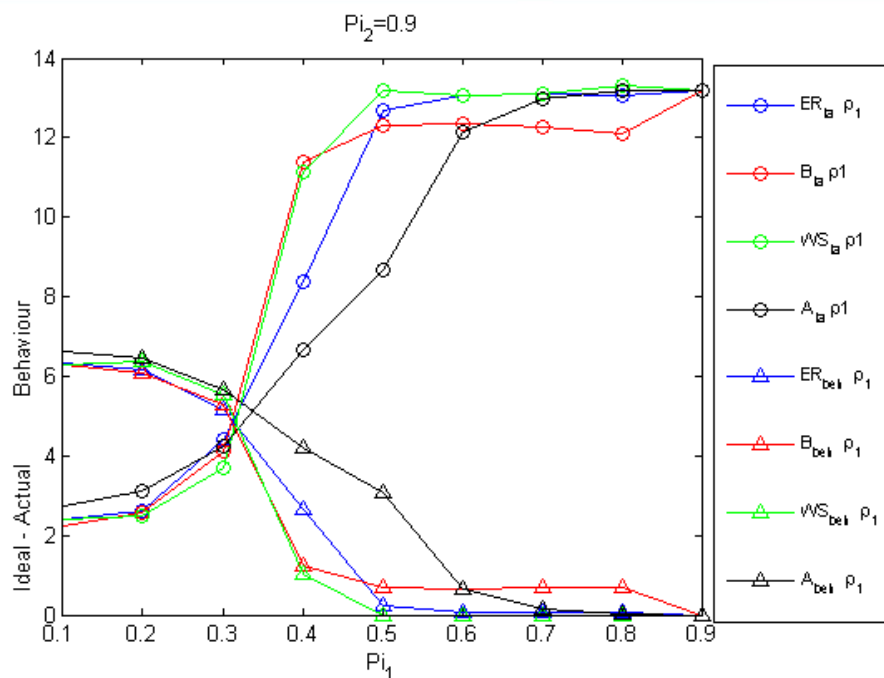
Command Center

observer > |

No networks



Networks



Summary



- When networks are present, average behaviour fails to reach maximum, even when the decay rate is set high.
- If internal motivation to carry out the behaviour is high enough, increasing peer pressure in the negative direction actually results in the *opposite* effect.
- Empirical network case differ significantly in magnitude compared with the theoretical ones.

The end



Thank you!