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Professional Social Network as a Media for Innovation Spreading

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Deep shift in modern life:
the cost to publish information
accessible to everyone in the world is

zero

Professional Social Network

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Way to accept innovation: one has to be informed about, to be interested in and to promote it .

Media for innovation spreading ?

Innovation Leader

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- A person with significantly bigger than median probability to have his idea been accepted by almost whole network.
- **Leader**: person property vs. network property.
- To reach neighbors of neighbors it has to be or an idea property or a **network** one.

Opinion leader ??

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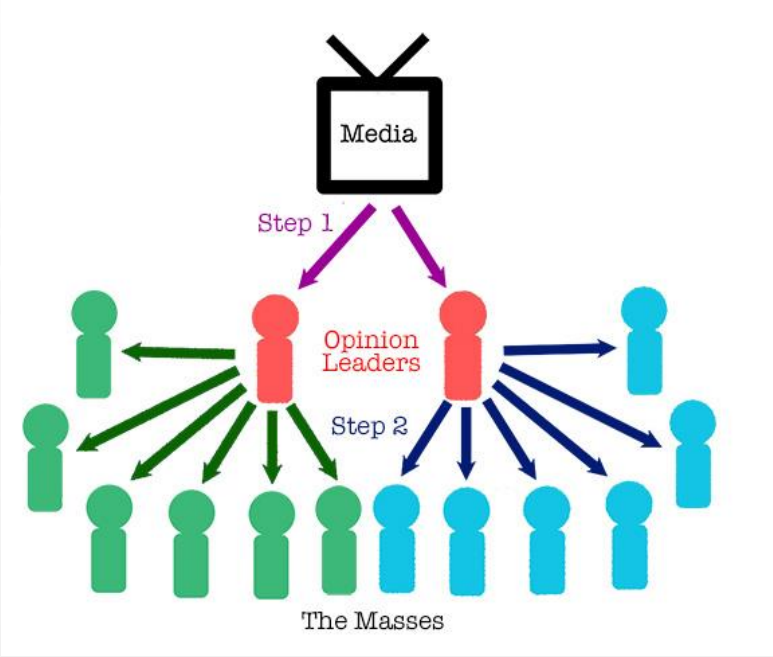
- Sociology observation – **EXISTS**. Starting from two-step flow of communication. Katz & Lazarsfeld (1955)



Opinion leader ??

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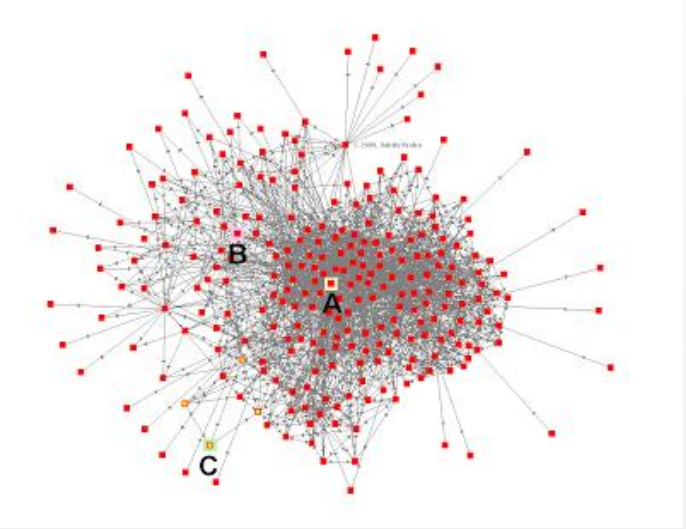
- Networks observation (based on contagion model) – **DOES NOT EXIST**. Network “stars” are not influencers ! Watts & Dodds (2007).
- Contagion model: information spreads as contagion disease, in contact exists probability to be “infected” by idea.



Who is a leader?

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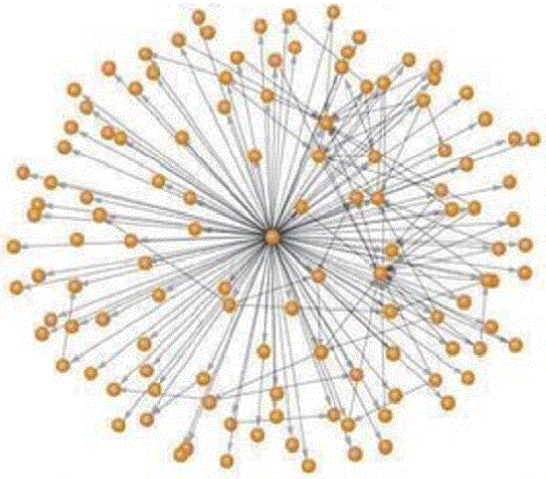
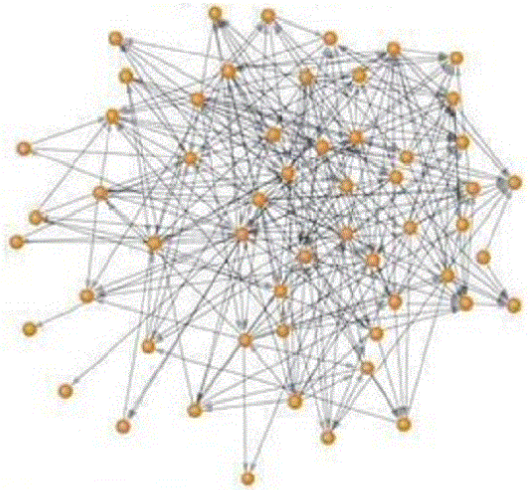
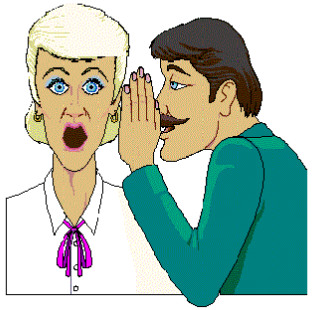




Source: "How Twitter Users Can Generate Better Ideas," by Salvatore Parise, Eoin Whelan and Steve Todd
MIT Sloan Management Review Summer 2015 sloanreview.mit.edu/x/56411



Different spreading entities

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- Why something spreads over network?

1. It is an actual one. Example: unexpected result of a football match. It is an attractive one. Example: charming cat video. **Model: contagion.**
2. It is part of social behavior. Example: obesity, used to smoke. **Model: threshold (complex contagion)**
3. It was started by opinion leader. Example: diffusion of innovation. **Model: 0-1-2**

0-1-2 Effect

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- "The probability of joining an activity when two friends has done so is significantly more than the twice of the probability of joining when only one has done so." – [Jon Kleinberg].
- J. Kleinberg.(2008) The convergence of social and technological networks. Communications of the ACM, 51(11):66-72, 2008.

0-1-2 Model

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- Two different probability:
  - P_1 :if a person is encountered with one “infector”.
  - P_2 :if a person is encountered with two “infectors”.
- $p_1 << p_2$
- The Model:
  - In each time interval for each not opinioned actor in the network we randomly select two of his friends:
    - If the two selected friends are not opinioned – the actor stay not opinioned.
    - If one is opinioned- the actor gets the opinion in p_1 probability.
    - If two are opinioned- the actor gets the opinion in p_2 probability.

Quantifying

- Measure of the leadership: probability to start innovation spreading p_{start}.
- If a one is a leader his p_{start} has to be significantly bigger in comparison to others.
- Tipping point t_p is a time period from start of spreading to "explosion" of innovation.
- t_p is approximately time for innovation to reach 10% of SN actors.
- $p_{start} \sim \exp(-t_p/t_0)$

Simulations

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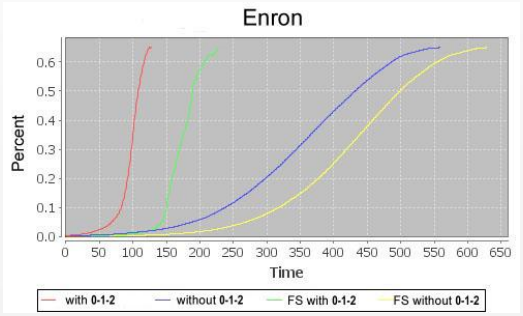
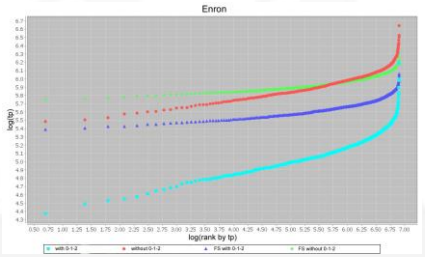
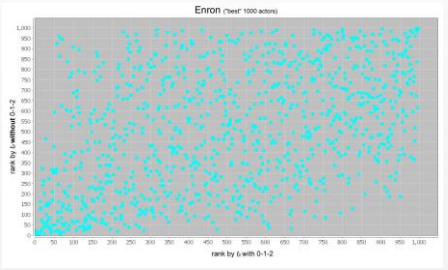
- We simulated innovation spreading on different real world social networks.
- The networks have a Small World property (big number of triangles) and power law degree distribution.







Conclusion

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- **Innovation leader is a network structure property**.
- For innovation leaders existing **Small World property is essential**.
- Innovation leaders have big number of "friends", but in contrast to "stars" **their "friends" are "friends" to each other**.

Thank you.

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