

# The Propagation of Bad News

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P150

6/2/2009

# What is Bad News?

- Definition: Unwanted news
  - Possible categories
    - Negative event
    - Harmful gossip
    - Nonsensical rumor
    - Fact (Only sometimes)
- Bad news is information.
- Information propagates.
- Propagation requires energy.
- What drives bad news?

# Study

- Goal: How does bad news spread so fast?
- Hypothesis: Due to the various possible paths, bad news spreads chaotically. Also, the driving force is due to the many paths.
- Method: Simulation with both static and random variables to “represent” reality.

# Hypothesis

- Consider this system
  - A person consists of a position vector and belief number.
  - Position is relative to original event location.
  - Belief is a fraction, where 0 is complete disbelief and 1 is complete belief.
  - People may contact others using many different methods.
  - Assume every person knows how to contact everyone else.
  - Assume belief is additive up to 1.
- What happens if only people may spread the news?

# People

1. Consider one initial witness at origin with belief = 1.
2. Initial witness contacts nearest neighbors, that is, neighbors with smallest distance between origin.
3. Neighbors become witnesses with some random belief. Possibly has no belief.
4. After a time step, all people in system move a small, random amount.
5. Now all current witnesses contact nearest neighbors and news spreads.

# Spread Rate (Just people)



# People and Tools

1. Consider same system as for people.
2. Now add communication tools which have either larger radius or larger distance capability.
3. However, max belief will be lower.
4. Witness using tool forfeits nearest neighbors for time step.
5. Happens at separate set probabilities in a time step.

# Tool Characteristics

- Phone – Many sources
  - Contacts one person at a large, set, relative distance to witness.
  - 75% belief factor
- Radio – Moderate
  - Contacts all people within 3 nearest neighbors of witness.
  - 50% belief factor
- TV – Few
  - Contacts all people within 7 nearest neighbors.
  - 33% belief factor
- Internet – Rare
  - Contacts all people within 15 nearest neighbors.
  - 10% belief factor.



# What Happens?

- Based on logic, the bad news spreads quickly and soon all people are full witnesses, i.e., belief = 1
- Addition of communication tools speeds up spread and causes the chaotic system.
- The tools allow the same person to be contacted several times in a time step.
- Due to additive belief, the person is more likely to become a witness when more witnesses exist.

# Stability

- Looking at the system, it seems to be always unstable.
- Only stability would be if initial witness had belief 0.
- Anything else allows belief to increase until reaches full witness.

# Other possibilities

- Witness with negative belief have disbelief.
- Additive belief means allow possibility of witness becoming normal again.
- Language barriers – only some belief or more disbelief added.
- Like/dislike – What if person hates witness?
- Reputation – Witness has history of exaggeration or outright lying.
- Tool frequency – Increase as belief increases?
- Free will – How to simulate?

# Results

- Main cause of spread is the addition of tools.
- Comparing to reality, it seems likely.
- Everyone is a full witness within a small amount of time.
- Needed time is proportional to population.
- Bad news seems to drive itself.

# Conclusions

- Simulator does not represent true reality.
- Very simplified model.
- Shows only if witnesses are believed.
- Possibly models a small, closed community.
- Plenty more can be done.