# The Propagation of Bad News

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### 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

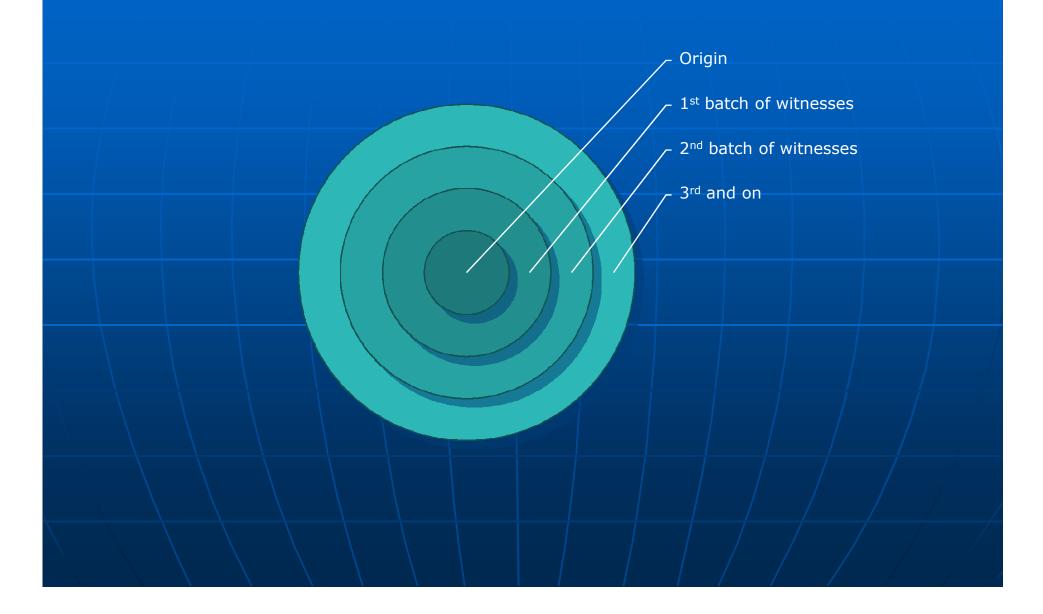
#### Consider this system

- 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 exists.

## 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.