

# **Rules, agents, edges and distributions:**

## ***Requisite components for computational social science models***

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**“"It usually takes more than three weeks to prepare a good impromptu speech.”**

**Mark Twain**

".. one cannot step in  
the same river twice."

"History does not repeat  
itself but it sure does  
rhyme."

Complex  
Systems

"Ain't nothin' ever  
happened that can  
happen again."

"Those who don't know  
history are destined to  
repeat it."

# Prohibition as a model



Example:

- How would you model Prohibition (1920 – 1933)?
  - Politics, Policy, and Policing
  - Asymmetrical support
  - Produced pervasive unintended adverse consequences

# Consequences

## Good

- Social
  - Vote
  - Integration



## Bad

- Corruption
  - Local, State
  - Federal
- Alcohol

## Ugly

- Crime
- Violence
- Poison

# Validation, Signatures, Metrics

- Scale specific metrics
  - Process and distributional characteristics
    - Robust  $n$ \_dimensional systems generate scale specific metrics: micro, meso, macro, time, space 
- Collectively they generate a signature
  - e.g., hook echo in thunder storm consistent with tornado presence 
- Validation requires data

## Rules

- Simple
- Local
- Update
  - Evolve
  - Feedback
- Sensitive:
  - Time
  - Event
  - Space
  - Scale
    - Process

## Agents

- Thin
- Heterogeneous
  - Genetic
  - Phenotype
  - Ontogenetic
  - Local Inhomogeneity
  - Memory
- Spatial
- Imperfect use of Information
- Probabilistic Response

## Edges

- Local
- Distribution
- Stochastic
  - Update
  - Reciprocal Influence

## Distributions

- Behavioral Structure
  - Exhaustive
  - Mutually Exclusive
- Perturbations

## Metrics

- Features
- Sensitive
  - Process
    - Stationary
  - Stage
  - Differences



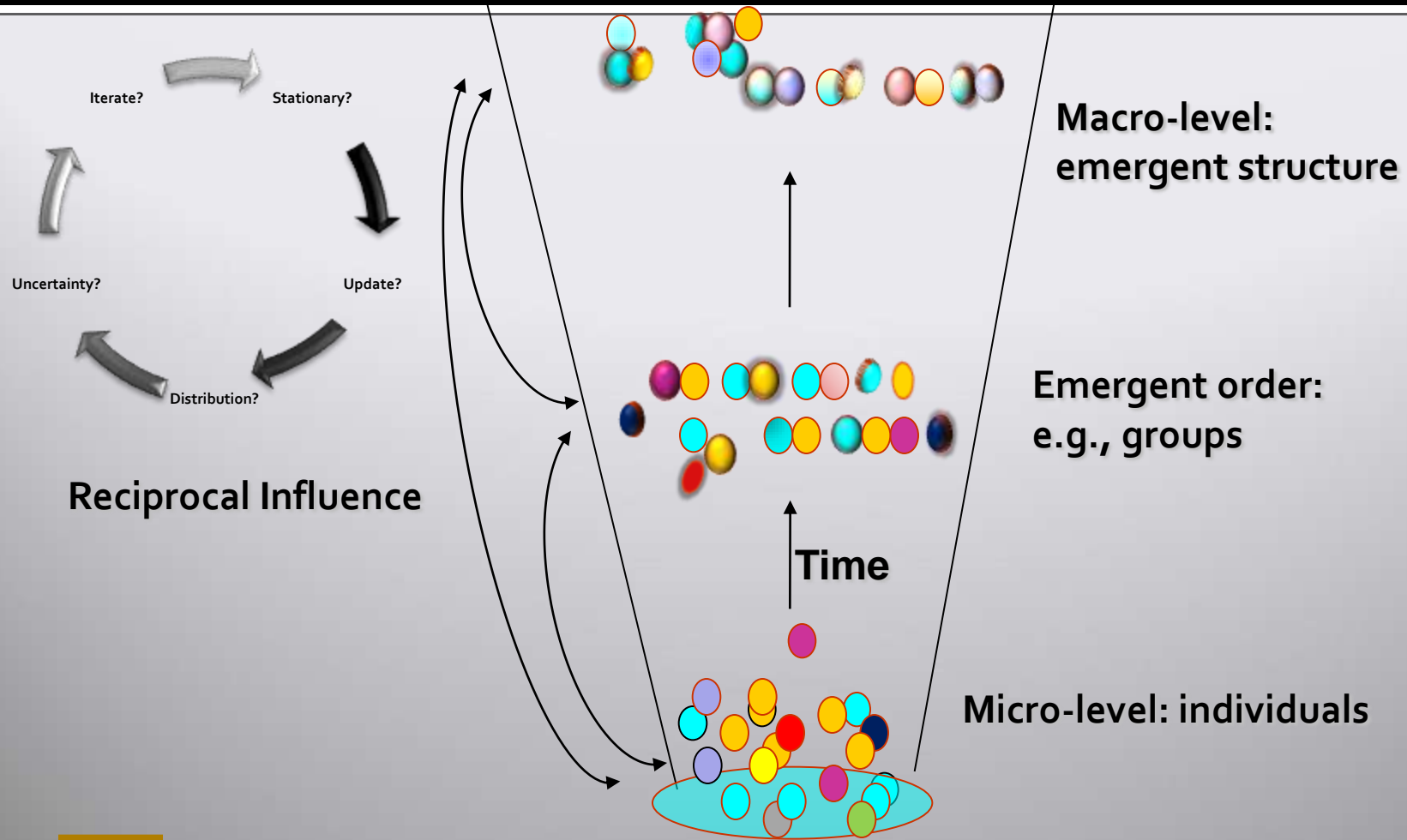
**“Science, in other words, is a system of relations. . . . it is the relations alone that objectivity must be sought; it would be vain to seek it in beings considered as isolated from one another”.**

Henri Poincaré

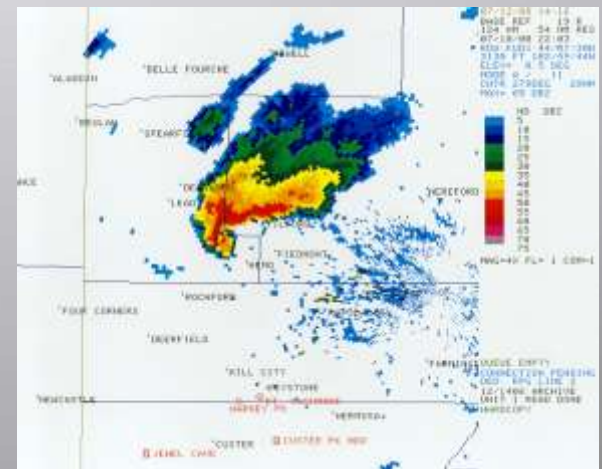
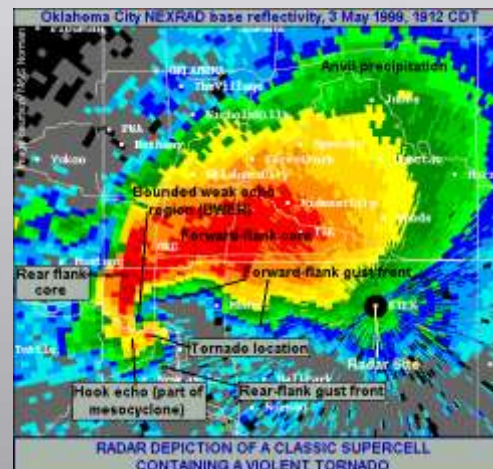
“Science and Reality” in *The Value of Science: Essential Writings of Henri Poincaré* (ed., Gould, S. J., 2001; pg. 347; original, 1913).



# Evolution of Poly-Level Processes In Social Organization



# Echo Hook: Signature





# References

## **Weather Photos:**

- [http://en.wikipedia.org/wiki/File:Tornadic\\_classic\\_supercell\\_radar.gif](http://en.wikipedia.org/wiki/File:Tornadic_classic_supercell_radar.gif)
- [http://www.crh.noaa.gov/Image/unr/07-10-00/07-10-00\\_Base\\_Zoom.gif](http://www.crh.noaa.gov/Image/unr/07-10-00/07-10-00_Base_Zoom.gif)
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## **Prohibition:**

- Blum, D. (2010). The Poisoner's Handbook: Murder and the Birth of Forensic Medicine in Jazz Age New York. Penguin Press HC.
- Okrent, D. (2010). Last Call: The Rise and Fall of Prohibition. Scribner.

## **System Quotes:**

- (1) Heraclitus; (2) Mark Twain; (3) Butch Hancock 'Flatlanders'; (4) Edmund Burke