# Transformation of Mature Communities –
# All about Social Identity and Collective Intelligence

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Transformation of mature communities, like New Mexico, to a healthier state is complex: solutions that work elsewhere may not work here and some approaches that trigger cultural divisions can make problems worse.

This discussion addresses the enabling and disabling factors of community transformation from a network science and culture perspective.

The main conclusions are that mature communities are a network of social/cultural/economic structures that deeply resist change, that some structures must be removed or replaced to have lasting change, and that proper management of social identity (collective awareness of 'us versus them') is essential for successful community transformation.

When culture and network science considerations are combined, we observed that most positive changes of societies (like the fall of the Berlin wall) are bottoms-up processes that engage all stakeholders and don't trigger polarizing social identities.

# Introduction

We've heard many great ideas for NM transformation, all from unique and defensible perspectives – with success stories in other communities.

Yet for each success, there is always a counter-example of the same effort not working.

We need a system view of the challenges, for example, to understand the following questions:

- **Why does a specific community transformation projects work in one place and not another?** And the answer "It's complex", while true, isn't helpful. We can do much better.

- **Why do transformation projects often show success initially, but then return to the prior unhealthy state after the funds and effort are ended?** Why isn't the change lasting?
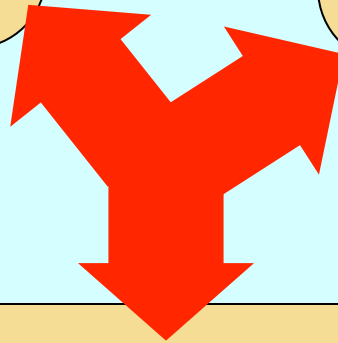
# Science of Social Dynamics

**Three components: Micro, Macro, & Connection**

**Macro: Collective behavior**

**Types:** Cultures, Society, Economy, …
**Observables:** Evolution, Development, dynamics,…
**Qualities**: stable, robust, fragile, stressed, …

**Micro: Individual behavior**

**Types**: cognitive, rational, social, habitual…
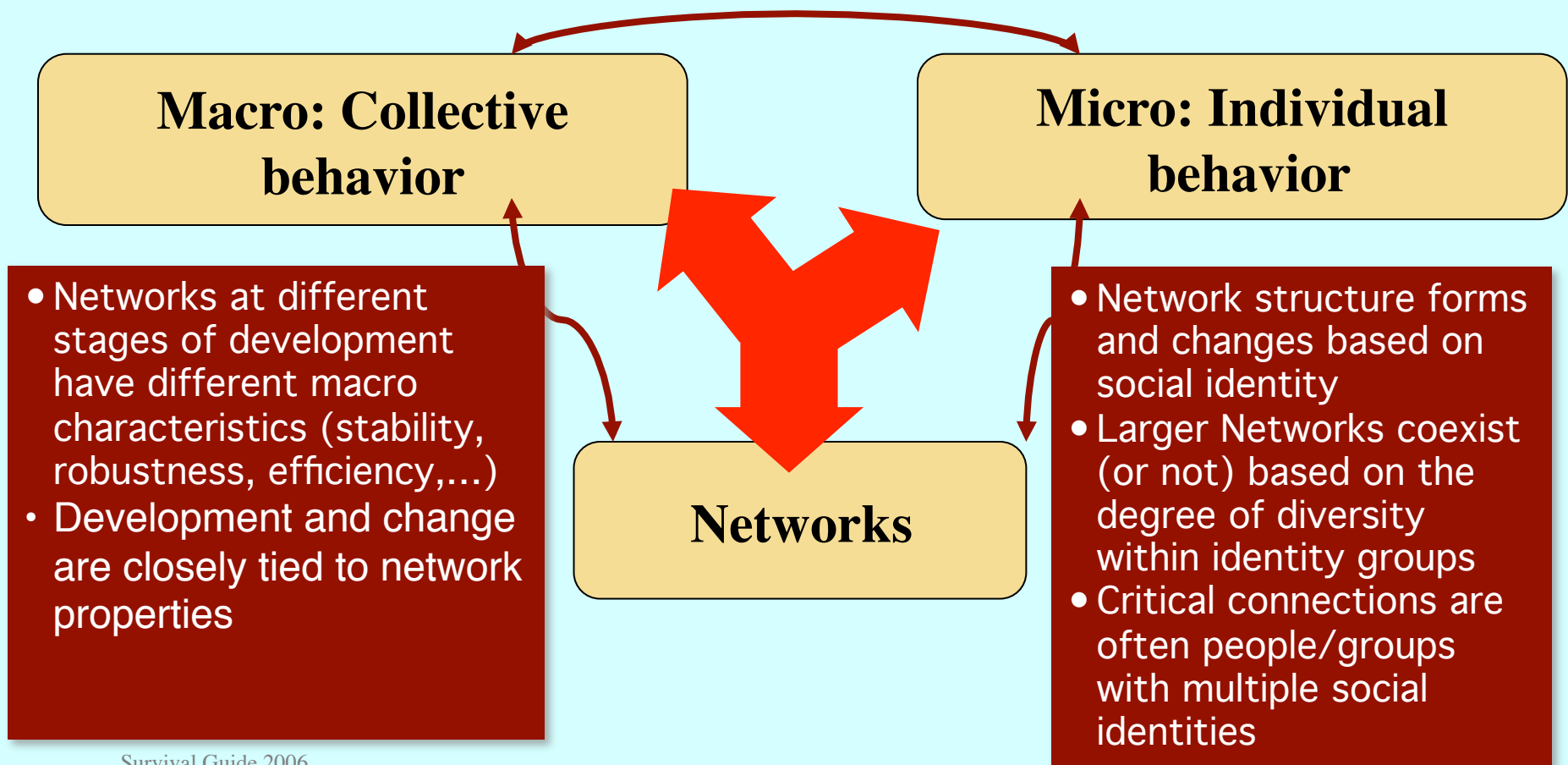**Observables**: actions but not motivations or intentions

**Networks**

**Types**: Social, political, consumer, information, …
**Qualities**: strength, symmetry, transients, clustered, hierarchical …

# Science of Social Dynamics

- Culture and social identity connect the individual to the group
- Individual states determine the collective state
- The collective state influences the individual state

**Macro: Collective behavior**

**Micro: Individual behavior**

**Networks**

- Networks at different stages of development have different macro characteristics (stability, robustness, efficiency,...)
- Development and change are closely tied to network properties

- Network structure forms and changes based on social identity
- Larger Networks coexist (or not) based on the degree of diversity within identity groups
- Critical connections are often people/groups with multiple social identities

# Validated Theories of Individual Behavior

❖ **Habitual repetition:**

  ◆ Classical conditioning theory (Pavlov),
  ◆ Operant conditioning theory (Skinner)

❖ **Individual optimization of decision:**

  ◆ Theory of reasoned action (Fishbein & Ajzen),
  ◆ Theory of planned behavior (Ajzen)

❖ **Socially aware:**

  ◆ Social comparison theory (Festinger),
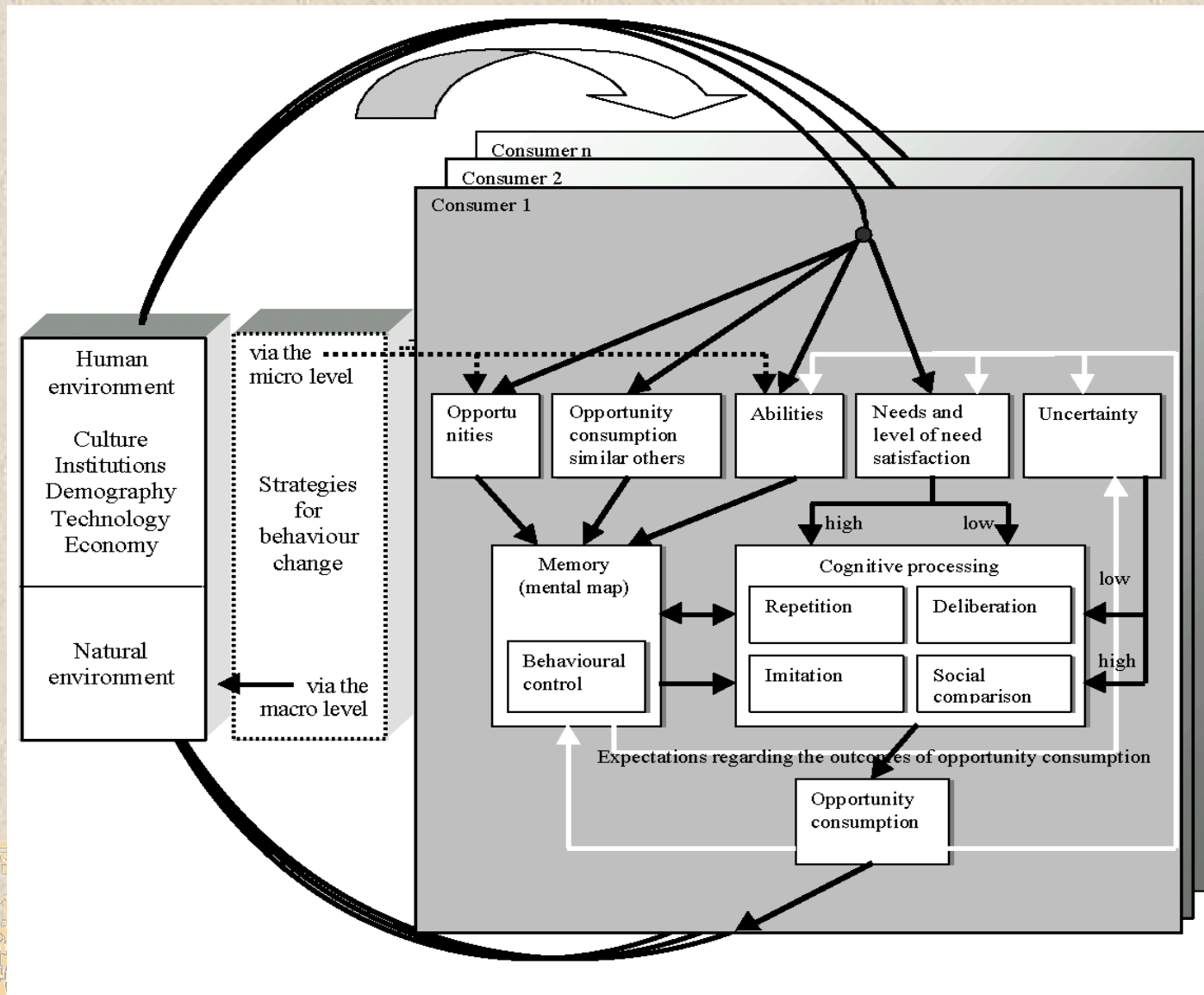  ◆ Group comparisons (Faucheux & Mascovici)

❖ **Social imitation:**

  ◆ Social learning theory (Bandura),
  ◆ Social impact theory (Latané),
  ◆ Theory of normative conduct (Cialdini, Kalgren & Reno)

# CONSUMAT model – M. Janssen & Wander Jager – Netherlands

Reproduces the results of the prior validated models, with triggers for the different decision processes.

# What drives the changes?

**Habitual State**

Unfulfilled needs → **Rational State**

Satisfied    Dissatisfied

**Increased uncertainty**
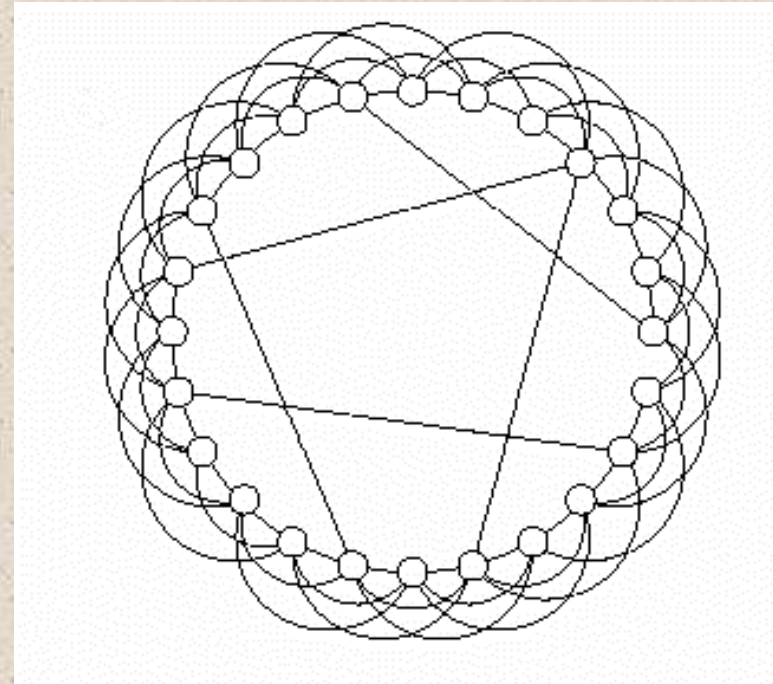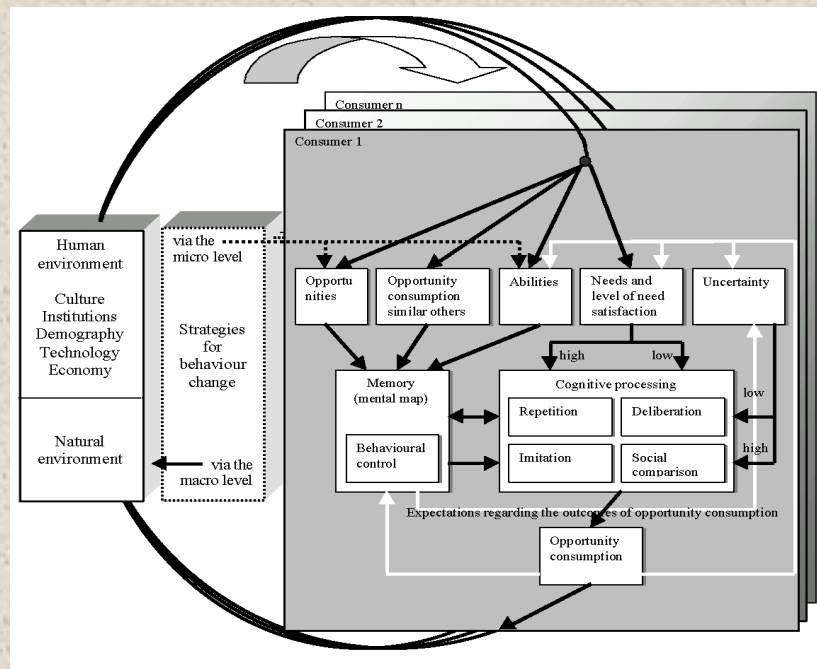
Certain

Uncertain

**Social copying State**

| | Satisfied | Dissatisfied |
|---|---|---|
| Certain | Repeater | Deliberator |
| Uncertain | Imitator | Comparer |

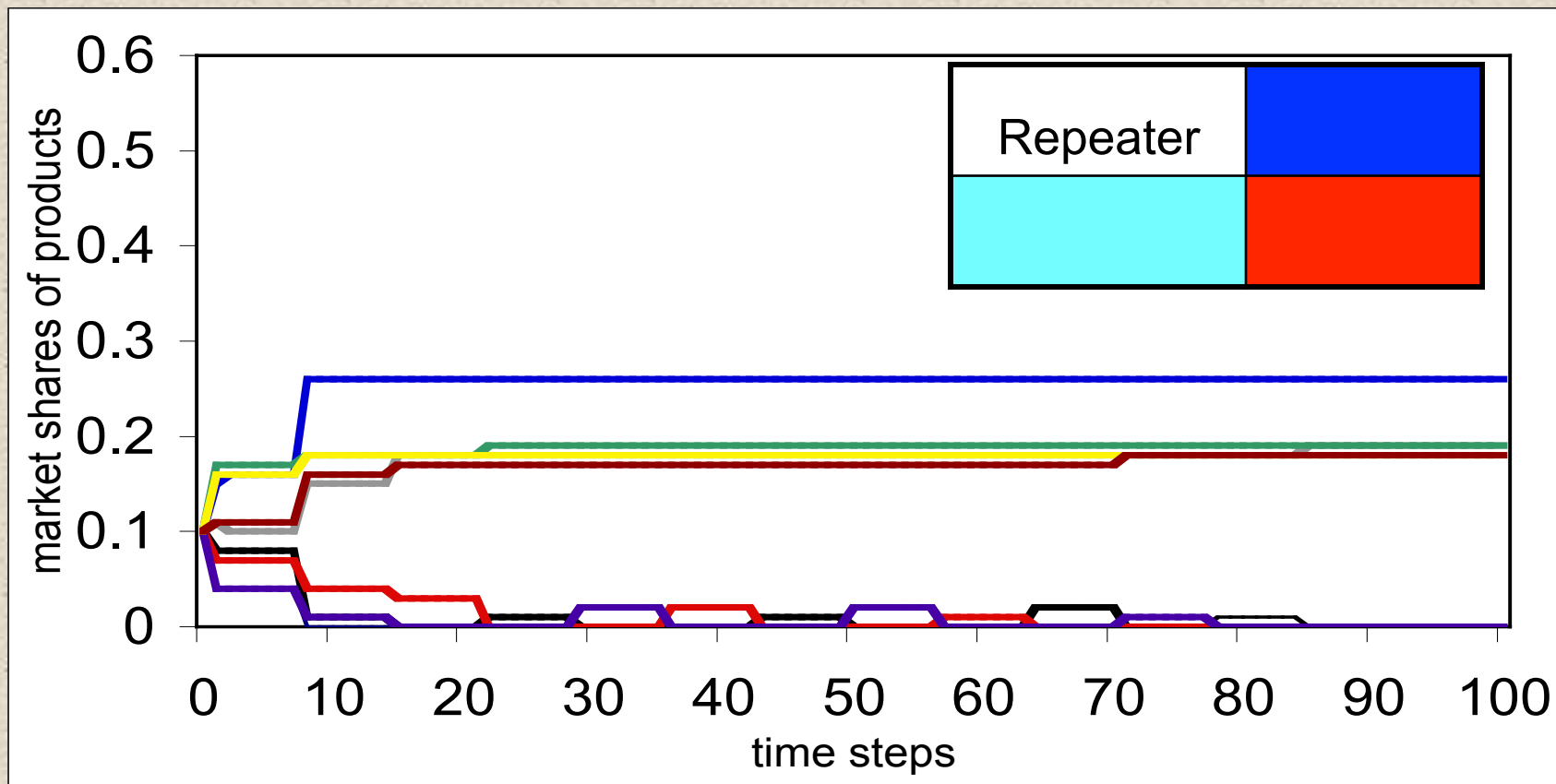# Individual Behavior + Network = Macro Dynamics



1000 Consumers with the same behavioral tendency buying 10 products on a small-world network

# Population of "Repeaters" - satisfied and certain
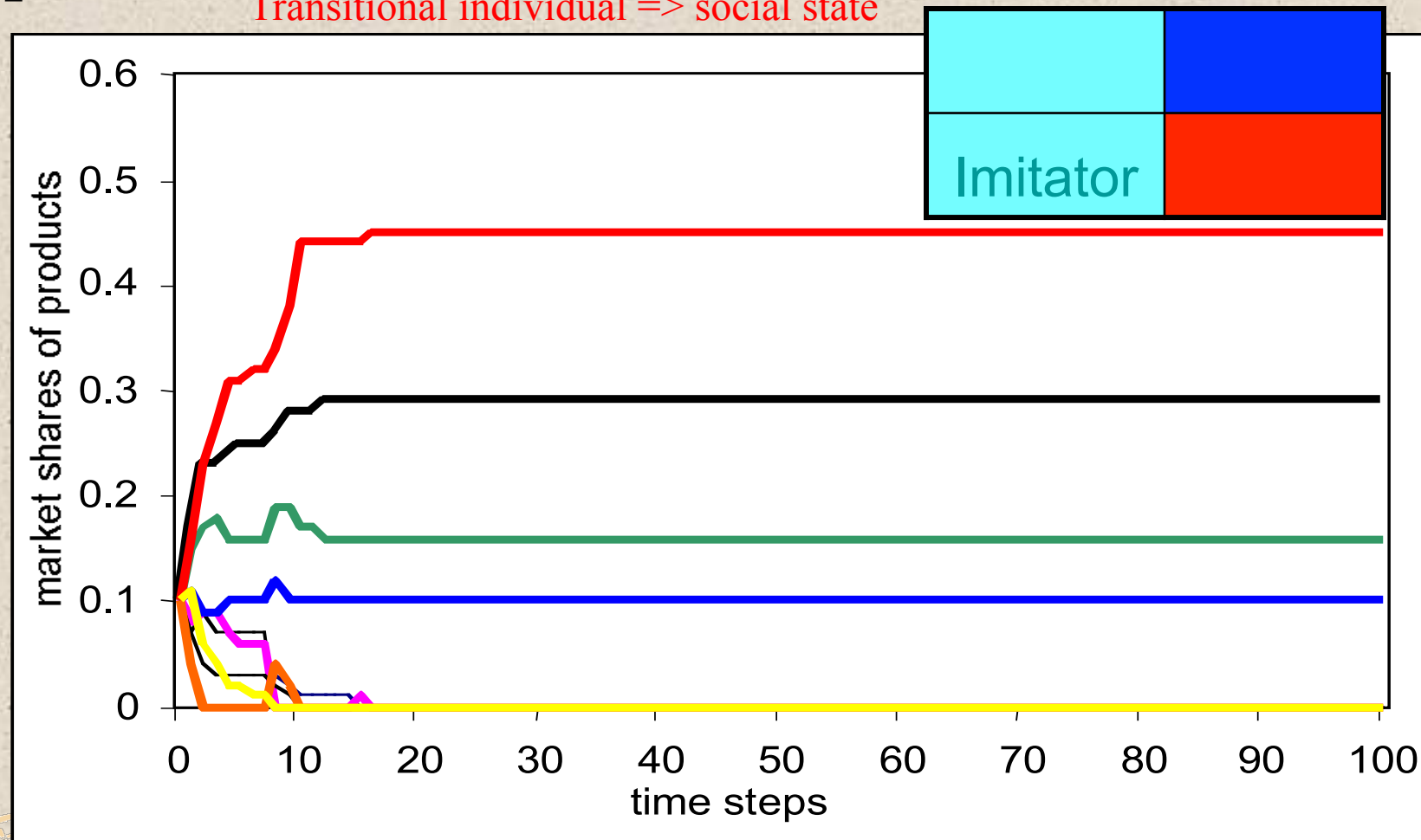
Closest to "Rest state"



Few products of equal distribution - highly stable

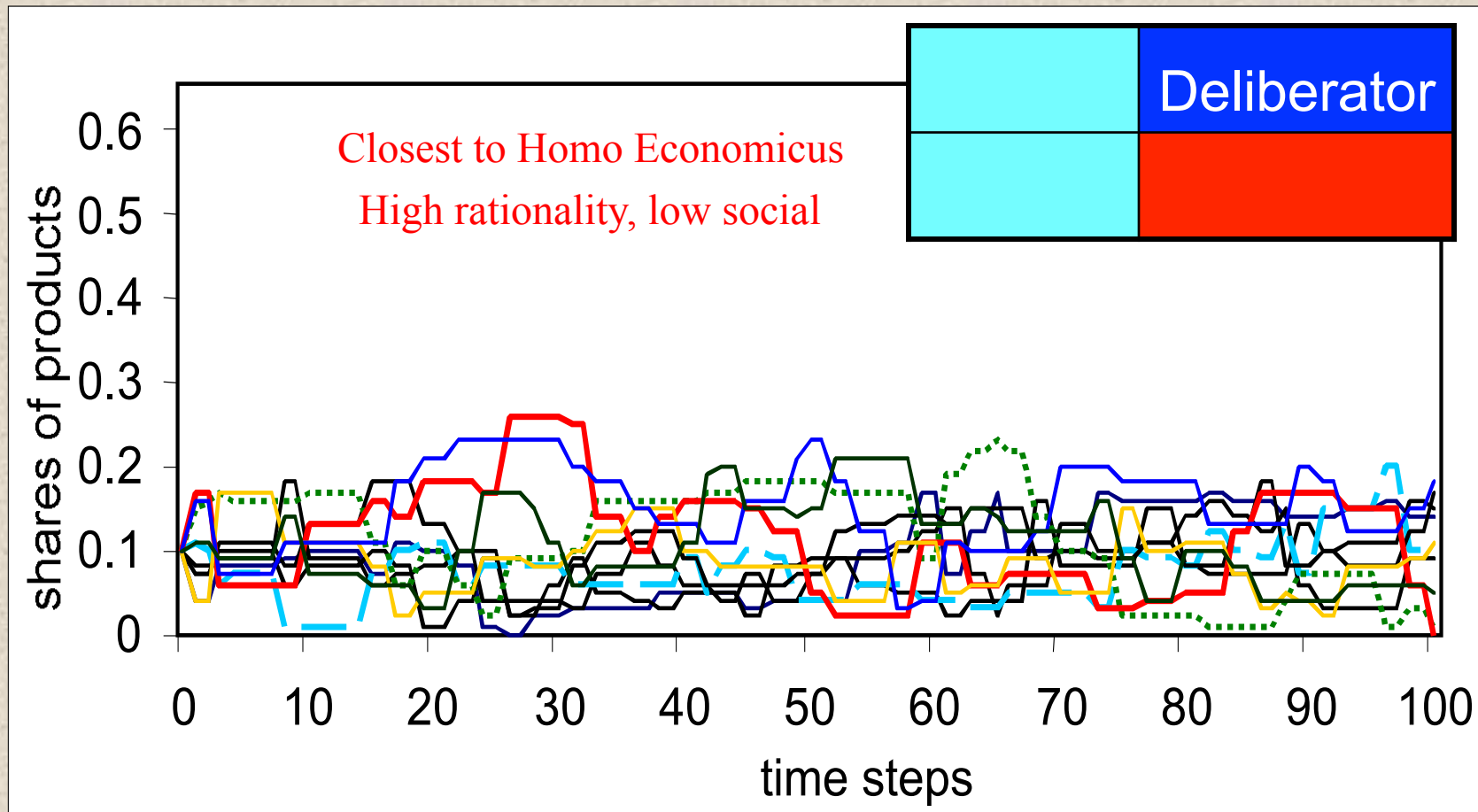# Population of "Imitators" - satisfied but uncertain

Transitional individual => social state



Few products of unequal distribution - highly stable

# Population of "Deliberators" - dissatisfied but certain



High volatility on all products

# Population of "Comparers" - dissatisfied & uncertain
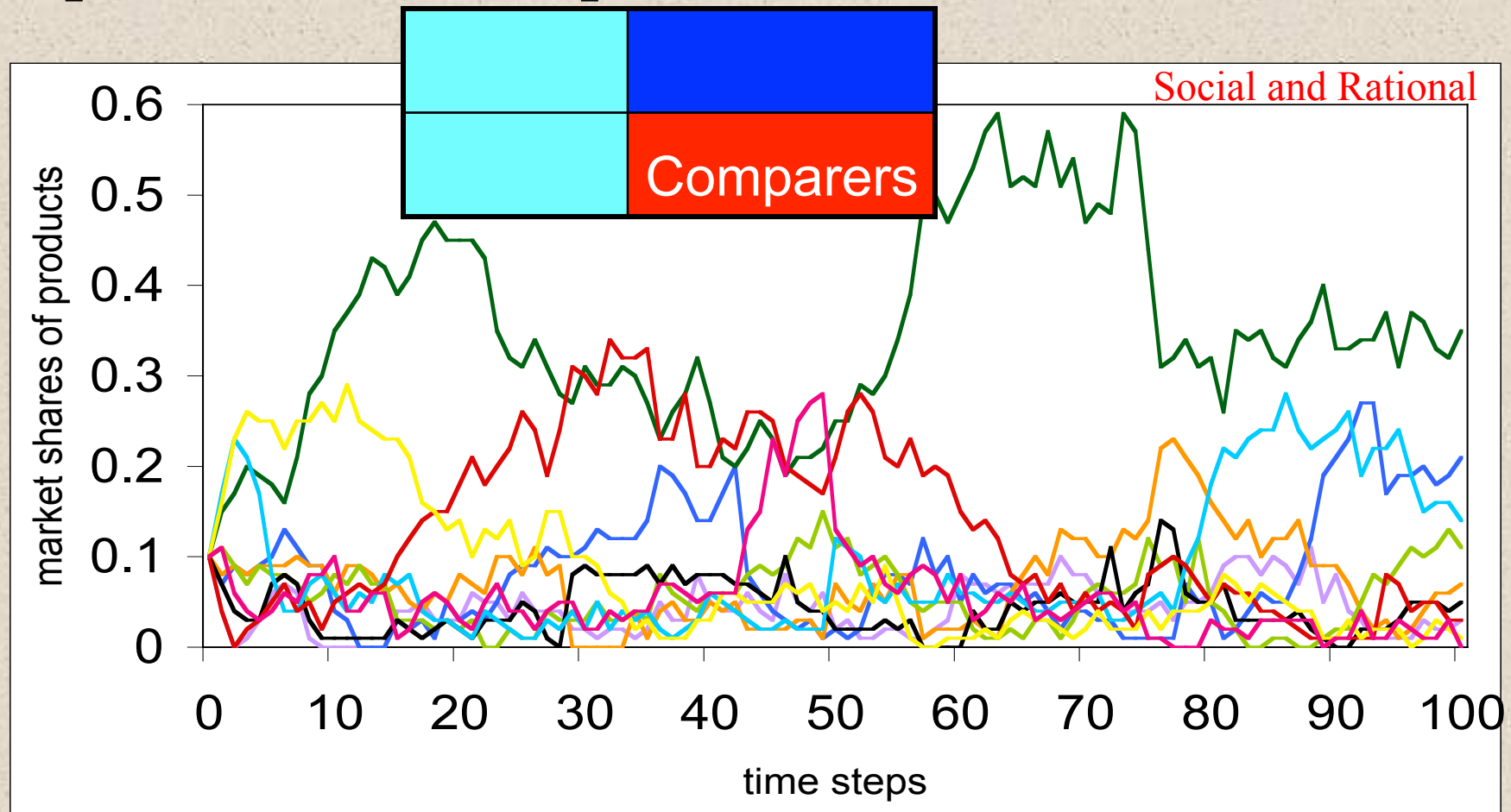


Volatility over long times on few products

But difficult to maintain - high energy state

Highly stable with sustained diversity

High volatility

"habitual" agent

Homo Economicus

**Repeater** | **Deliberator**

**Imitator** | **Comparer**

Socially driven

Social and Rational

Highly stable - decreased diversity

Longer time volatility - difficult to sustain

# Transformation of "Mature" Networked systems

Collective → Individual → Networks
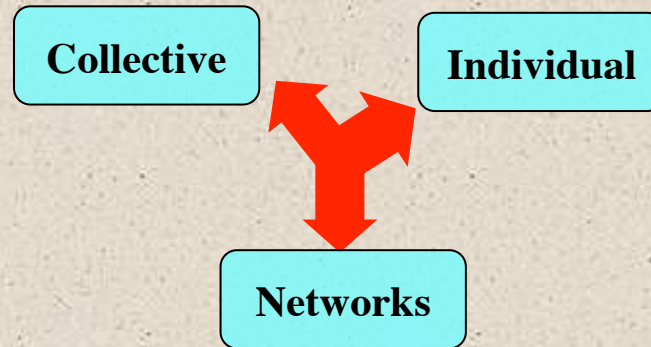
## Prigogine's three "universal" laws of transformation

1. **Mature systems resist change – they stay in "equilibrium"**
   - If you force part of the system to change, once the driver is removed, the system goes back to the way it was.
   - Broadly validated for many networked systems: genetic evolution, ecosystems, personalities, markets (inefficient), society (John Padgett's work), and communities.
2. **Permanent change requires "creative destruction":** Lasting change most often requires some structures in the system to fail or be destroyed.
   - Major failure often results in permanent, positive change - not just because of the innovation after the crisis, but because the structures that resisted change were broken and the system could innovate again.
   - Many examples from societies (John Padgett's work) to financial markets to biological evolution (Cambrian explosion).
3. **New structures change the equilibrium point**
   - When new structures are generated, the equilibrium state changes.

# Focus on the dominant structure: Social Identity

❖ **Social identity is hard-wired in to social organisms**

  ◆ When triggered, it results in actions based on "self" vs. them

  ◆ Social identity is our social analog of our biological immune system: it defines and protects the collective self

  ◆ My working definition: "if an act is done to someone in your social identity group, it feel like it was done to you."

❖ **Social organisms form group (social) identity**

  ◆ "... experiments show that competition is not necessary for group identification and even the most minimal group assignment can affect behavior. 'Groups' form by nothing more than random assignment of subjects to labels, such as even or odd."

❖ **Group Identity can be the dominant factor of behavior**

  ◆ "Subjects are more likely to give rewards to those with the same label than to those with other labels, even when choices are anonymous and have no impact on their own payoffs. Subjects also have higher opinions of members of their own group."
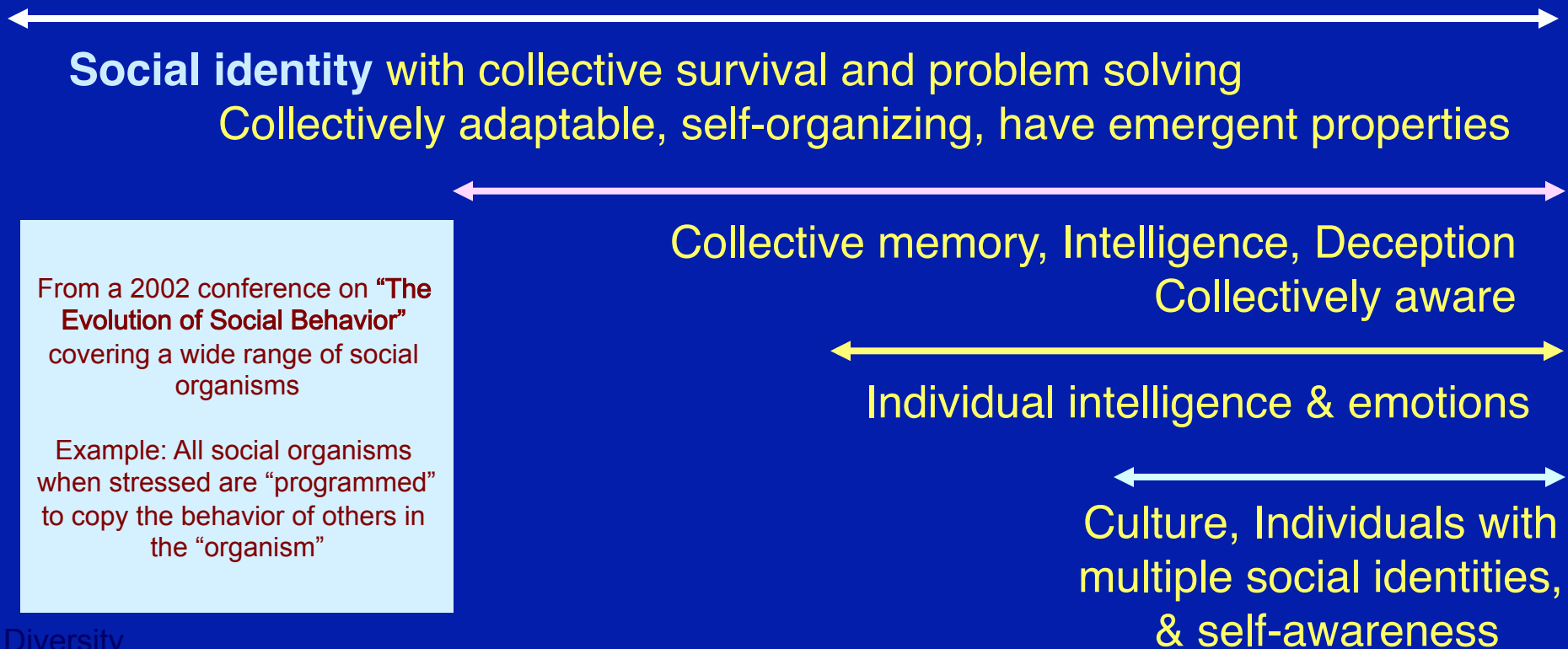
Akerlof, G. A. and R. E. Kranton (2000). "Economics and Identity." Quarterly Journal of Economics **115**, 715-753.

# Levels of Social complexity

| slime molds | "low" social insects | "high" social insects* | social mammals | "low" apes | "high" apes | humans |
|---|---|---|---|---|---|---|

\* spiders too!

**Social identity** with collective survival and problem solving
Collectively adaptable, self-organizing, have emergent properties

From a 2002 conference on **"The Evolution of Social Behavior"** covering a wide range of social organisms

Example: All social organisms when stressed are "programmed" to copy the behavior of others in the "organism"

Collective memory, Intelligence, Deception
Collectively aware

Individual intelligence & emotions

Culture, Individuals with multiple social identities, & self-awareness

Diversity

# What are your social identity groups (SIGs)?

❖ **SIGs share common "worldview", language, identifying symbols, knowledge and can quickly coordinate these**

  ◆ These features are easily recognizable by the SIG
  ◆ These may not be expressible by the individuals in the SIG
  ◆ These are unfamiliar or appear as noise to other SIGs

❖ **Common cultural SIGs**

  ◆ Native (Pueblo, Apache), Spanish, Anglo, Latino, Southern, …

❖ **Common cross-cultural SIGs**

  ◆ **Mothers**, gender-based, families, religion, …

❖ **"Under-appreciated" SIGs**

  ◆ **Work**: government, Lab (LANL, SNL, …), military, …
  ◆ **Professional**: service, scientist, lawyer, MD, physicist, …
  ◆ **Age**: child, teen, young adults, mid-life, elderly
  ◆ **Lifestyle**: vegetarian, gun owner, activist, commuter, …

## Principle of Social Proof

- *Individuals decide what to believe based on what their identity group believes*
- *Individuals can generate counter-messages to counteract rival messages*
- *Requirements for social proof:* similarity of identity groups
- *Triggers of social proof:* individual uncertainty in consequences and group fear of outside threats

## Influence of Friends

- *People prefer to say yes to whom they know and like*
- *The more similar, the stronger the influence*
- *Similarity can be superficial but repeated contact*: identity groups can form from common aspects of the environment, such as being at food and water distributions points.

## Influence of Authority (both from individual leaders and groups)

- *High compliance to messages from recognized authorities*, deferring host's desires, thinking and needs
- *Triggers of authority:* symbols of authority, deference to others, uncertainty, outside threats
- While traditionally authorities are "recognized and legitimate," the influence includes "non-legitimate" but recognized authorities, such an social media for teens (e.g., twitter)
- Messages from "authorities" from opposing identity groups can result in counter-messages

§7.2

# Rat Studies of Maximum Carrying Capacity

**Cooperative social structure**

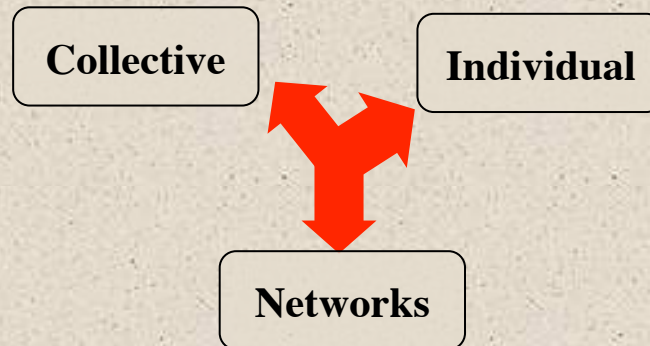**Control - no imposed social structure**
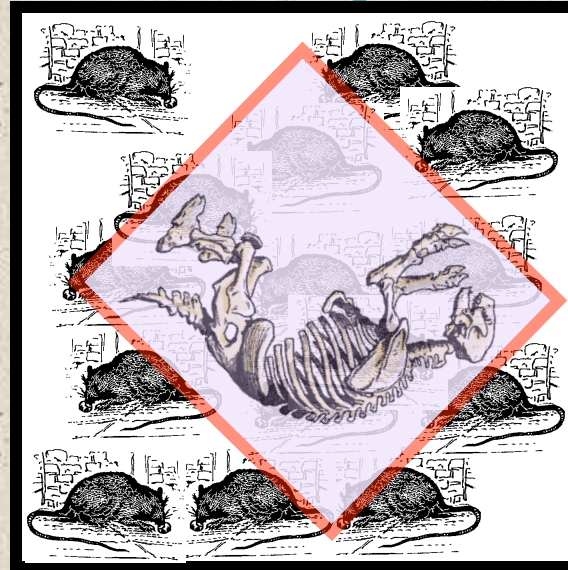


NIMH psychologist John B. Calhoun, 1971

Both systems loaded to 2 1/2 times the optimal capacity.

Social order system can carry 8 times the optimal capacity.

# Observations on Collectives with polarized SIGs

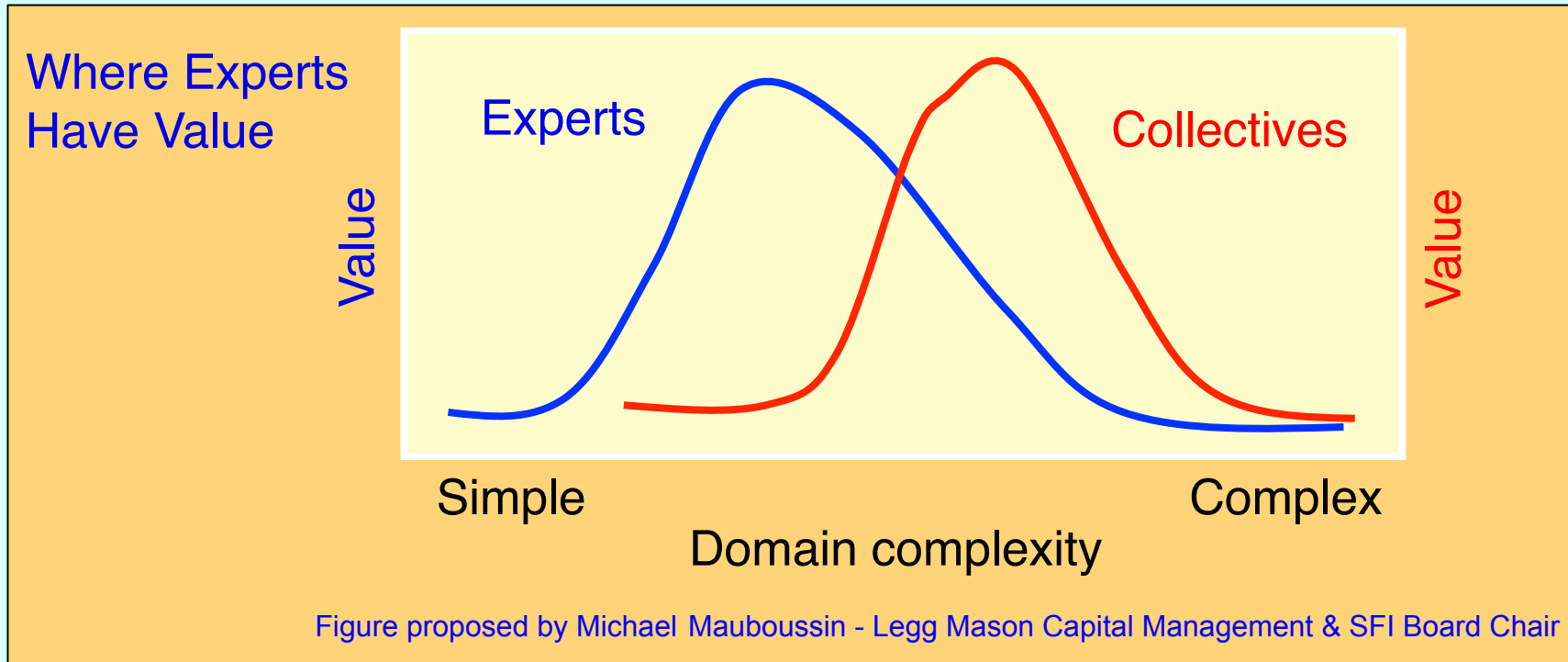Collective

Individual

Networks

**The messenger is more important than the message**

- **When social identity is triggered, there is a rapid coordination of actions, often without rationality**
    - Individuals will copy and support the SIG, even to the point of self-destruction
    - Diversity within the SIG is repressed
    - Individuals will oppose the actions and ideas of any opposing SIG, even if they would otherwise agree
    - Leaders can easily manipulate the SIG

- **In simple systems, a triggered SIG is advantageous – the SIG can quickly address the threat by "circling up the wagons"**
- **In complex systems, social copying can be "maladapted" – by repressing important expressions of diversity**

# Observations on Diversity and Communities

**Where Experts Have Value**

Value

Experts

Collectives

Value

Simple

Complex

Domain complexity

Figure proposed by Michael Mauboussin - Legg Mason Capital Management & SFI Board Chair

**The next set of slides give details on the following conclusions.**

- **Leadership now includes "bottoms-up" processes (Arab Spring), because they more innovative, can change structure that limits change (per Prigogine) & perform better.**
- **For complex problems, diverse collectives can solve problems better than experts, both in performance and robustness – Called *Collective Intelligence* as captured in Wisdom of the Crowds, Crowd Sourcing, and other recent popular books**
- **Cultural and social biases may be a necessary part of the better collective solution**
- **Resources are used that enable diverse groups (Open Spaces, World Café, SAGE)**

Following slides were not shown due to time limits.

**To see a full discussion, see the first two references at the end.**

Also see the text below each slide in powerpoint for explanations.

# Definitions of Leadership

Good Leadership traits:

- ❖ Performance: Accurately and reliably solves problems.
- ❖ Approach: Able to communicate and persuade others without resort to negative or coercive tactics.
- ❖ Resources: Able to understand a wide range of areas, rather than having a narrow (and narrow-minded) area of expertise.
- ❖ Integrity: Owning up to mistakes, rather than putting energy into covering up.
- ❖ Personality: Calm, confident and predictable, particularly when under stress.

# Expert Performance in Finance

Why can't financial leaders outperform consistently the S&P 500 "collective" (including good + bad performers)?

- Professional money managers fail to beat the S&P 500 at an average rate of 70% per year.

- 90% trail the S&P over a 10-year period.

- Only a few beat every year for 10 years – Soros, Miller, ….
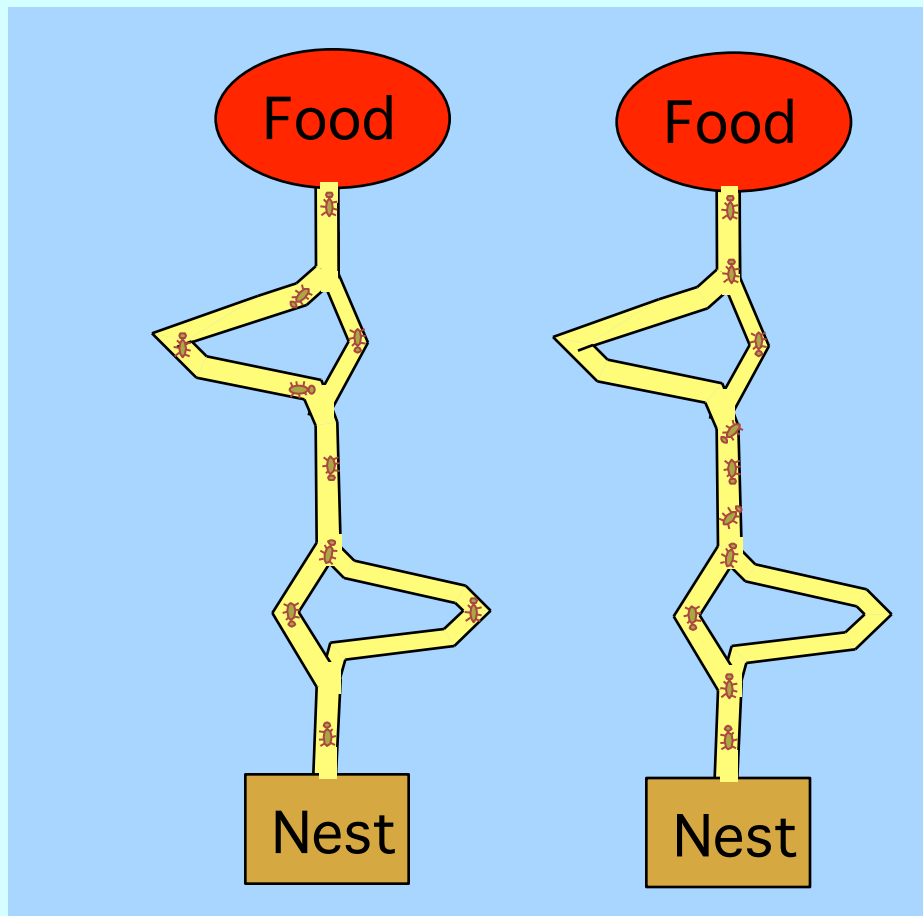
"These are the people who have more knowledge and more training than the vast majority of investors. And yet, neither the superior knowledge nor the superior experience helps them in the long run."                    Bill Mann, TMFOtter

# Ants Solving "HARD" problems

## The ant colony (and individuals) finds the shortest path



**Does selection by a "classic leader" find the path?**
No, when the shortest path is found there is no one ant that is taking the shortest path! Only later does this happen.

**Is diversity important?**
If all ants took the same path (no diversity), then the shortest path would never be found! Only by all paths being explored (high diversity) is the shortest path found

**How does this work?**
Especially when each ant has no concept of a shortest path! The collective finds a solution that the individuals cannot even understand. This is an "emergent" solution.

The above are powerful observations that deeply challenge traditional paradigms of performance

# A Model for Collectives Solving *Hard* Problems

(view this slide in powerpoint)

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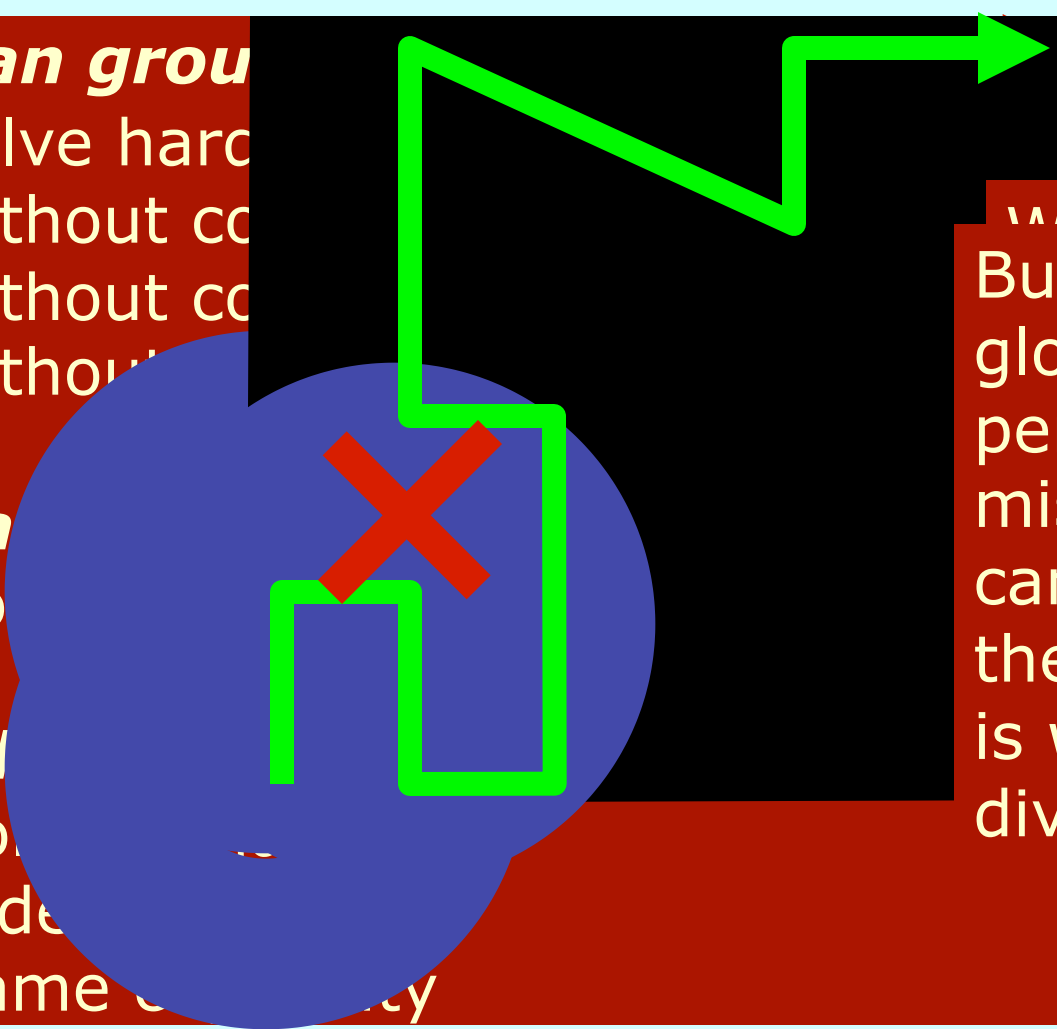
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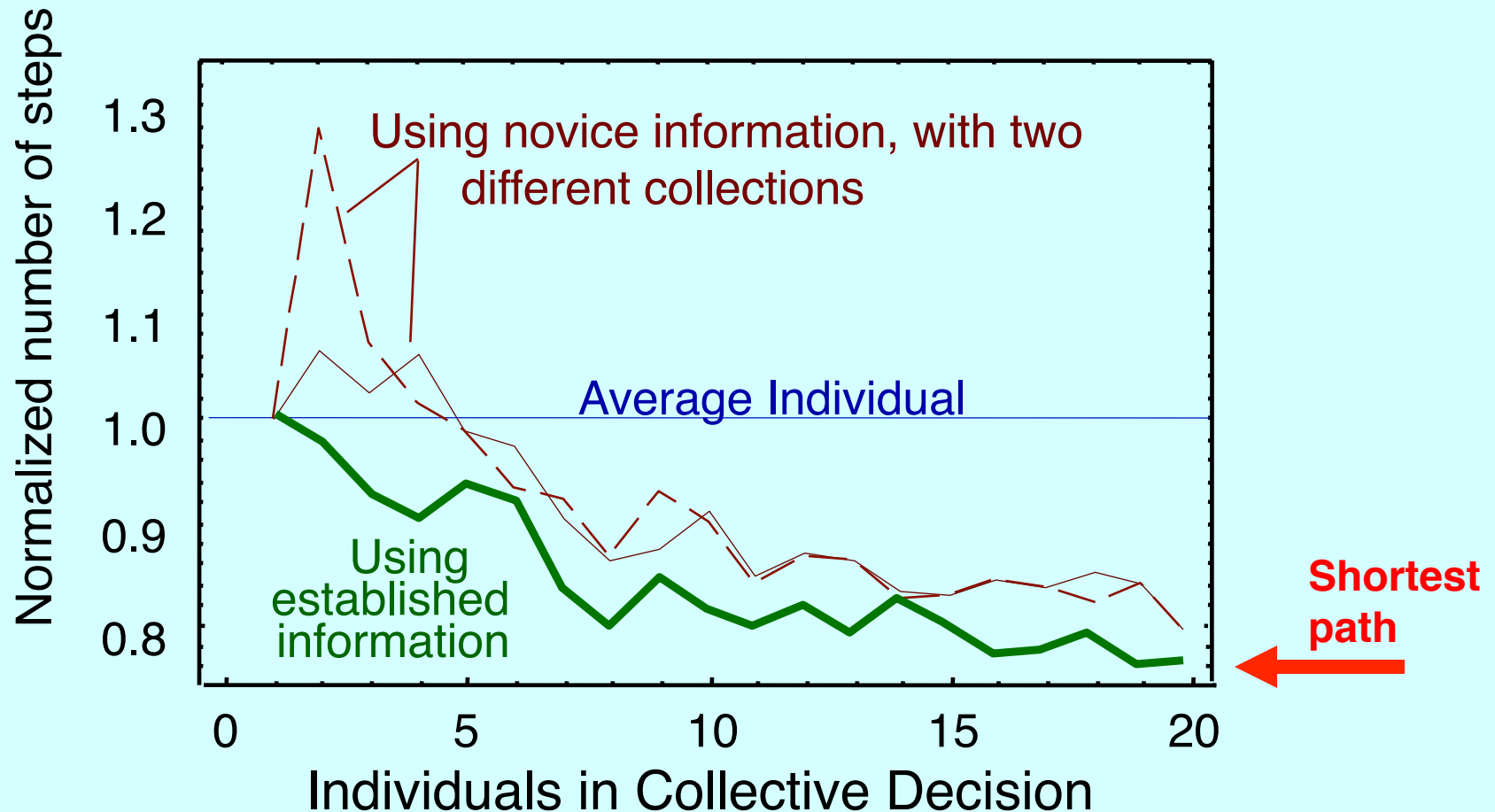
> So
> Inde
> Same

End

But because a global perspective is missing, they cannot shorten their path. This is where diversity helps.

# Averaged Performance



These results are in the first chapter of Surwicki's Wisdom of the Crowds.

# How collectives find the Shortest path
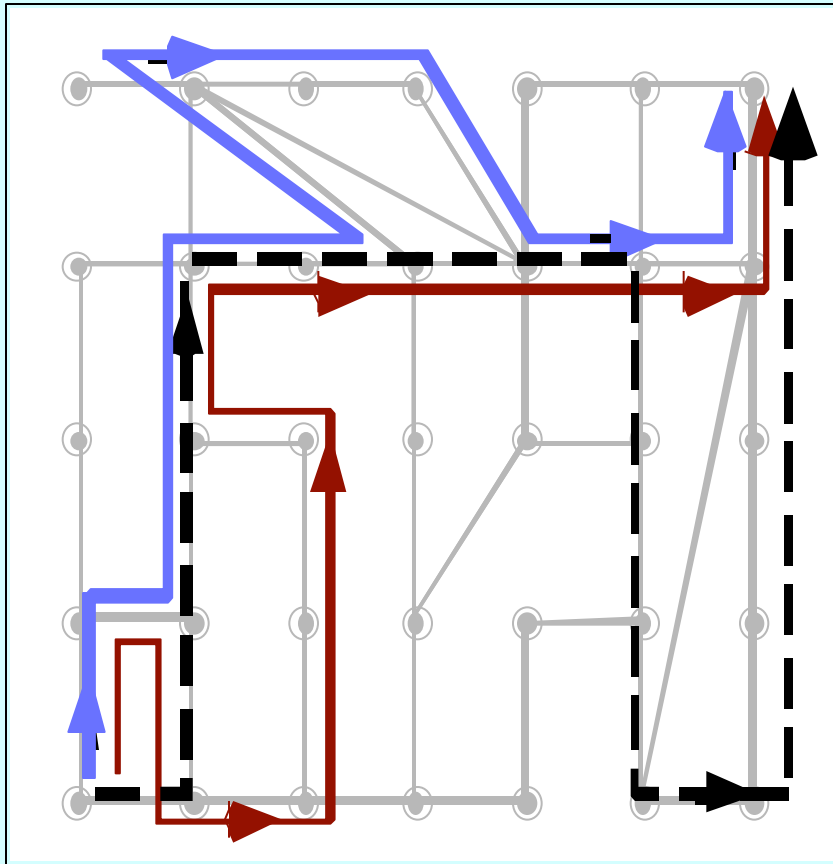


Paths of three ants
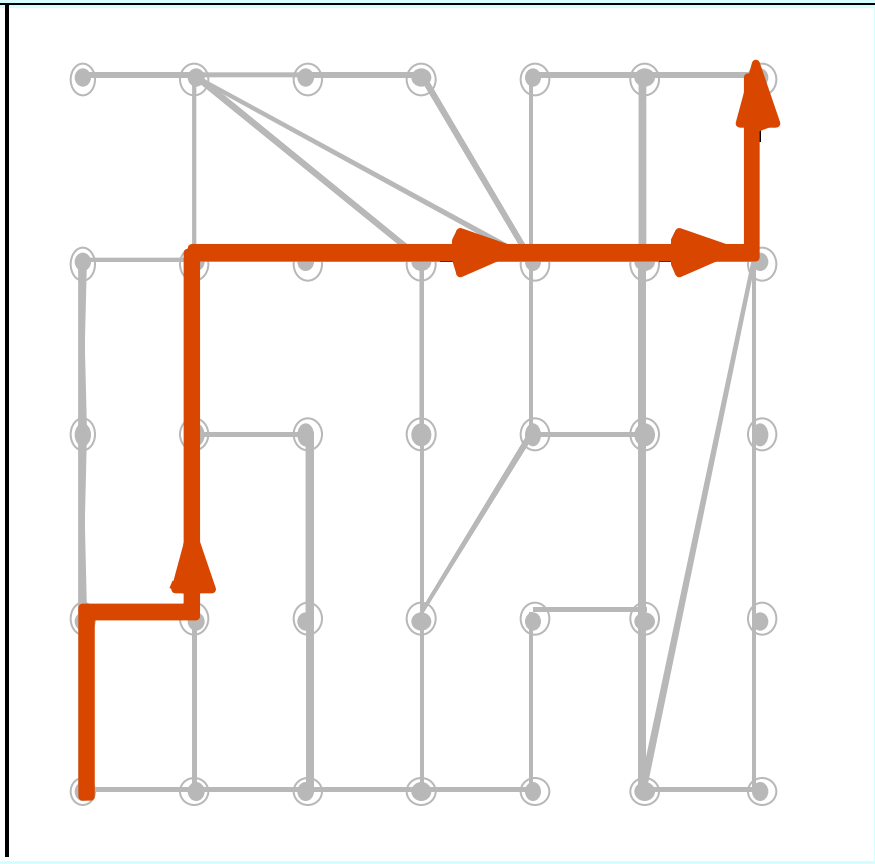
Collective path

**Unlike in natural selection, no one individual is the fittest!**

# Noise and Robustness

**Noise: Replace "valid" information with "false" information**

## An "expert" individual
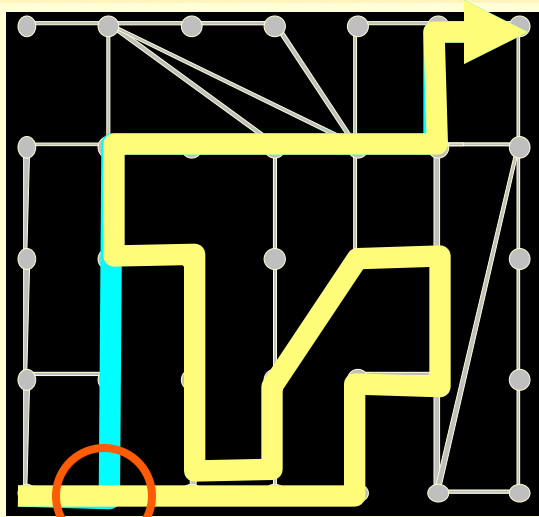


**Insert false information here**

## A collective
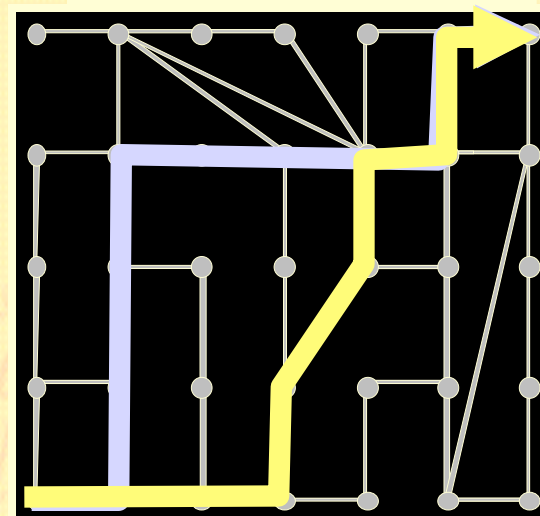


- Individuals are very sensitive to noise

  10 steps become 21 steps

  Lack of experience elsewhere

- Collectives are insensitive

  10 steps become 9 steps

  Contingency from diversity

# Revisit Traits of Good Leadership

Reapply to Distributed, Bottoms-up Leadership

- **Performance**: Accurately and reliably solves problems
  ➔ Collectives outperform leaders
- **Approach**: Bottoms-up solutions naturally include all stakeholders and minimize conflict
- **Resources**: Able to understand a wide range of areas
  ➔ Collectives have greater resources
- **Integrity**: Owning up to mistakes, rather than covering up ➔ Collectives by inclusion are transparent and in high integrity.  Solutions are more robust
- **Personality**: Calm, confident and predictable, particularly when under stress ➔ Emergent solutions by collectives solve problems without awareness, so less stress!

# How Collective Intelligence fits into Leadership

**Unpredictable**

**Degree of Emergence:**
How performance arises

**Localized Emergent:**
Leadership outside of structure as in a hero or savior

**Distributed Emergent:**
Emergent functions in societies as in the fall of the Berlin wall, future symbiotic intelligent systems, …

**Localized Deterministic:**
Classical top-down leaders supported by structure

**Distributed Deterministic:**
Democracies, commodity/ currency exchanges, prediction markets, recommender systems, …

**Deterministic**

Localized                          Distributed

**Degree of Distribution**
Where performance is located

# How Social Identity can inform Decision Makers

The following slides summarize of a year-long project funded by the Office of Naval Research to use the recent advances of epidemiological simulations (like EpiCast) which accurately model the spread of infectious diseases in real populations to do the same for the spread of infectious ideas. The major conclusion is that the spread of infectious ideas is all about social identity and diversity in community and nations.

In the same way that EpiCast (an advanced epidemiological simulation resource developed at LANL – Norm was the PI) predicted epidemics in real populations in regions and nations and even the world – driven by demographic, workflow/travel and infectious data, the SAGE resource predicts the spread of ideas in communities, regions and nations and potentially the world, using similar data plus the data obtained on social identity groups.

It also predicts the formation of counter-messages that often accompany any message in polarized groups and how messages can change the state of a group from habitual to polarized.
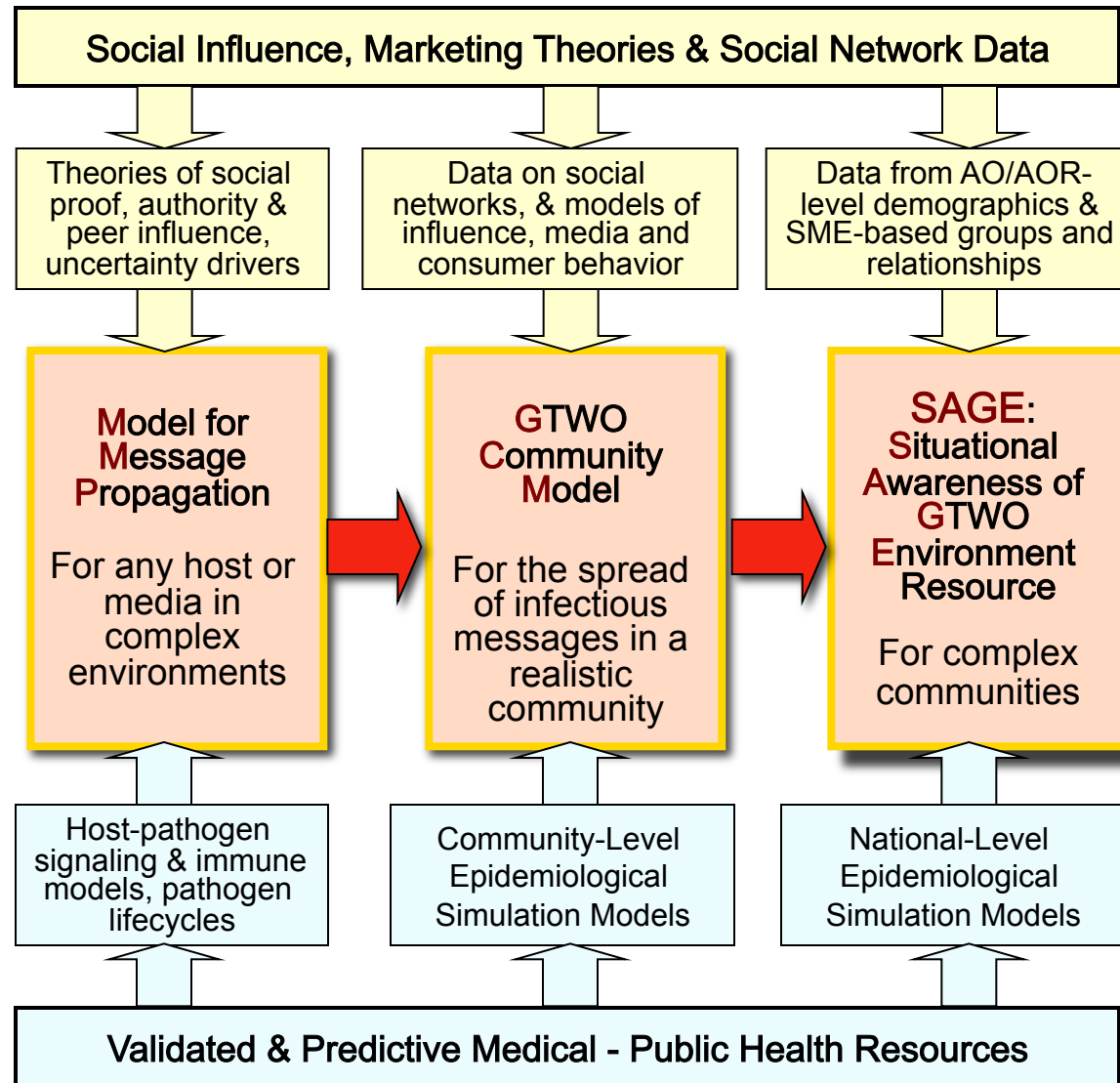
**Support the development with theories and data from the social sciences**

Social Influence, Marketing Theories & Social Network Data

| Theories of social proof, authority & peer influence, uncertainty drivers | Data on social networks, & models of influence, media and consumer behavior | Data from AO/AOR-level demographics & SME-based groups and relationships |

**Model for Message Propagation**

For any host or media in complex environments

**GTWO Community Model**

For the spread of infectious messages in a realistic community

**SAGE: Situational Awareness of GTWO Environment Resource**

For complex communities

**All-Scale SAGE:**

- Integrates individual to regional to global
- Compatible with data, planning, and options at all levels

| Host-pathogen signaling & immune models, pathogen lifecycles | Community-Level Epidemiological Simulation Models | National-Level Epidemiological Simulation Models |

**Build up from mature and demonstrated public health resources**

Validated & Predictive Medical - Public Health Resources

§9

# Relevant Social Science to Message Spread

**Overall:** ⇨ **No general model/theory for spread of ideas in realistic communities**

⇨ **Existing theories with information components are focused on explaining changes in behavioral or belief states and less focused on actual processes of message propagation and modification as required**

### Theory of Diffusion of Information (Rogers, 1962)
Not a developed theory, requires information not easily obtained, e.g., social roles.

### Theory of Information Cascades (Bikhchandani, 1992)
In economics, focuses on the tendency of individuals to internalize and signal ideas of their peers based on the truthfulness of the content. Includes imitation of belief as a mechanism, resulting in belief cascades from conversion of agnostic receivers by an opinionated believer.

### Coherence Model of Preference and Belief Formation (Chai, 1998)
Assumes individuals use a rational-choice model on preferences and beliefs to minimize expected regret to achieve internal coherence. Has potential application to message modification, within cultural contexts.

### Spiral of Silence Theory (Noelle-Neumann, 1974)
A mass-communication theory for the influence of majority public opinions on individuals.

### Memetics and Memplex - The Selfish Meme Model (Dawkins, 1976; Blackmore, 1999)
Applies the Selfish Gene concept from evolutionary biology to memes. Undeveloped theories.

### Epidemiological Approaches from Anthropology and Psychology (Sperber, 1985)
Largely focused on explaining cultural evolution, particularly the interplay between individual and society. Allowed for heterogeneous populations with intervening intermediaries of message spread, such as physical interference or cultural norms which provided a more realistic description of the processes in cultural change.

**Two main components are a *message* and a *host*,**
- **Host**: broadly defined as an individual, group or media – any entity that can transmit and modify a message. Each host processes the same message uniquely

**Message includes *content* and *packaging***
- **Content** is the information that is the focus of the message
- **Packaging** is additional information, attached or unattached, that interacts with the host prior to the release of the content
- **Classes of Packaging** are defined by
  - ***Where it resides***: *endogenous* or *exogenous*
  - ***How it is expressed***: *explicit*, *tacit*, and *undefined*
  - ***Its dynamics***: *transitory* or *sustained*
  - ***Its multi-level attributes***: *non-emergent* or *emergent*

**A Host's immune system reacts to, rejects or accepts a message, primarily based on interaction with the packaging, not content**

**Hosts can modify the packaging, content, or both**, before passing on the message

## Basis of the Message Model for Propagation - from Bio

referentia

### Hosts are any entity that can store and transfer messages
- As in the Selfish Gene, messages are the unit of survival, not hosts
- Then, humans, groups, leaders, mass media, social-network media are all potential hosts

### Message contains content *and* packaging
- A message cannot exist without packaging
- Packaging can identify for the message: the origin, media source, associated identity group
- Packaging can be attached to the message or not, explicit or not, transient or not, emergent or not, etc.

### Utility of a message may be independent of the content
- A message cannot exist without packaging

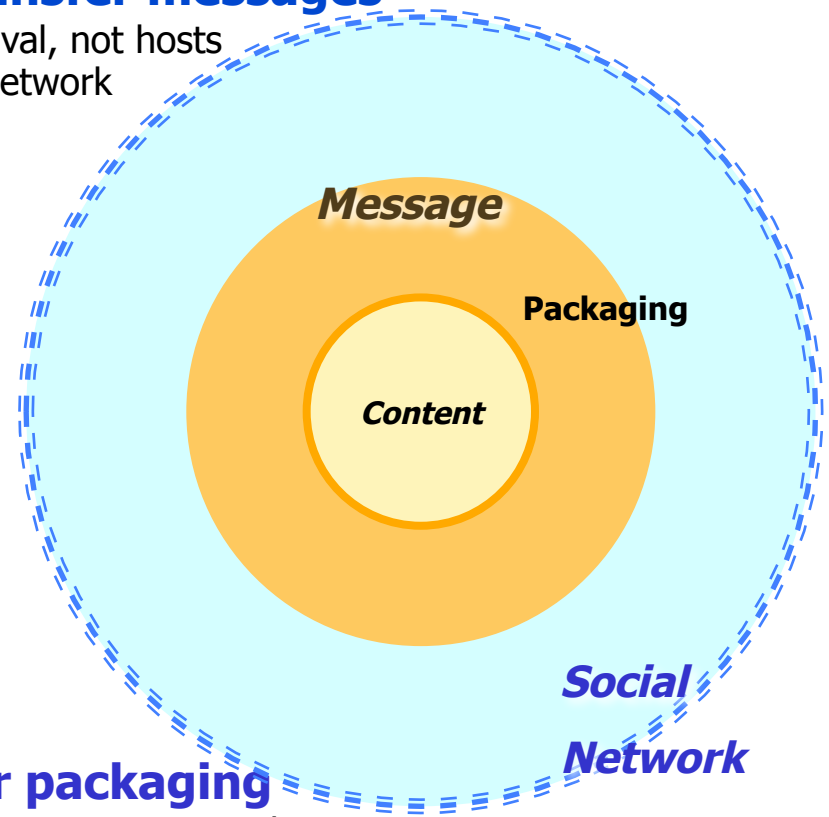### Hosts have immune systems that accept or reject messages
- Immune systems respond primarily to packaging

### Message modification can be to content or packaging
- Modification may be just to the packaging, which can cause a major change in contagiousness.
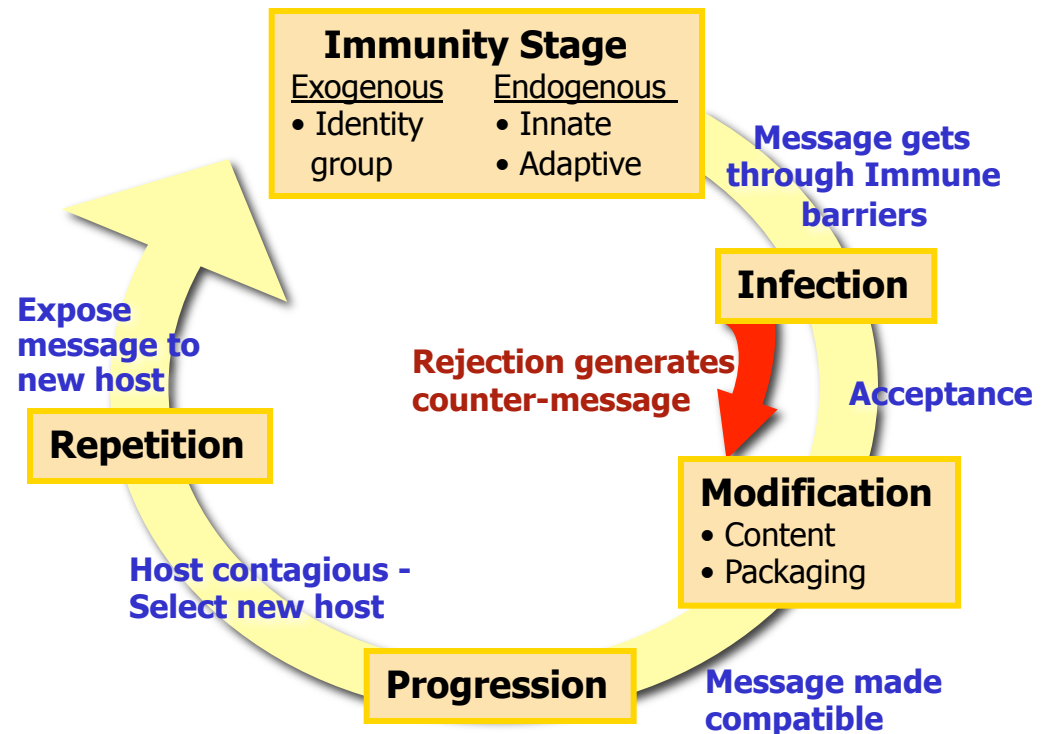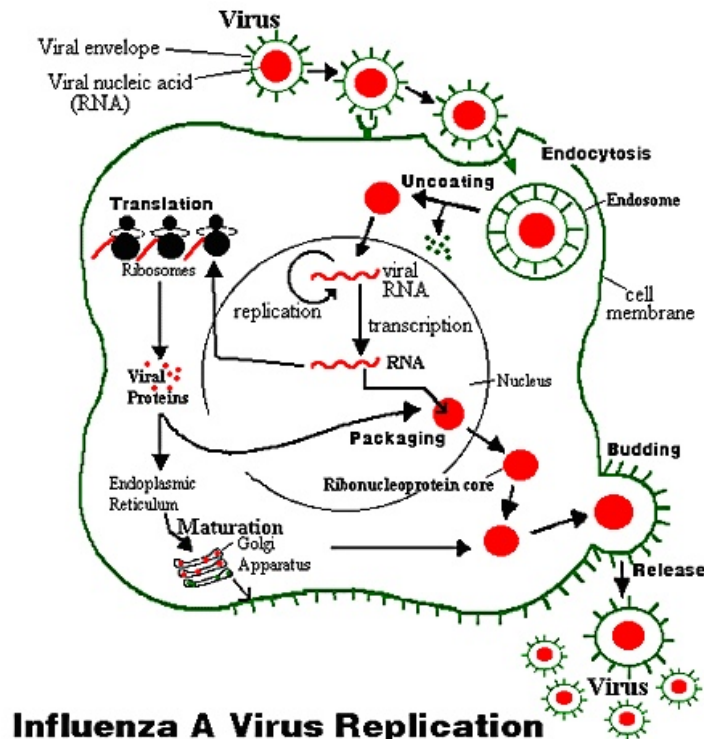
### Operationally, focus on the variance of messages
- While the unit of propagation is the message, the evolution of the epidemic is defined by the variations and frequencies of occurrence

*Message*

**Packaging**

*Content*

*Social*

*Network*

# Lifecycle of the Message in a Host

referentia

## *Influenza-Cell Lifecycle*



Influenza A Virus Replication

## *Stages in the Message-Host Lifecycle*



**Immunity Stage**

Exogenous | Endogenous
- Identity group
- Innate
- Adaptive

**Message gets through Immune barriers**

**Infection**

**Expose message to new host**

**Rejection generates counter-message**

**Acceptance**

**Repetition**

**Modification**
- Content
- Packaging

**Host contagious - Select new host**

**Progression**

**Message made compatible**

- The Immune response can generate a counter message **(Red arrow)**.
- Stages aren't necessarily sequential - some can be in parallel.
- Lifecycle can end at any stage or be delayed.

§6.9

# Realizing a GCM for Validation and Verification

referentia

**Analysis of dependencies across different scenarios can provide unique insights into the coupling of identity groups in message spreading and efficacy of different campaigns**

In the figures at the right, the results of many EpiCast simulations are shown. Although only older people have some immunity from being vaccinated, other age groups benefit, showing the coupling between age groups.

**Different age groups behave like different identity groups**: Each has greater connectivity within groups than between groups, similar infection rates and progression timing.

Narrow distributions in the frequency histogram means small variations within the group and likely greater robustness in the outcome.

**Using analysis of this type, decision makers can assess the impact of different identity groups, understanding the coupling and timing of message spread between groups.**



No residual Immunity

With residual Immunity
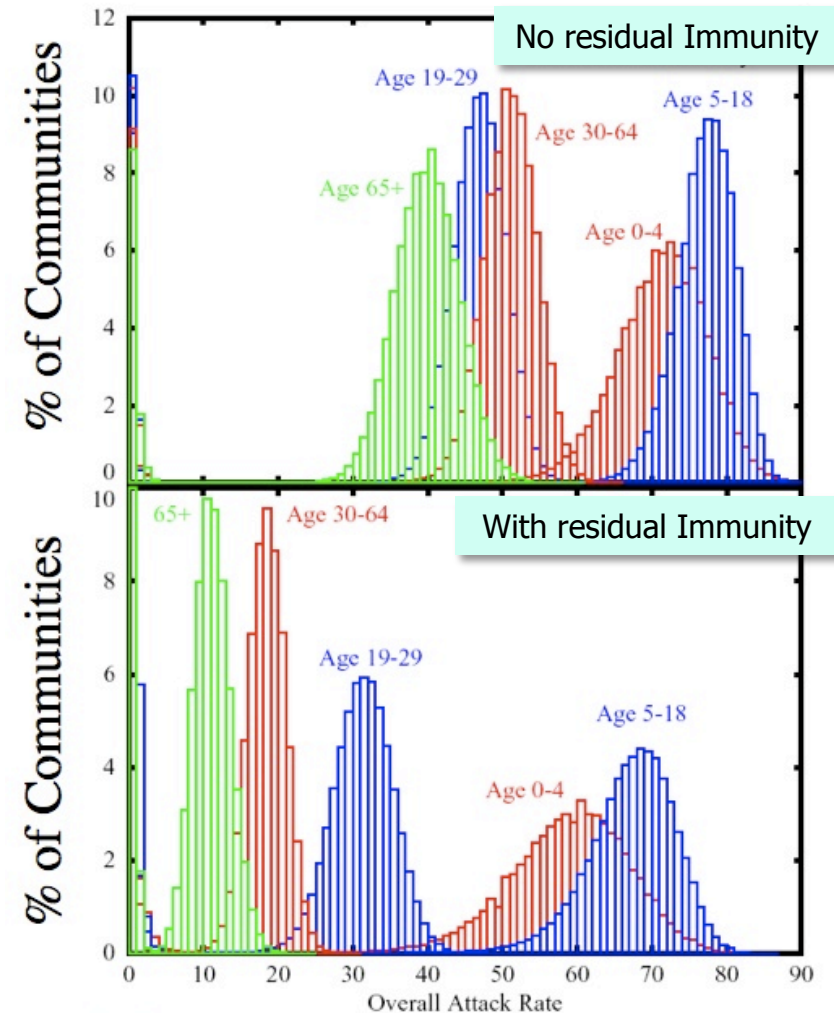
Histogram of the overall attack rates (% infected) broken out by age group.

# Lessons for Complex Mature Communities

**Don't trust any proposals that do not originate from all the stakeholders:** otherwise you have a biased solution or one that is missing critical buy-in from a stakeholder that could kill the proposal or implementation. And it may not include the Wisdom of the Crowds.

**Just because a solution worked somewhere else, doesn't mean it will work in NM.** Solutions that are universal are more likely to work, but are not guaranteed.

**Traditional planning processes (top-down) in complex communities are likely to fail.** Bottom-up planning has a much higher chance of success because stakeholders are already involved and heard, but more importantly, better solutions come from diverse groups.

**Planning and implementation must be very cognizant of triggering social identity groups** - the best approach is to similar to marketing approaches: do some trial runs in small groups to identify potholes and failure points and opportunities!

**Self-initiated and catalytic solutions have a higher likelihood of success**, than solutions that require large resources to be sustained.

**There is a balance between encouraging cultural groups (better communication, etc.) and minimizing reaching out to cultural groups (can cause polarization and competition).** A good solution is to reach out to identities that cross dominant cultural, ethnic and socioeconomic identity groups (like mothers, families, etc.). They will be represented anyway, but the negative expression of them will be less likely to be triggered.

# References

For a diverse view on Collective Intelligence (CI), the following book has summaries from many practitioners of CI:
- •"COLLECTIVE INTELLIGENCE: Creating a Prosperous World at Peace." Click here.
- •For Norm's myopic chapter: The Science of Collective Intelligence.  Click here.

Highly recommend the talks (both slides and text are available) of a science retreat for the *Physician Accountability for Physician Competence.* See  http://www.innovationlabs.com/summit/discovery1/   Norm helped put the program together, and the talks are a great introduction to issues in any field of collective decision making and implementation in diverse and complex communities. Download the slides as you read the text – you can easily guess which slide is being presented.   Norm gave two talks on "Importance of diversity" and "Strategies in complex ecosystems."

My out-of-date web site: http://CollectiveScience.com

Johnson, N. L. (1998). "Collective Problem Solving: Functionality Beyond the Individual. This is the research that started my investigation into diversity. And was unpublishable at the time because it was so radical. http://collectivescience.com/Documents1.html

Johnson, N. L. (2002). "The Development of Collective Structure and Its Response to Environmental Change." S.E.E.D. Journal **2**(3). Norm has a simulation he can give you so you can explore (very easily even if you never did it before) the system on your own.

Johnson, Norman Lee and Watkins, Jennifer H., "The Where-How of Leadership Emergence (WHOLE) Landscape: Charting Emergent Collective Leadership" (December 1, 2009).   Available at SSRN – Social Sciences Research Nework.

Lichtenstein, Uhl-Bien, Marion, Seers, Orton and Schreiber. "Complexity Leadership Theory: An interactive perspective on leading in complex adaptive systems" Emergence: Complexity and Organization Volume 8, Number 4, 2006.

Sawyer, R.K. (2006). Social Emergence: Society as Complex Systems.   Good book on as an intro to complex systems and society.

Watkins, J.H. (2007). "Prediction Markets as an Aggregation Mechanism of Collective Intelligence." from http://public.lanl.gov/jhw.

Watkins and Rodriguez (2007). "A Survey of Web-based Collective Decision Making Systems" from http://public.lanl.gov/jhw.  This is a brilliant paper that surveys all the different collective decision processes (including democracy and markets) and how they work.