



Complex Mimetic Systems

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Overview

- Background: complex systems theory
- Complex Adaptive Systems (CAS)
- Complex Mimetic Systems
- Research questions and directions

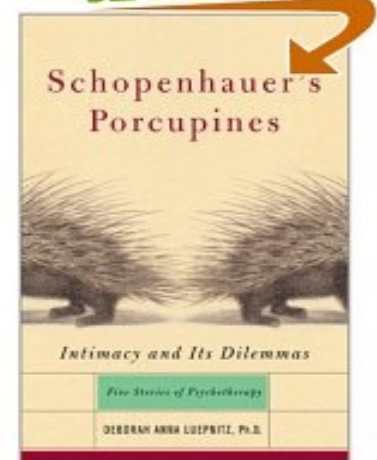
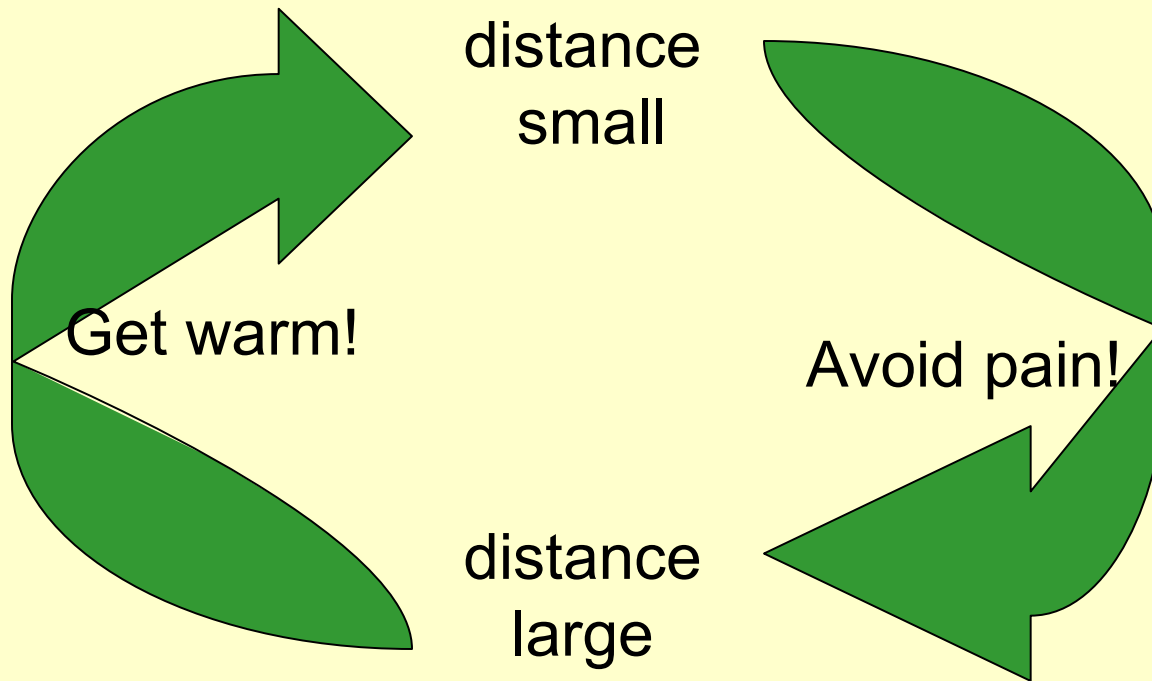
Complex systems

- Studies relationships between parts (micro) and collective behavior (macro)
- Example (Hayek): market economy: “the result of human action, but not the result of any human design”. Or: “the Internet”
- Complex system theory \neq chaos theory
 - Chaos theory: small number of non-linear interactions leading to bewildering (although deterministic) behavior
 - Complex systems: huge number of complicated interactions leading to simple behavioral patterns

Complex systems (ctd)

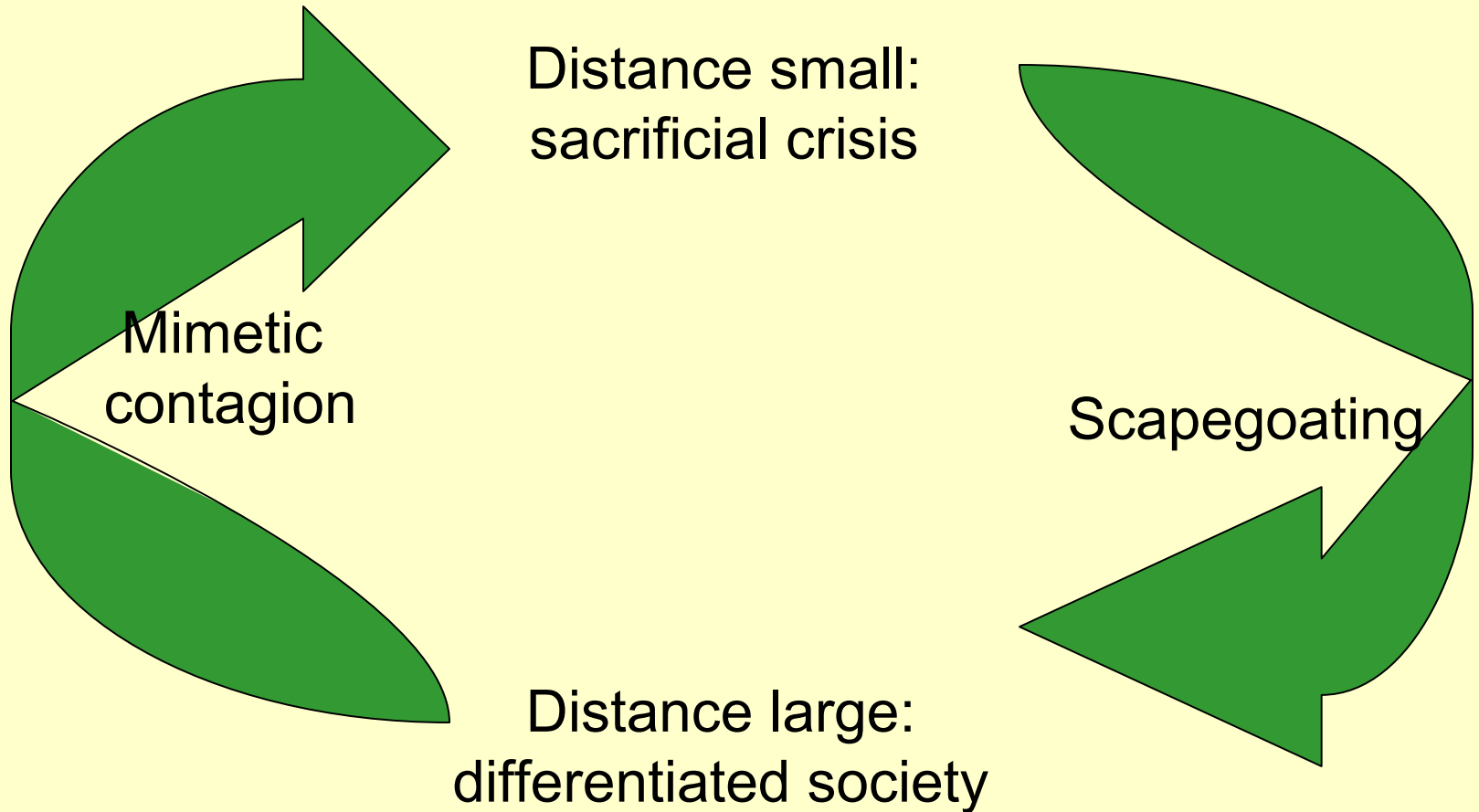
- Complex systems are *open*
- Complex systems have a memory
- Complex systems may be nested
- Boundaries are difficult to determine
- Complex systems contain *feedback loops*
- Exhibit *network* topology

Feedback loops



Autopoiesis (Maturana): system (boundaries) identified by the feedback loops (called "organization")

Girard's culture cycle



Some early work

- Colloque de Cerisy (1983), L'Auto-organisation: De la physique au politique
- Atlan, Castoriadis, Varela, Dupuy, ..
- Colloque de Cerisy (1985), Violence et Vérité (A. Orléan, J.P. Dupuy, ..)
- CREA (Ecole polytechnique)
 - Focus on issues of recursion, fixed points, etc as well as system boundaries (structural coupling)

Complex networks toolbox

(Amaral & Ottino, 2004)

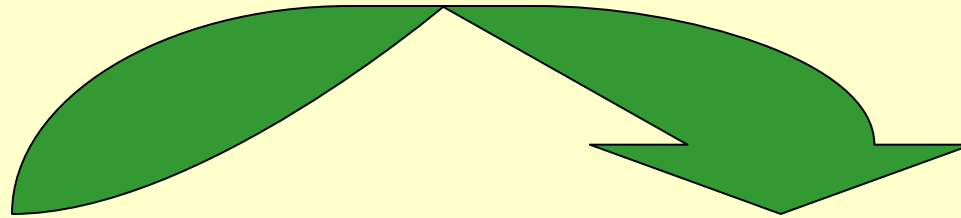
- Non-linear dynamics
- Statistical physics (including discrete models, such as agent-based modeling)
- Network theory
 - small-world phenomenon
 - immunization
 - robustness

Complex Adaptive Systems

- *Adaptive*: able to change and learn from experience
- CAS: John Holland, Santa Fe Institute
- “Network of many agents, no central control; coherence, if any, arises from competition and cooperation among agents”
- Innovation viewed as interactive process

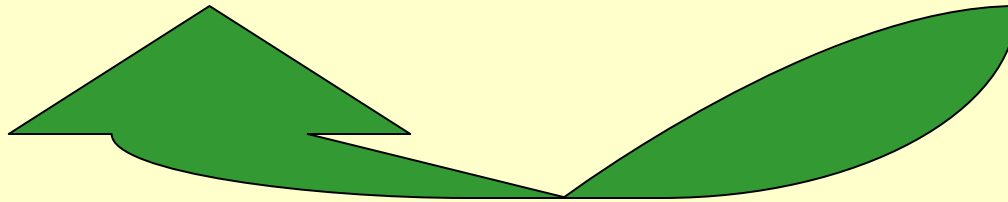
Competition and Cooperation

reconciliation by scapegoating



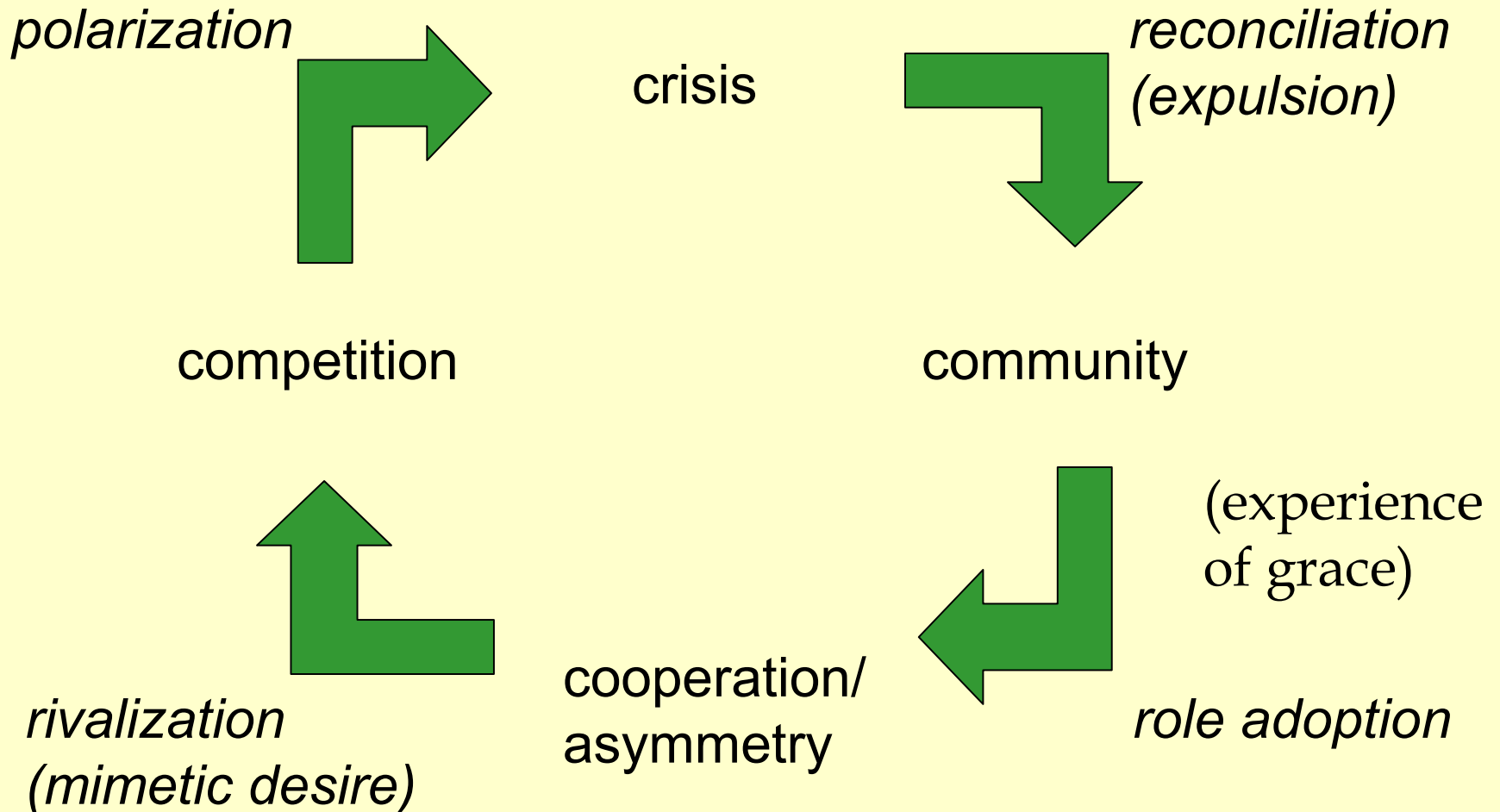
competition

cooperation

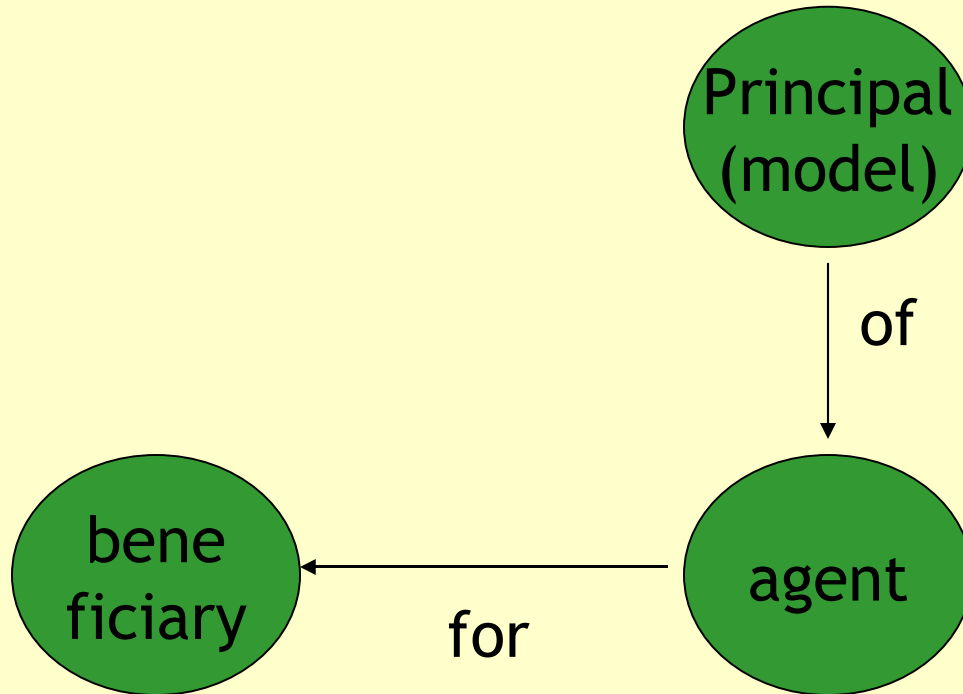


rivalization by mimetic desire

Complex Mimetic System cycle



Structure of human action (J. Taylor)



CAS

XYZ

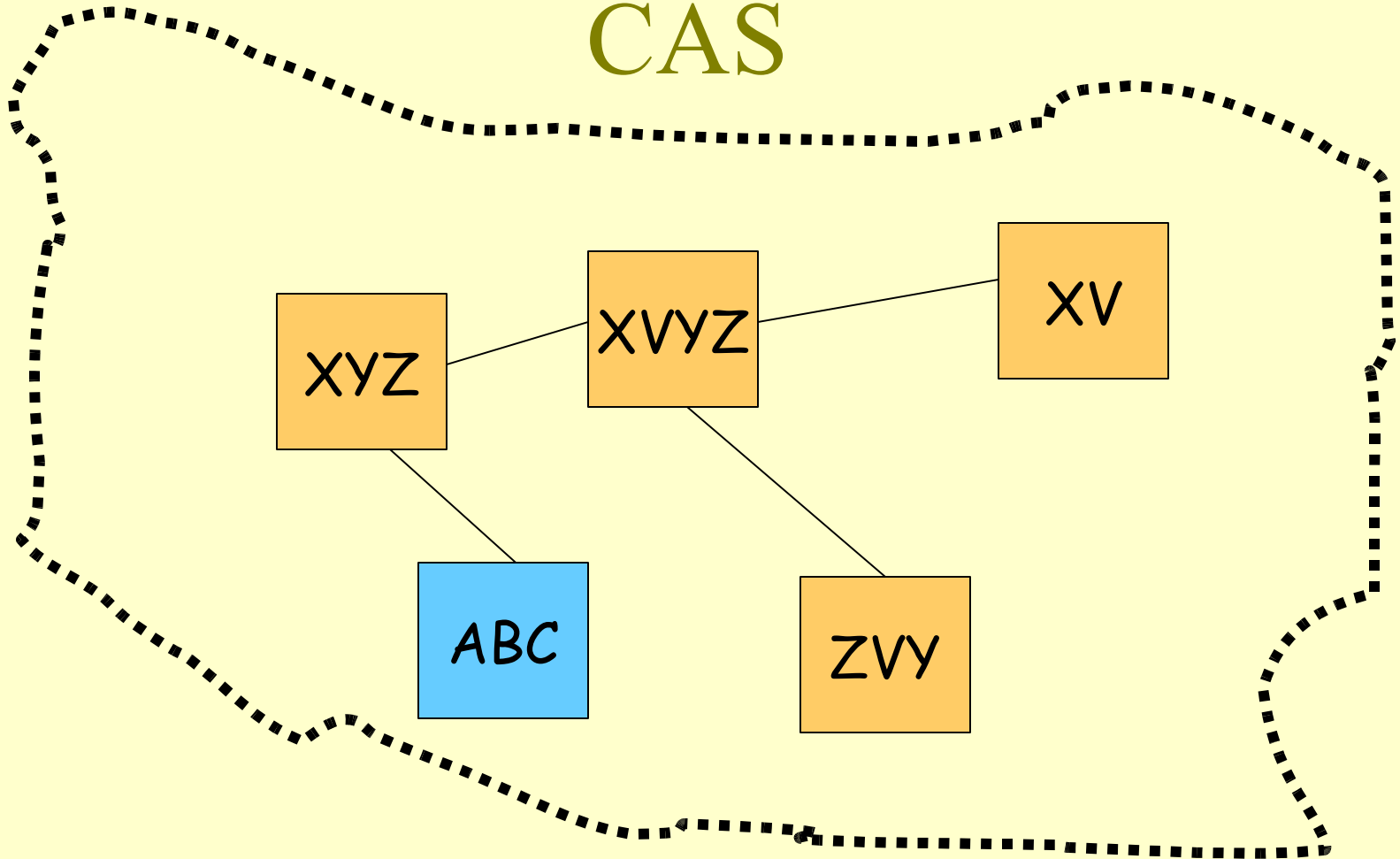
XVYZ

XV

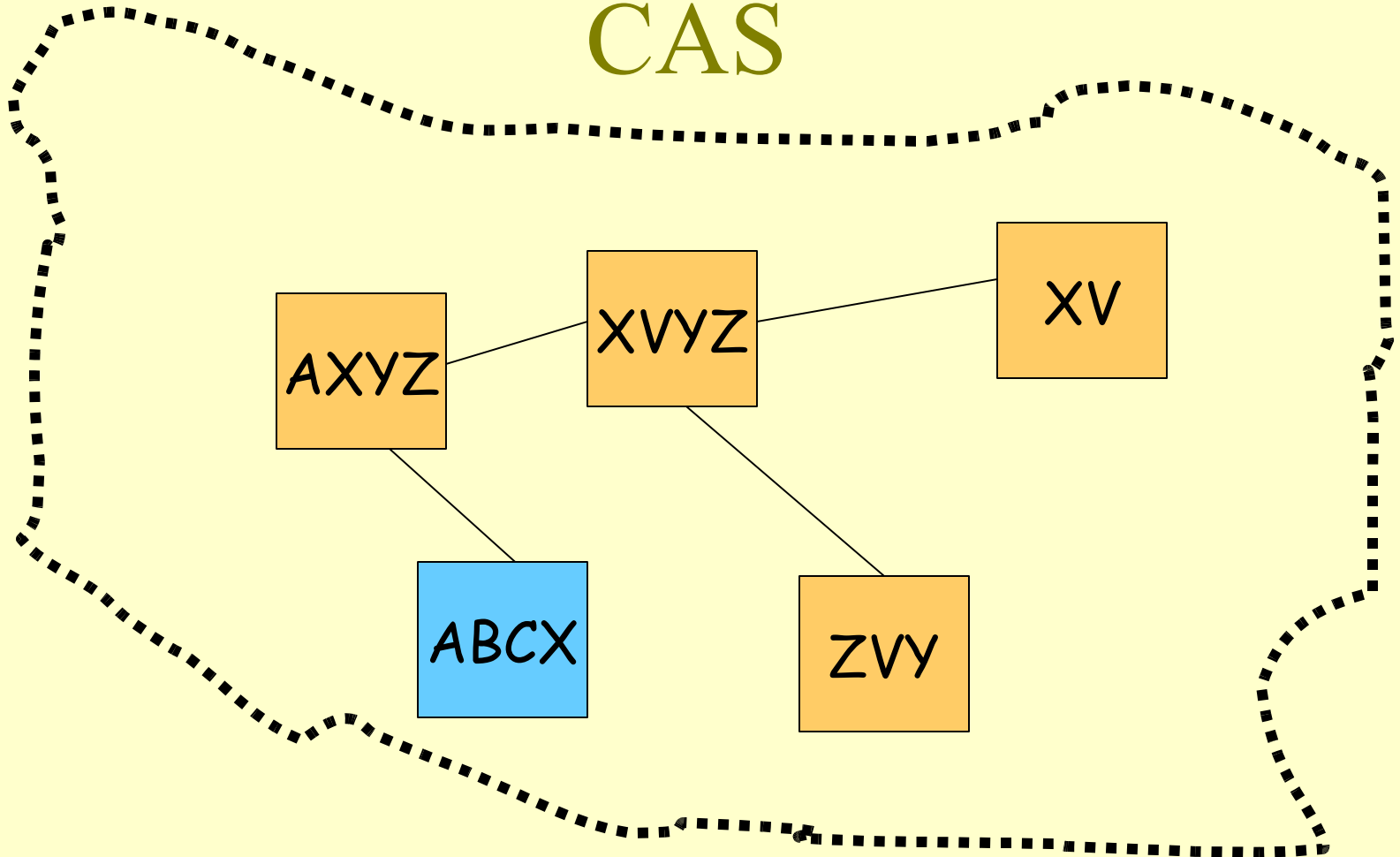
ZVY

ABC

CAS

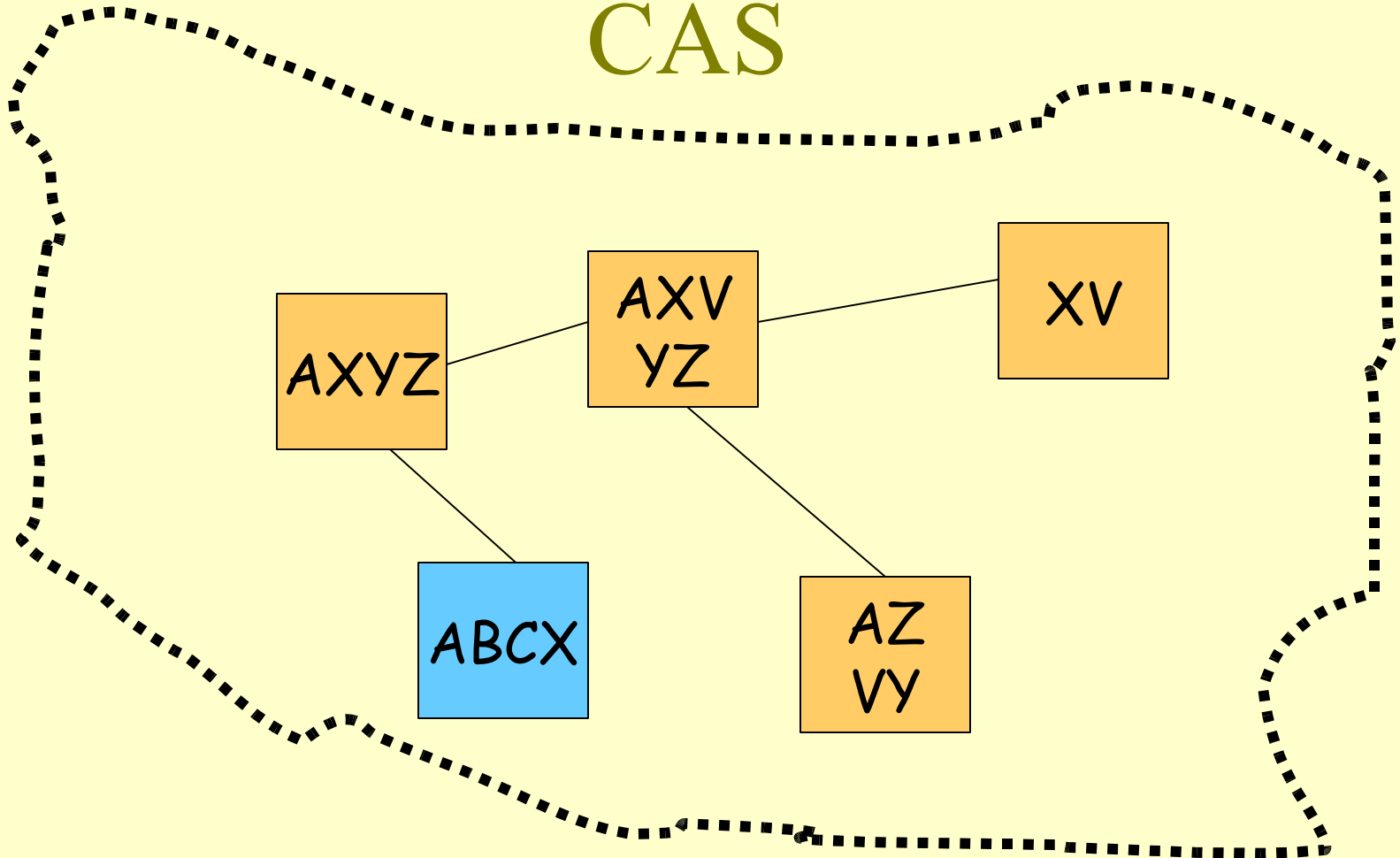


CAS



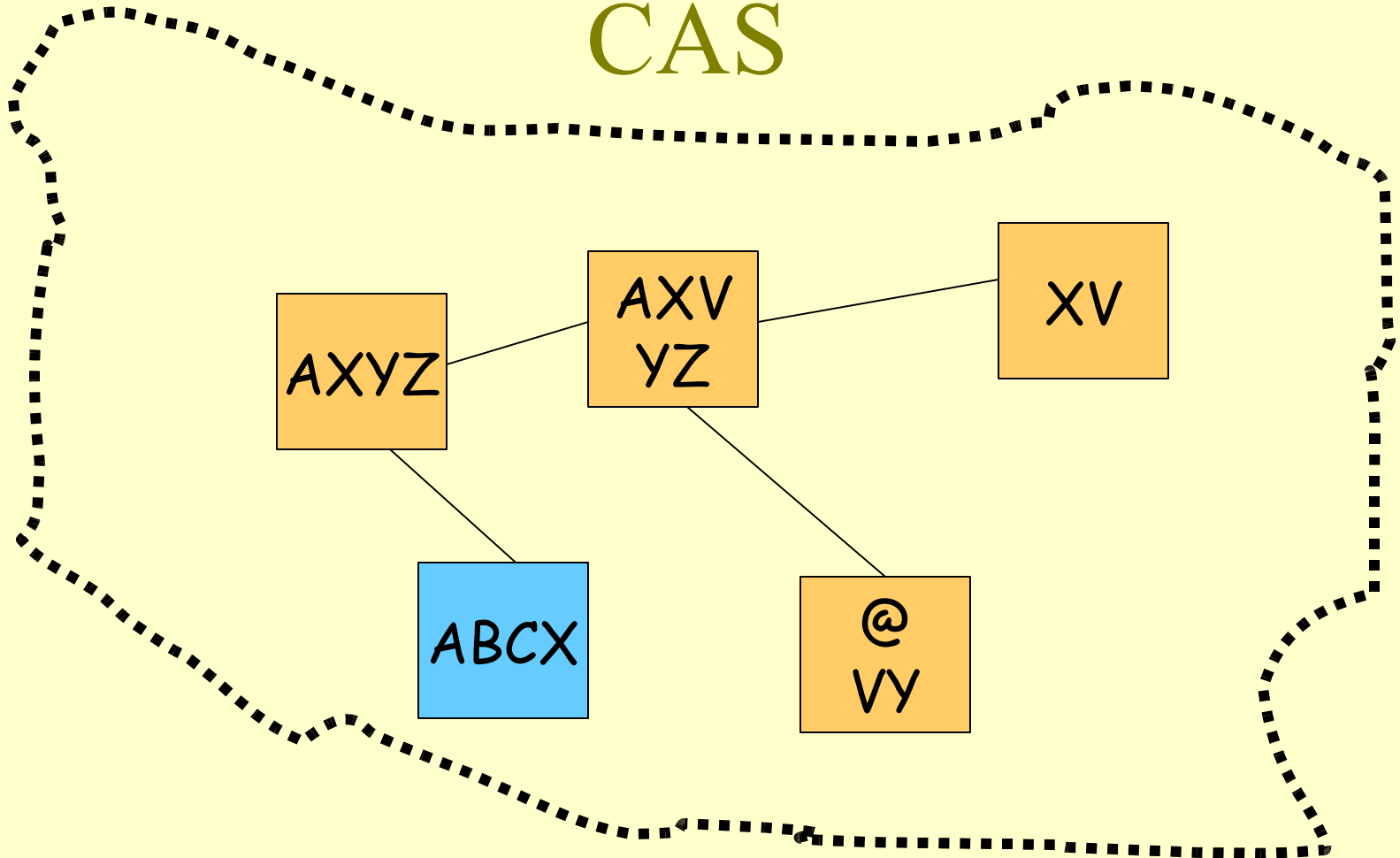
$AV \rightarrow @$

CAS



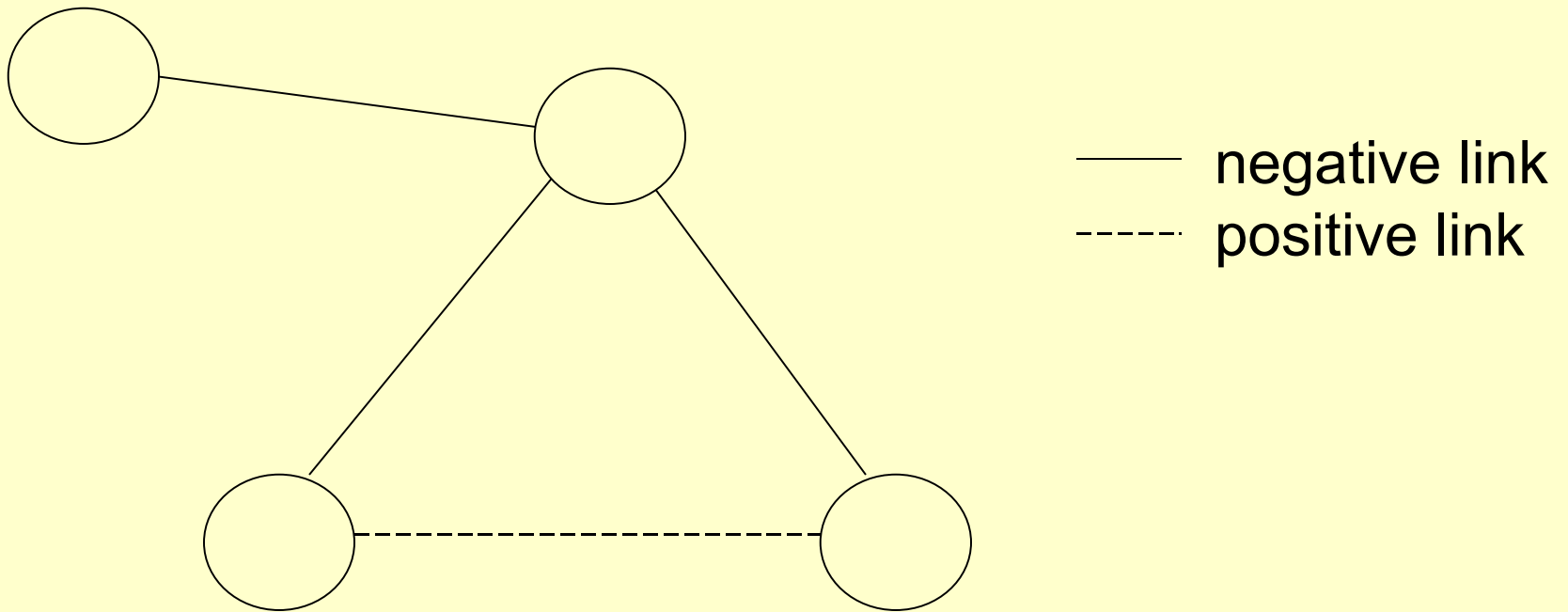
AZ → @

CAS

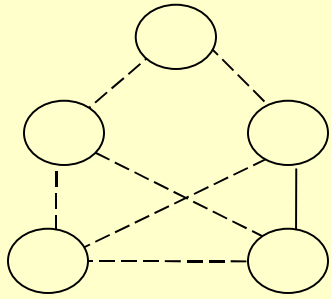


AV → @

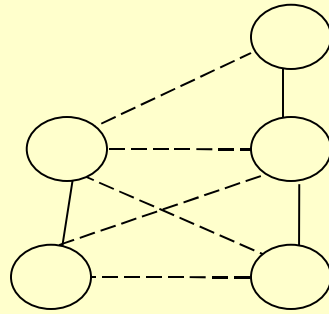
Edwin Hutchins' social networks



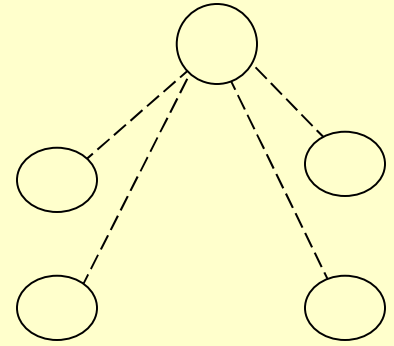
E. Hutchins, 1995. *Cognition in the Wild*. MIT Press.



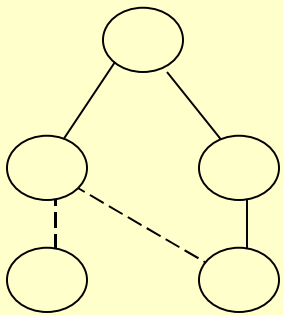
(b)



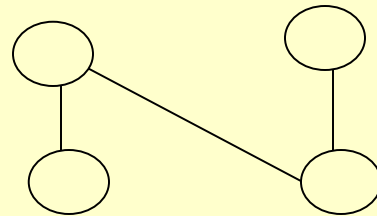
(c)



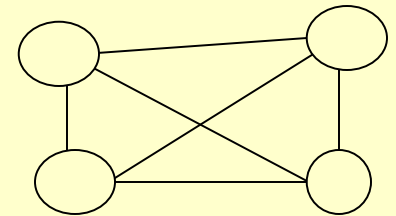
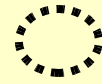
(d)



(a)



(f)

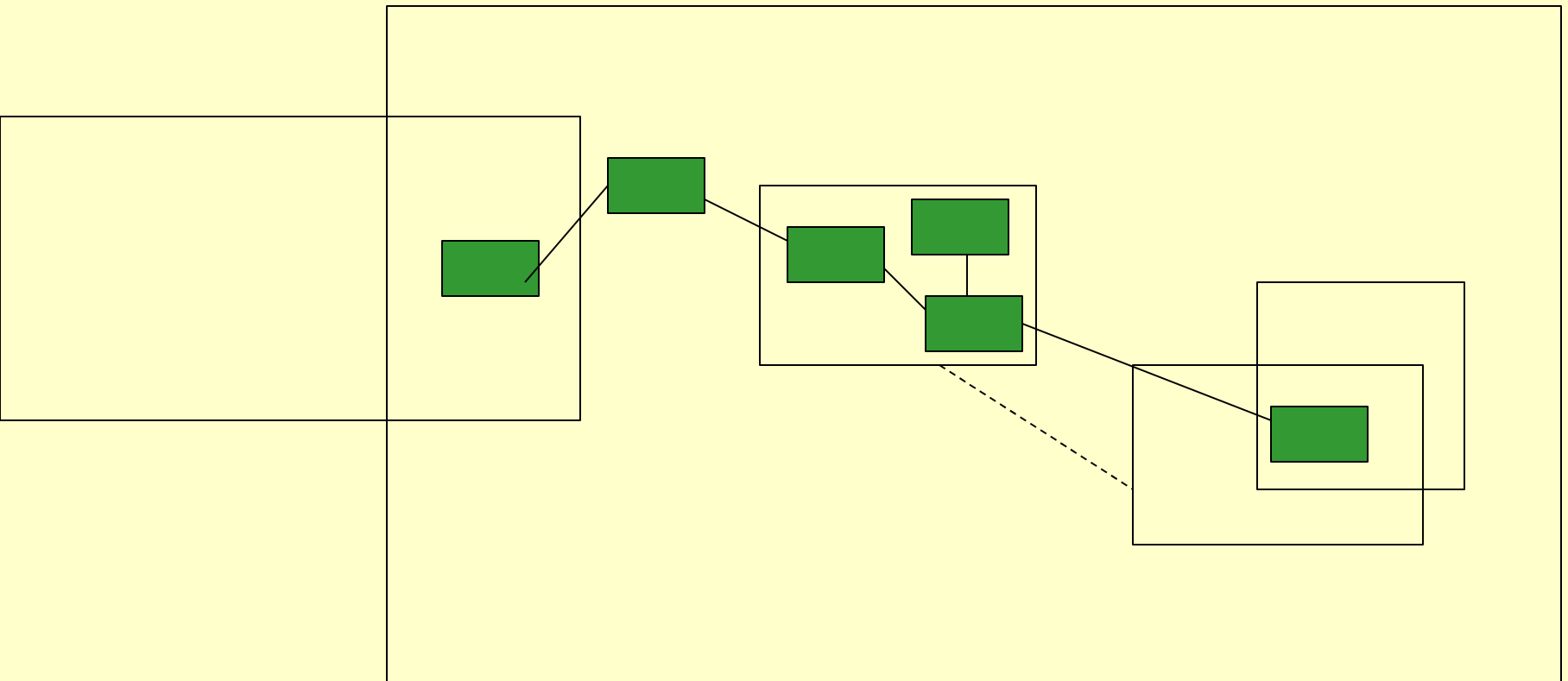


(e)

Some research questions

- Mimesis and social change (innovation, ..)
 - What is the influence of various mimetic variations (peer group imitation, class imitation, public media, ..)?
 - What are the dynamics of positive and negative links?
 - What is the influence of the network topology?
 - What is the influence of interaction between systems?
- CMS cycle
 - Are there variants of or alternatives to expulsion as reconciliation mechanism (e.g. split up)?
 - How does cooperation and role adoption come about as a result of reconciliation?
 - How do different levels of social systems influence each other?

Different levels Overlapping systems



Mimesis of what?

Behavior

resolution: learning

may result in: focused attention on objects

Possession (object)

resolution: duplication of the object

elimination of the object

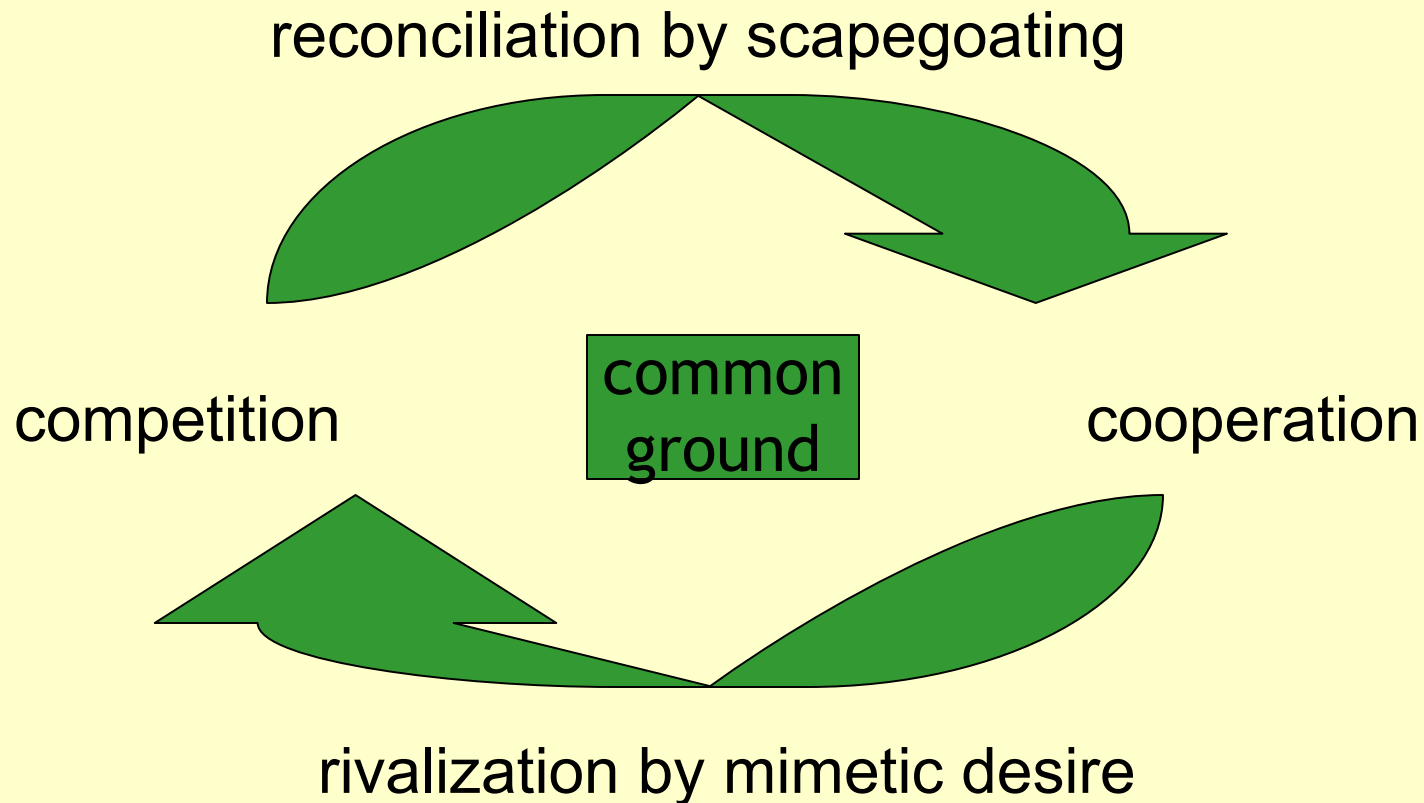
elimination of one party

Beliefs

can result from learning

can result from competition (finding arguments)

Culture cycle and common ground



Nonaka's knowledge cycle

