Heider balance and self-evaluation

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in cooperation with

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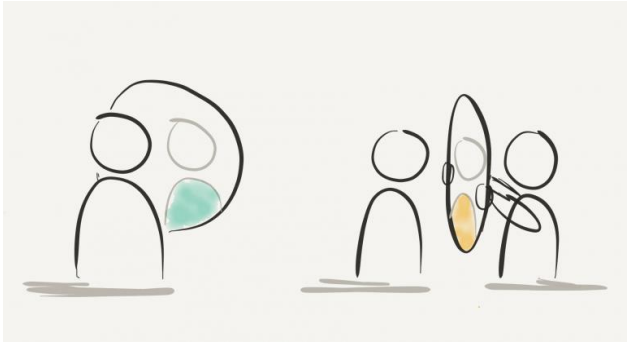

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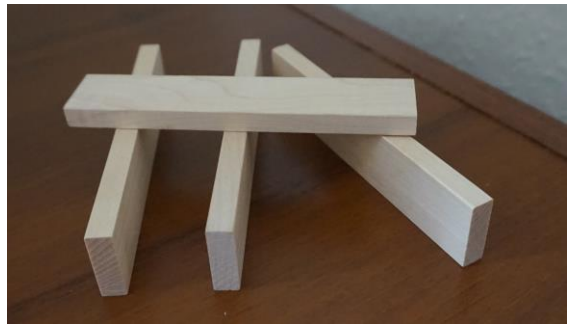
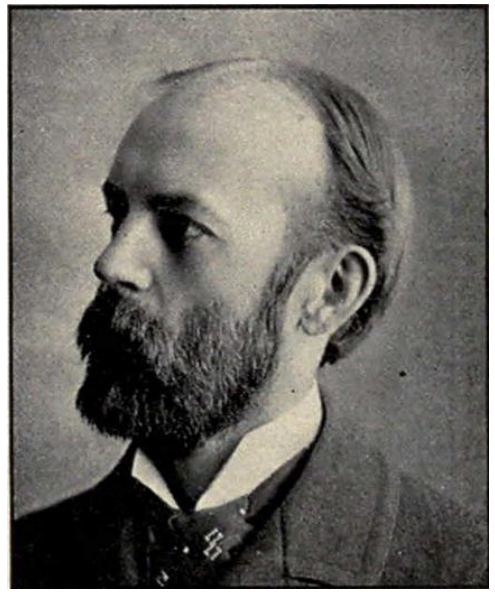
Outline

1. Self-evaluation by Cooley
2. Heider balance
3. Dynamics of (asymmetric) relations
4. Self-evaluation index
5. Exemplary stationary states
6. So what?



SELF-EVALUATION

"If a boy […] has any success, […] he gloats over it […]. He is eager to call in his friends […], saying to them, 'See what I am doing! Is it not remarkable?' feeling elated when it is praised, and resentful or humiliated when fault is found with it."



Charles Horton Cooley
(1864-1929)

each to each a looking glass
reflects the other that doth pass

We are ashamed to seem evasive in the presence of a straightforward man, cowardly in the presence of a brave one, gross in the eyes of a refined one, and so on. We always imagine, and in imagining share, the judgments of the other mind.

[C. H. Cooley, Human Nature and the Social Order, 1902]

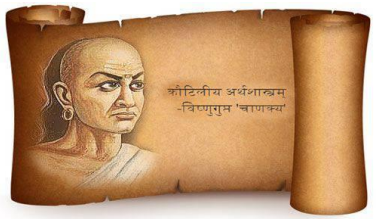
An important theory about the origins and the developments of selfhood was proposed in symbolic interactionist theory (Cooley, 1902; Mead, 1984). In this view, the inner self starts off near empty or blank and gradually fills up with information attained from other people. (…) people's self-ratings did match up well with how they *believed* other people rated them. Beliefs about self could thus derive from the feedback one believes that one gets from others.

[Roy F. Baumeister, The Nature and Structure of the Self: An Overview, in The Self in Social Psychology, R. F. Baumeister (Ed.), Psychology Press, Taylor &Francis, Philadelphia 1999, p.10]

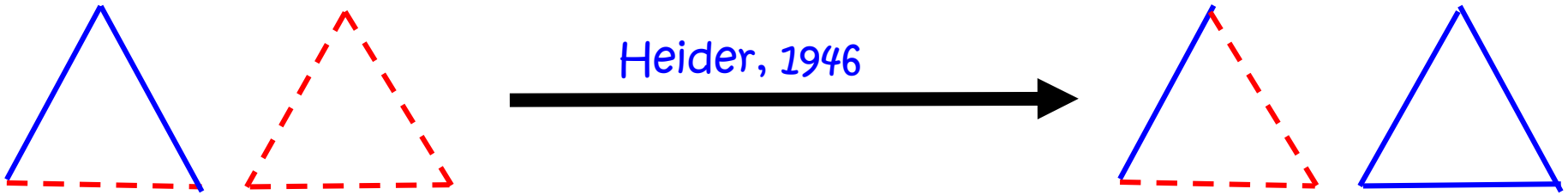
THE HEIDER BALANCE

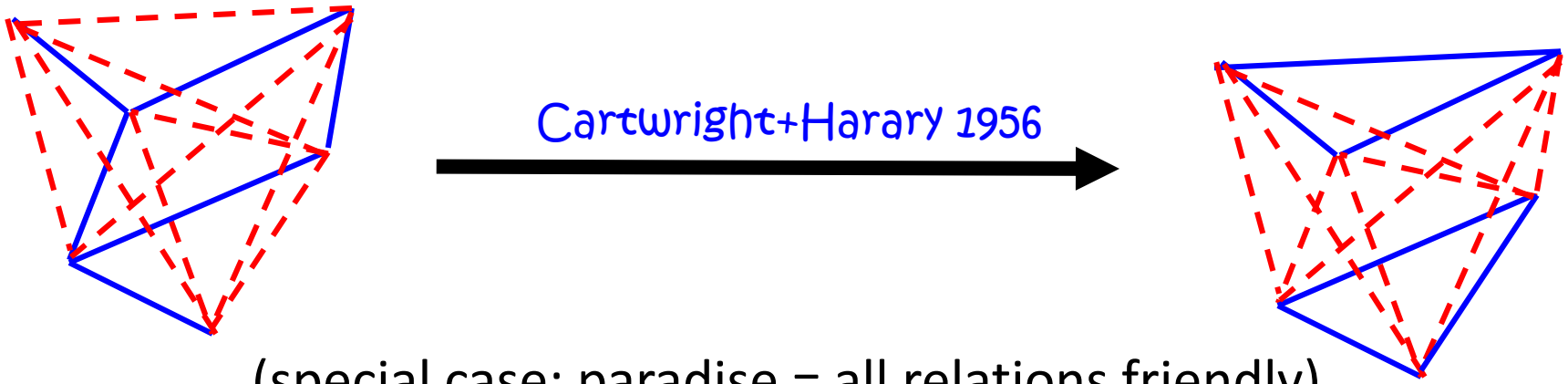
a consequence of removal of cognitive dissonance

a friend of my friend is my friend,
a friend of my enemy is my enemy,
an enemy of my friend is my enemy,
an enemy of my enemy is my friend.



Chanakya, 400 BC





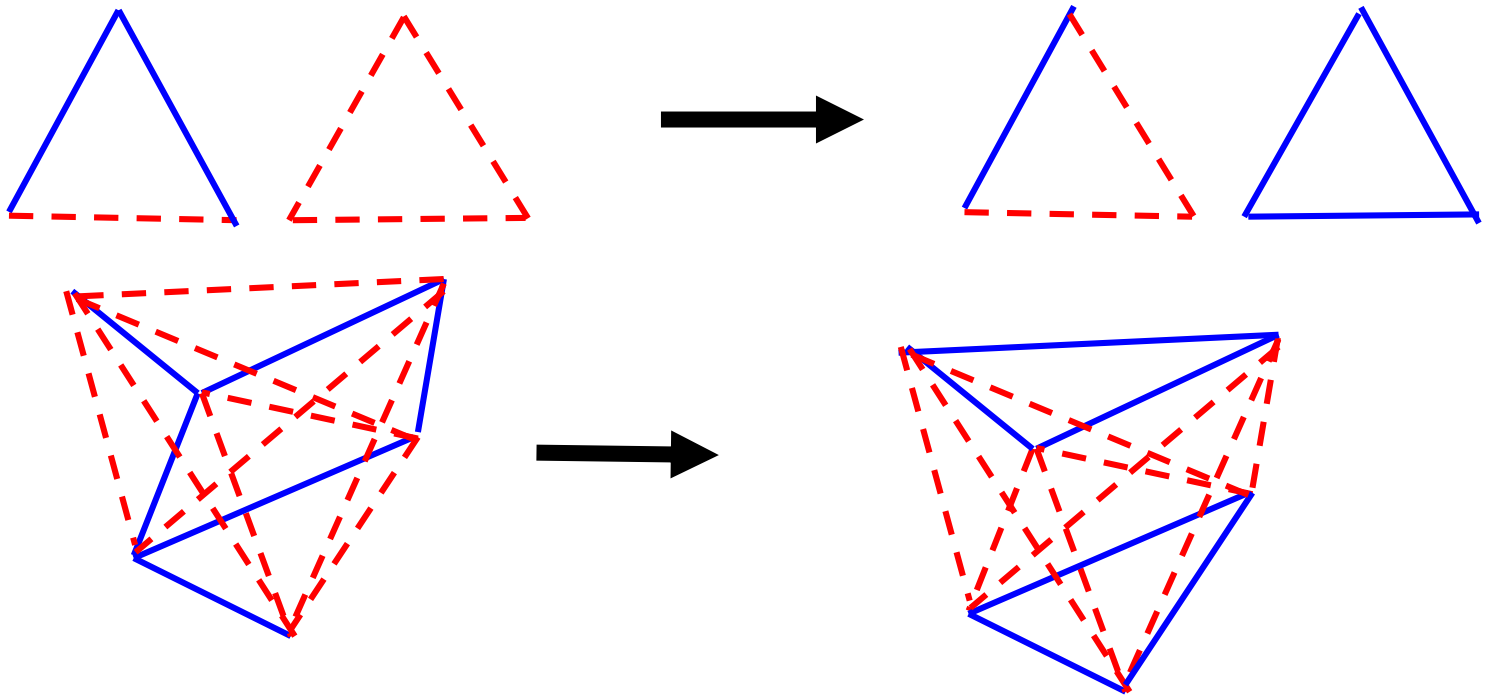
(special case: paradise = all relations friendly)

DYNAMICS OF RELATIONS

$$\frac{dx_{ij}}{dt} = (1 - x_{ij}^{\,2}) \sum_{k \neq i, \neq j}^{N-2} x_{ik}\, x_{kj}$$

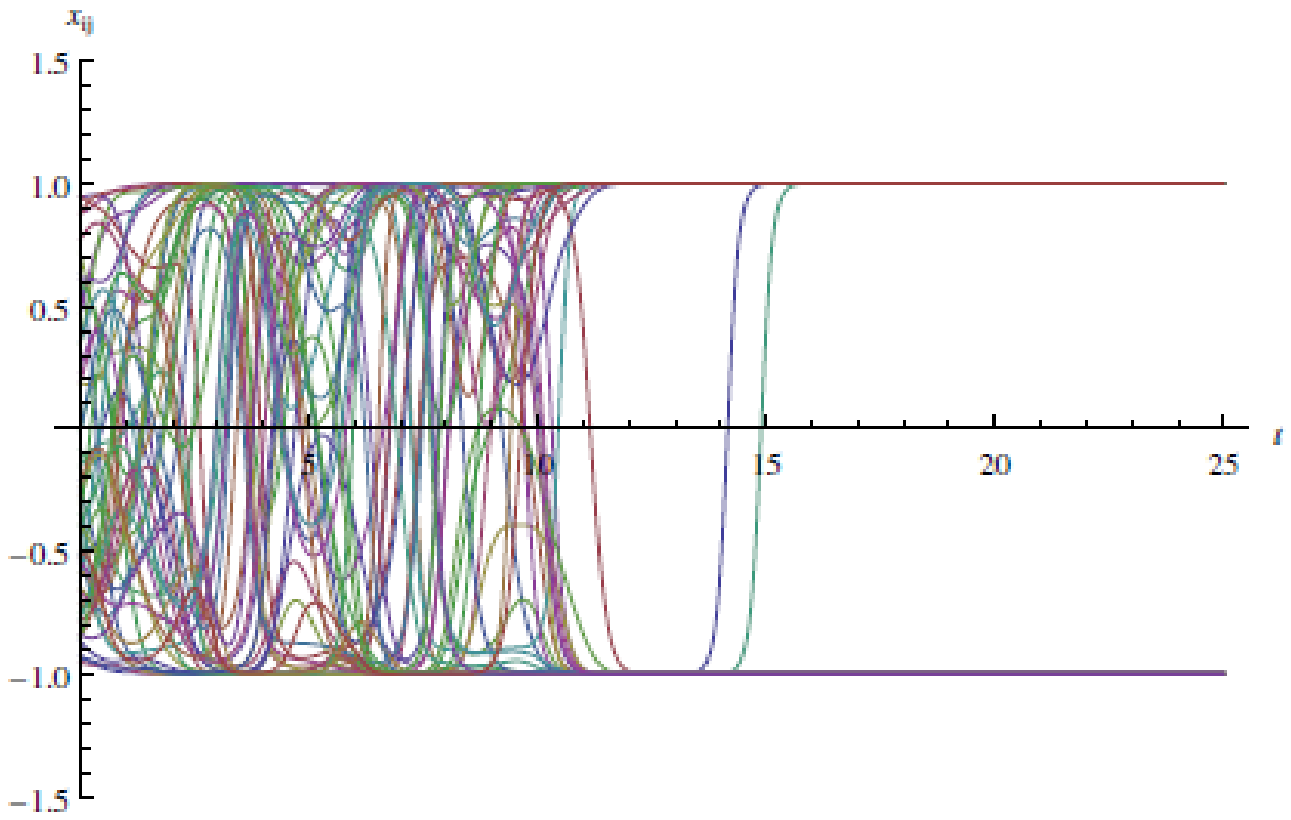
For $x_{ik} = x_{ki}$ we get HB:

[KK et al., IJMPC 16 (2005) 707]



Here $x_{ik} \neq x_{ki}$

EXEMPLARY DYNAMICS



x[1, 1] x[2, 1] x[3, 1]
x[1, 2] x[2, 2] x[3, 2]
x[1, 3] x[2, 3] x[3, 3]
x[1, 4] x[2, 4] x[3, 4]
x[1, 5] x[2, 5] x[3, 5]
x[1, 6] x[2, 6] x[3, 6]
x[1, 7] x[2, 7] x[3, 7]

lead to $x_{ik} = \pm 1$ in the stationary states

A SELF-EVALUATION INDEX

where „disliked others” are disregarded

$$y_i = \frac{1}{2}\sum_{i \neq k}^{N-1}(1 + x_{ik})x_{ki}$$

$y_i \geq 0 \rightarrow$ self-evaluation positive or zero

$y_i < 0 \rightarrow$ self-evaluation negative

(*i* frustrated)

EXEMPLARY STATIONARY STATES

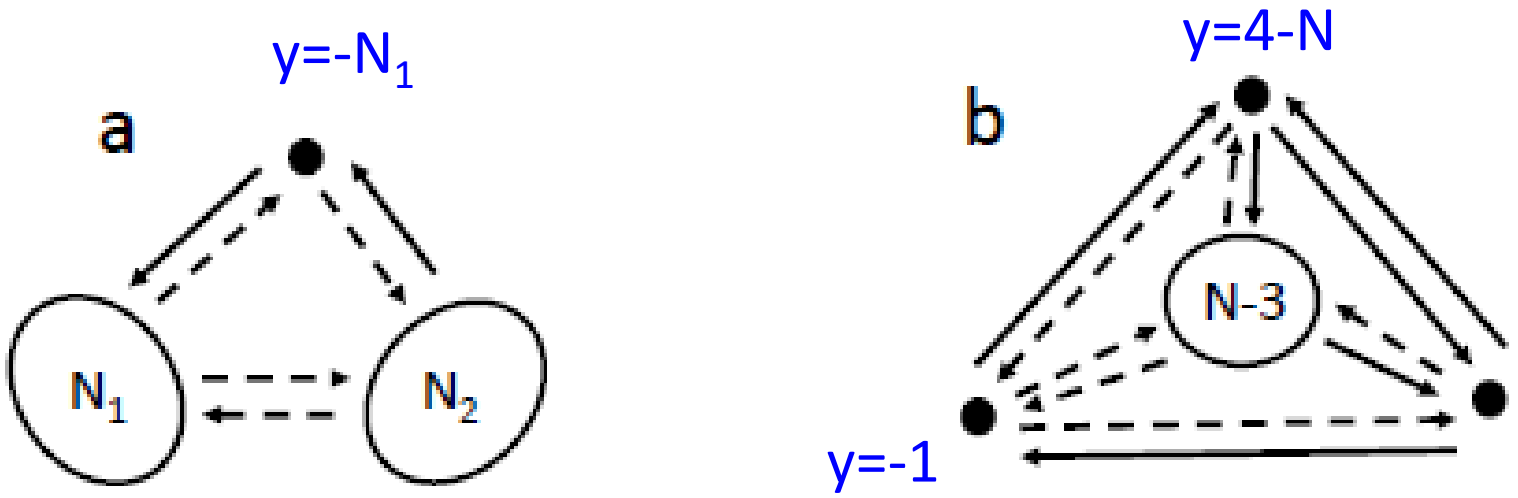
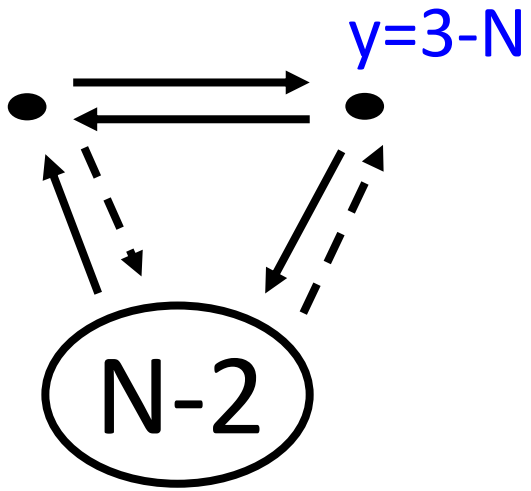
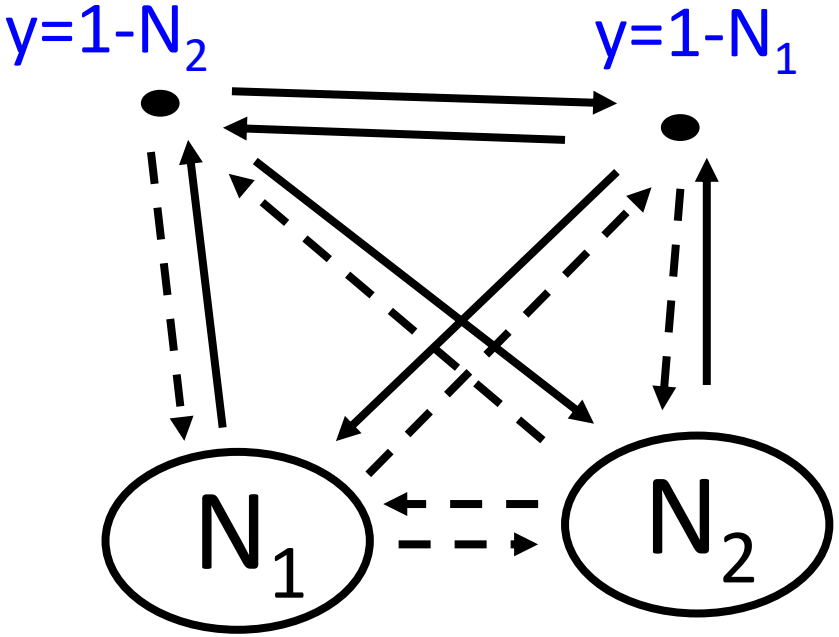
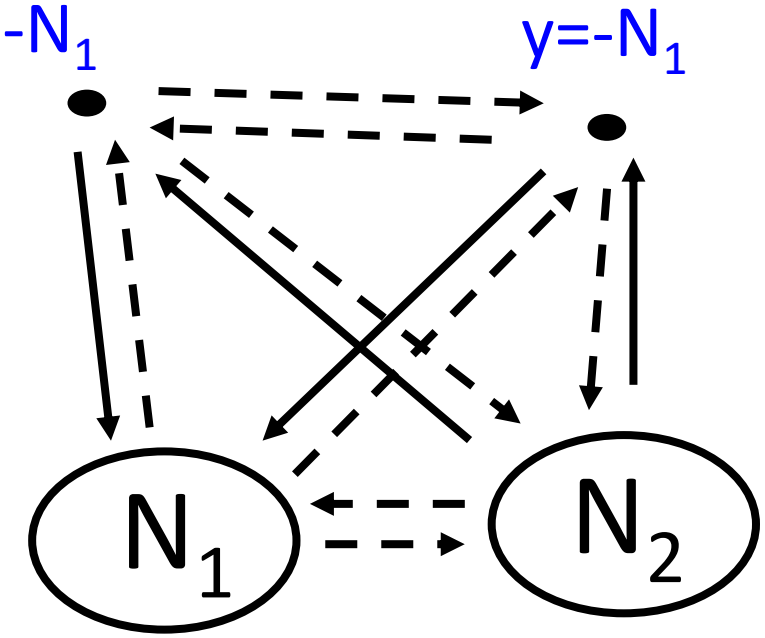


Fig. 1. Two examples of configurations of a fully connected network with asymmetric relations of some nodes. The ovals relate to clusters with identical signs of relations; positive (full lines) and negative (dotted lines). Both configurations (*a*) and (*b*) are unbalanced and stable.

more stationary states



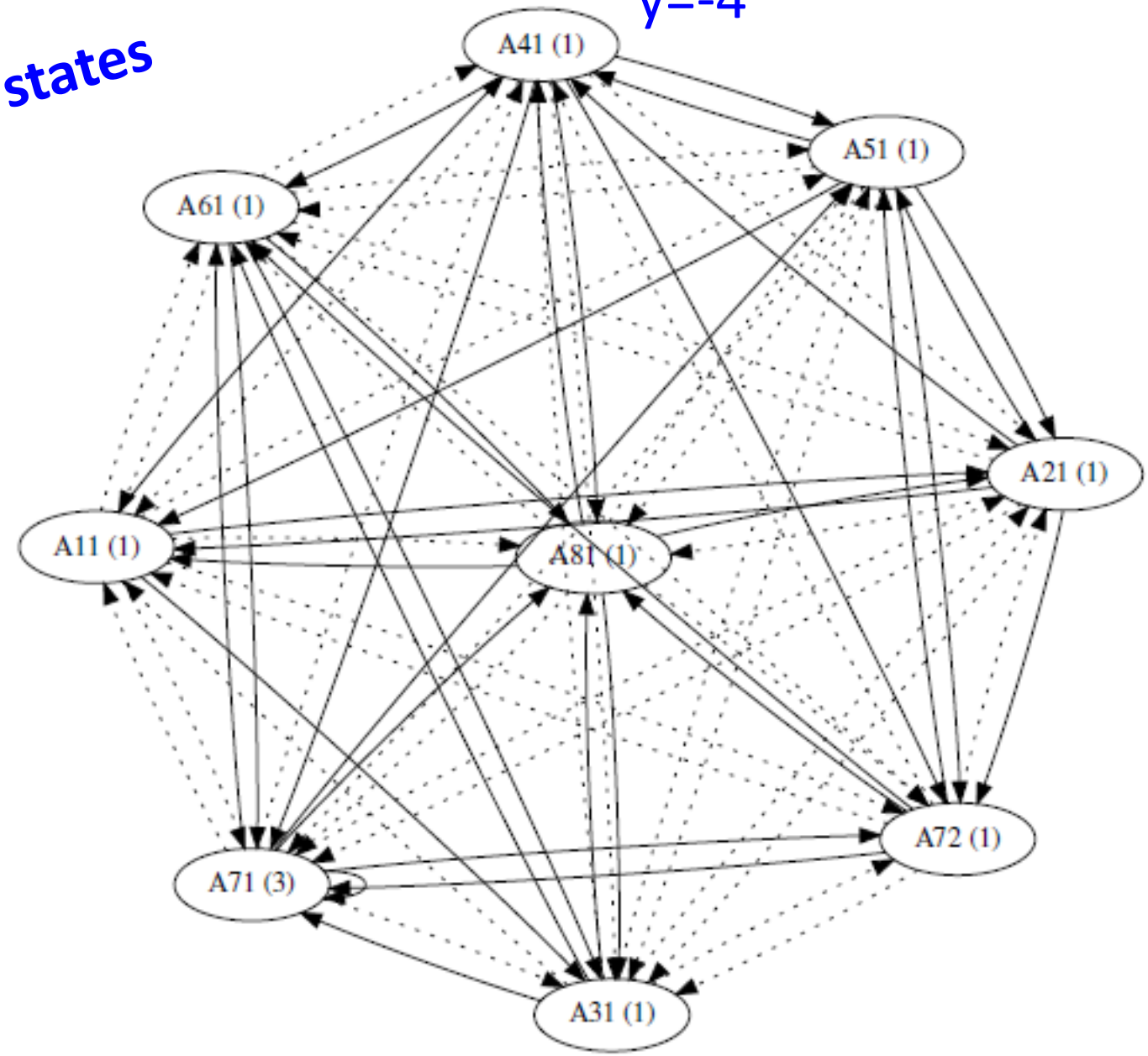




more stationary states

y=-4

N=11



For higher *N*, we meet the problem of graph classification.

An algorithm for given *N* :

a) Set a random asymmetric initial state $\{x_{ij}(t=0)\}$

b) Find the stationary solution of the dynamics $\{x_{ij}(t=\infty)\}$

c) Classify nodes according to their number of positive links

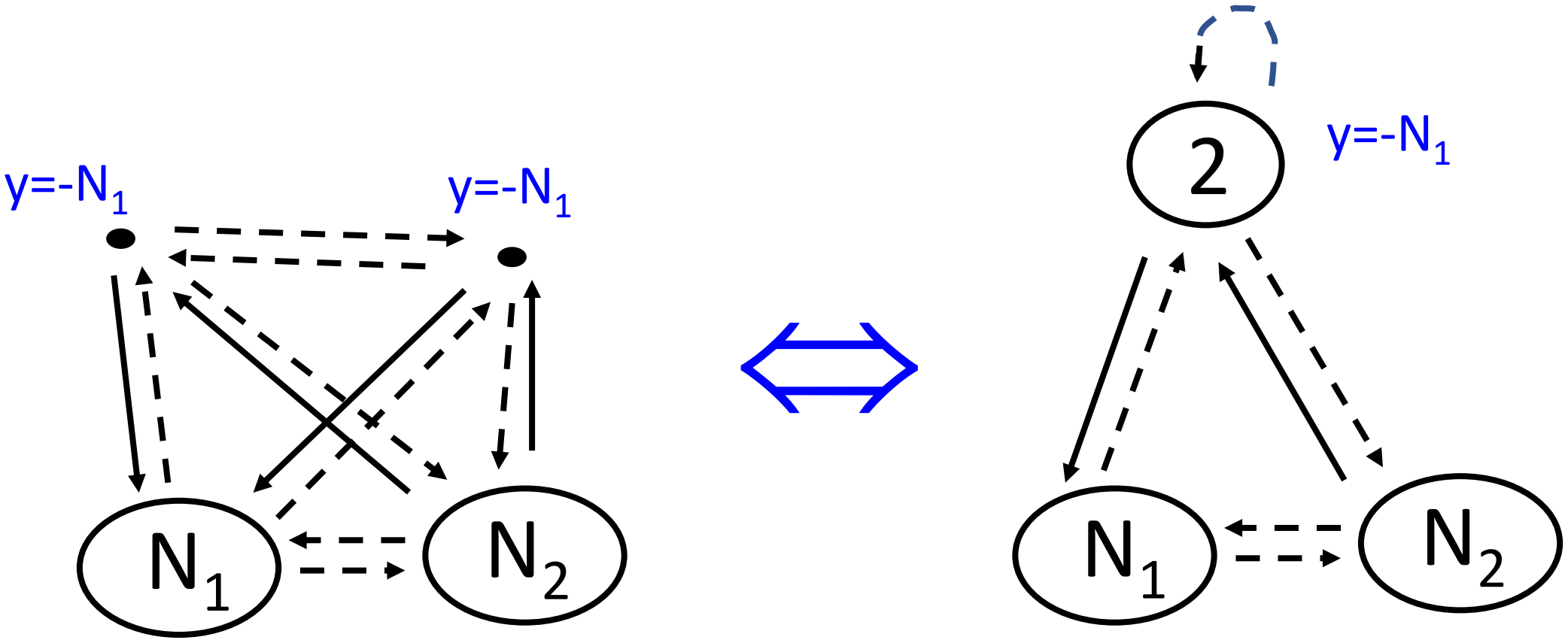
d) Do the neighhbors of nodes in the same class belong to the same classes?
If NOT, refine the classification. Continue until YES.

e) The graph is classified as the list of classes of nodes,
with the numbers of nodes in each class.

f) Go to a).

[M. J. Krawczyk, Physica A 390 (2011) 2181]

class equivalence



SO WHAT ?

Following the „looking-glass self” theory, we infer on low self-evaluation from asymmetric interpersonal relations.

The proces of removal of cognitive dissonance drives interpersonal relations to stationary configurations. Some of these configurations appear to be frustrating for selected individuals.

Our results allow to classify these configurations and – in principle – to identify them in social groups.

Not merely little devils: a still from the 1990 Columbia film Lord of the Flies. Photograph: Pictorial Press Ltd/Alamy

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