Opinion formation in an open system and the spiral of silence

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outline

- Ritual invocations
- Spiral of silence
- Open social systems
- The model
- Numerical results
- Conclusions/Links to physics

Sociology is…

… a science which attempts the interpretative understanding of social action in order thereby to arrive a causal explanation of its course and effects.

[M.W., The methodology of the social sciences, 1903-1917/1949]

Max Weber,
1864-1920

Karl E. Weick,
1936 - ☺

Sensemaking is…

…the activity that enables us to turn the ongoing complexity of the world into a "situation that is comprehended explicitly in words and that serves as a springboard into action"

[K.E.W, K. M. Sutcliffe, D. Obstfeld, Organization Science 16 (2005) 409]

Spiral of silence

H1. Society threatens deviant individuals with isolation

H2. Individuals fear isolation

H3. This fear of isolation makes individuals scan continuously the opinion climate

H4. The perceived climate of opinion influences their behaviour in public, specially in speaking out

Elisabeth Noelle-Neumann, 1916-2010

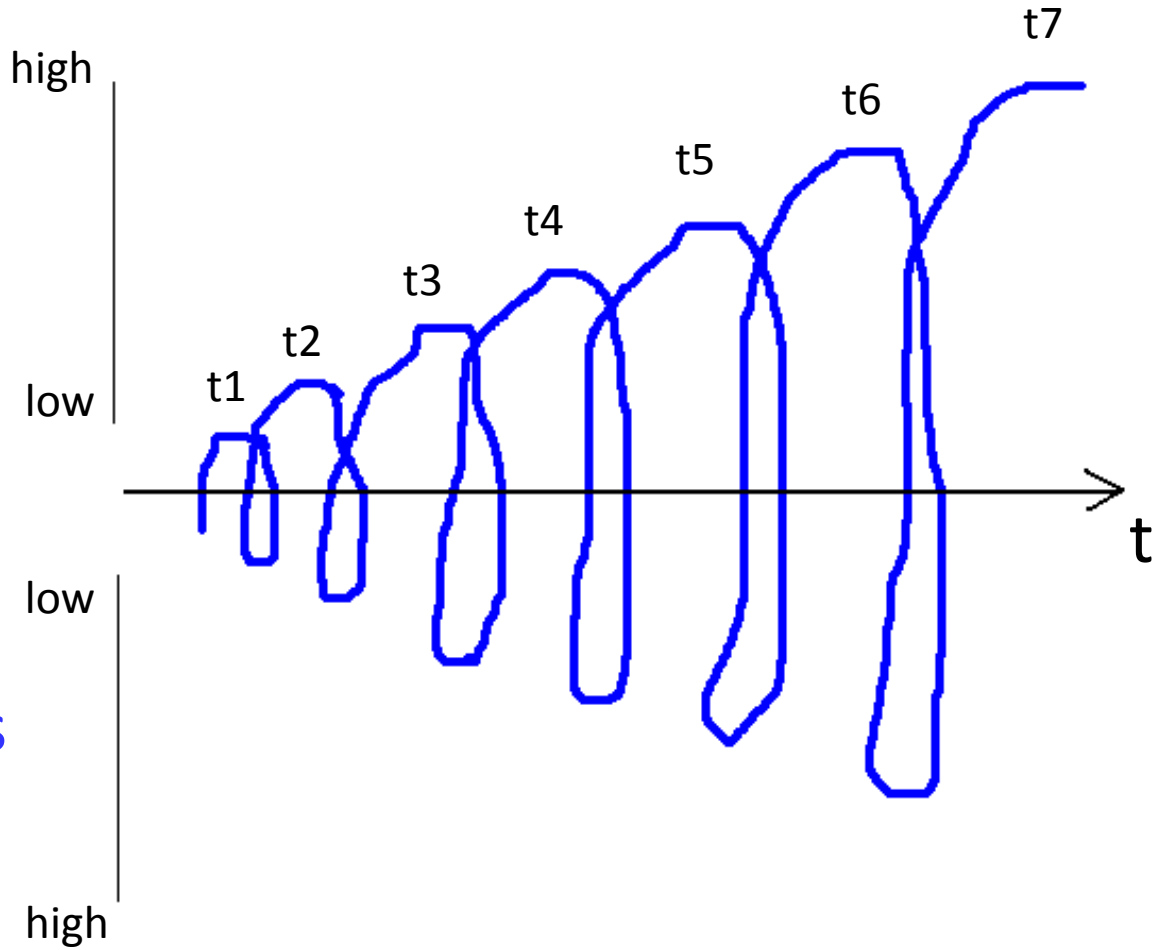
H5. (…) Those who think their opinion is the majority tend to speak out; otherwise they remain silent. Thus, the majority opinion seems to be more supported than it is in reality; the minority one seems to be less supported than it is. (…) At last stage, the minority opinion reduces to a small core group or disappears.

[E. N.-N., Journal of Communication 24 (1974) 43]

Spiral of silence

Perceived strength of opposition to ***

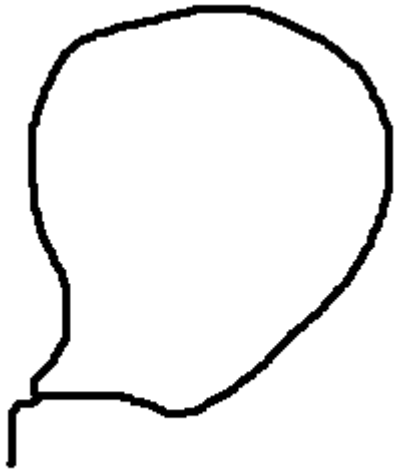
Number of people unwilling to express viewpoints in favor of ***



[after D. A. Scheufele, CAB International 2007. The Media, the Public and Agricultural Biotechnology (ed. D. Brossard et al.) (http://dietramscheufele.com/sos2.pdf)]

A test of isolation

Q: What opinion is represented by the person on the left?



Do some opinions cause such aversion that they produce isolation?

[E. Noelle-Neumann, The spiral of silence. A theory of public opinion – our social skin, 1980/1984/2004]

Open social systems

Zoya Samoilenko,
Conversation
in a Train Compartment

outflow

inflow

pl.wikipedia.org/wiki/Kolejka_(zbiorowość)

The model

1. Each actor is endowed with charisma *C* and opinion *S*.

2. Once per a time, one actor leaves the group and another one enters. Those who entered first leave first. The number of actors *N* is kept constant.

3. Actors may express their opinions *k* times during they are present. Each actor at each time *t* perceives what he hears from other actors since he appeared, and he takes it as an established opinion.

4. Each actor expresses his opinion with the probability which decreases with the difference between his opinion and the opinion of others, as perceived by him.

More details

1. The distribution of charisma is Poissonian, with < *C* >=3

2. The distribution of opinion is normalized Gaussian (< *S* >=0)

3. The opinion perceived by *i* is $< S >_i (t) = < C(j) S^*(j) >$

   where *S*(j)* is an opinion expressed by an actor $j \neq i$.

4. Each actor *i* expresses his opinion with the probability

$$p_i(t) = \frac{c}{1 + \exp(a|x| - b)}$$

   where $x = S(i) - < S >_i (t)$

5. $k = 50\,N^2$, $c = 1/5$

Question:

How long time a leader is remembered?

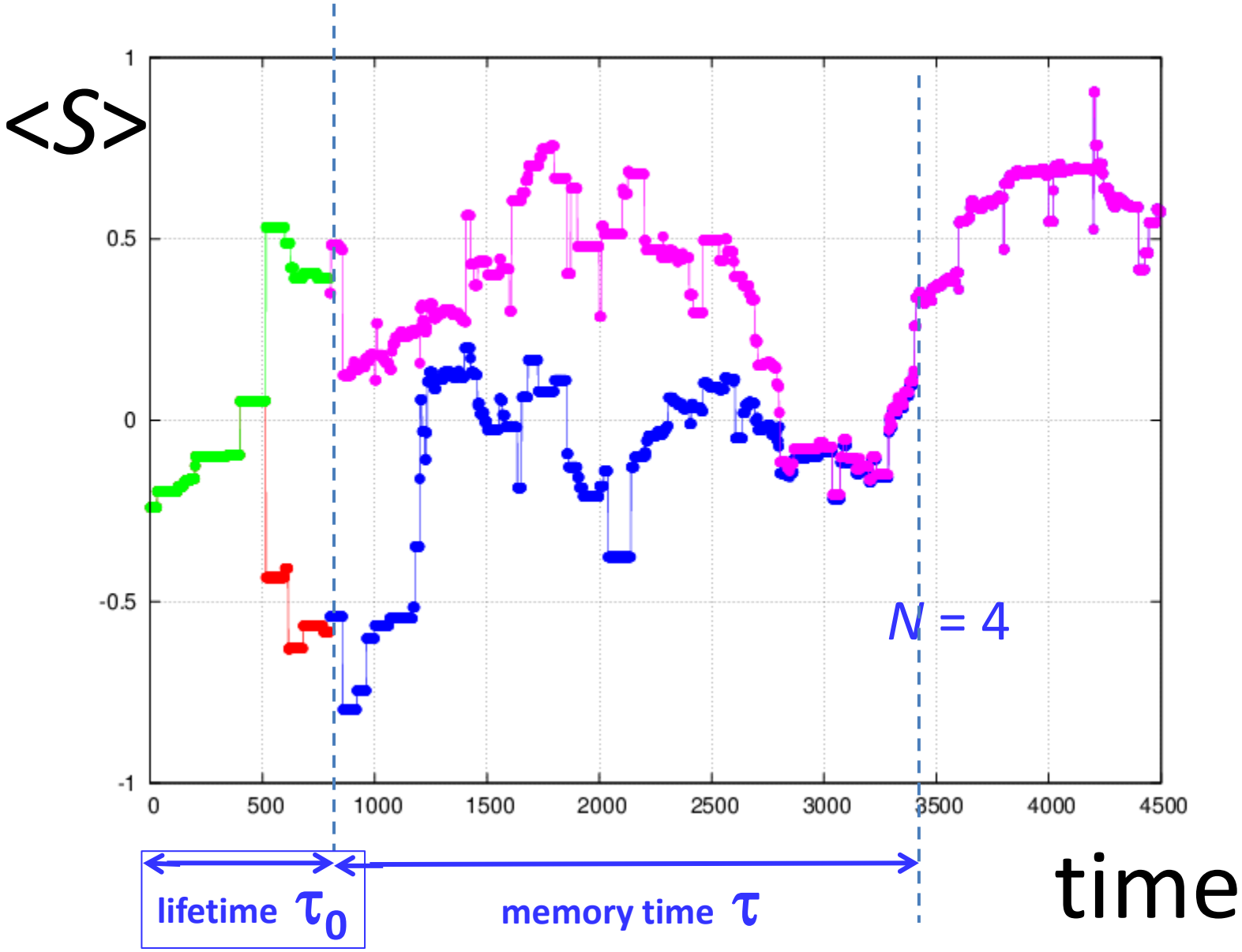
method

Step 1: A leader is selected, with $C > 5$

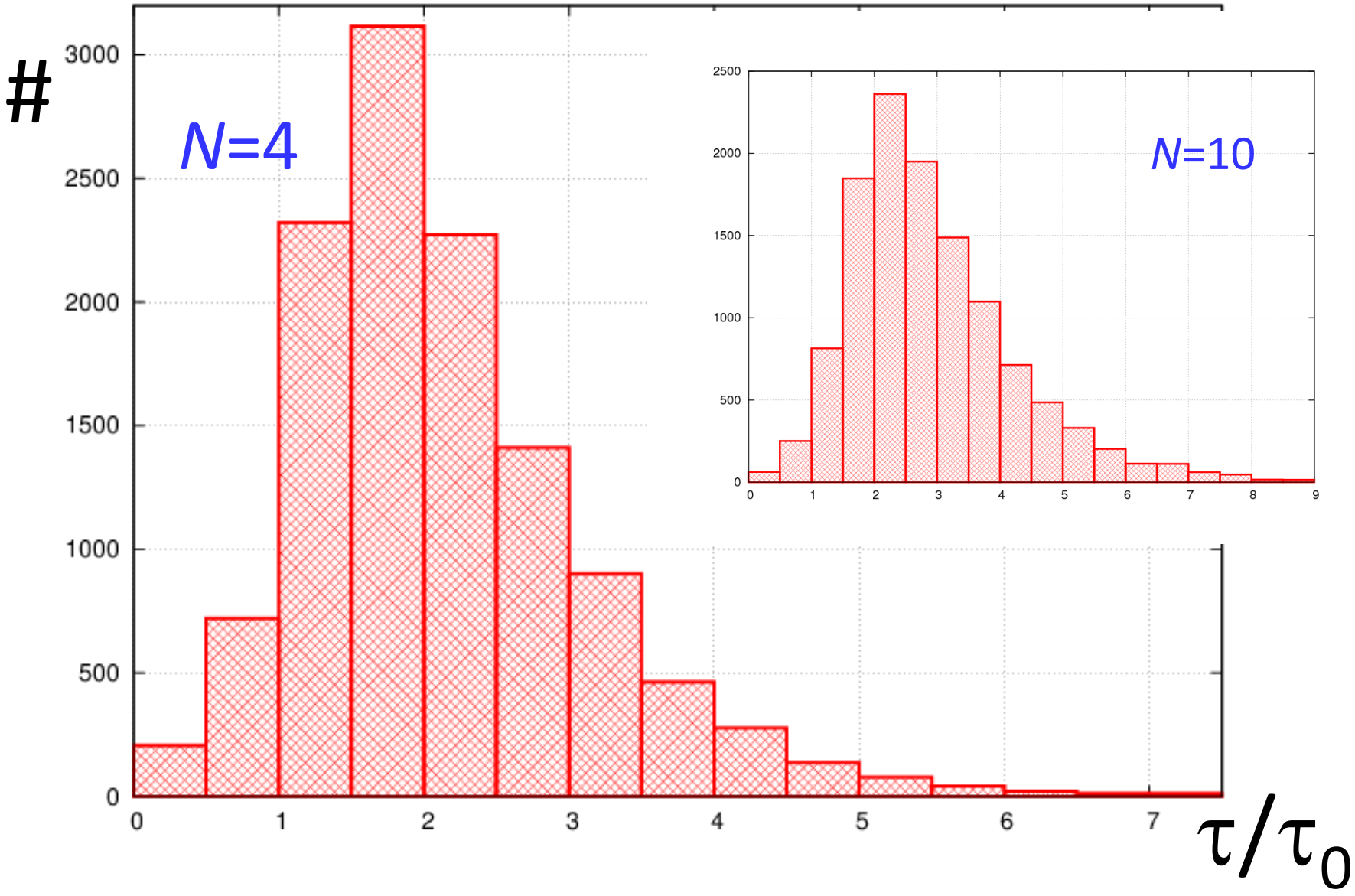
Step 2: The time evolution of $\langle S \rangle$ is traced two times, for the leader's opinion +1 and -1.

As long as the difference $\langle \Delta S \rangle$ between these two cases persists, the leader is remembered.

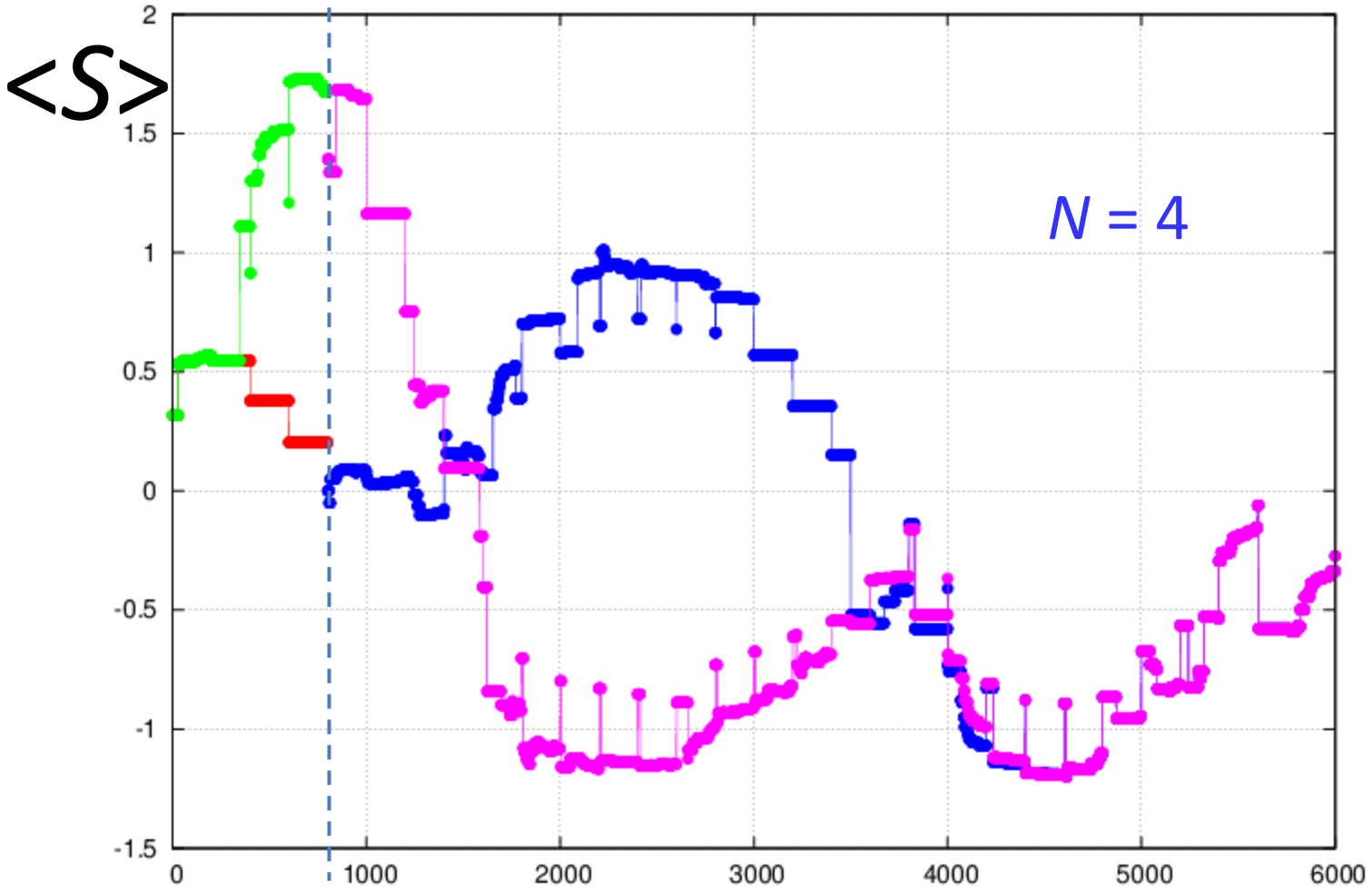
Numerical results – an example



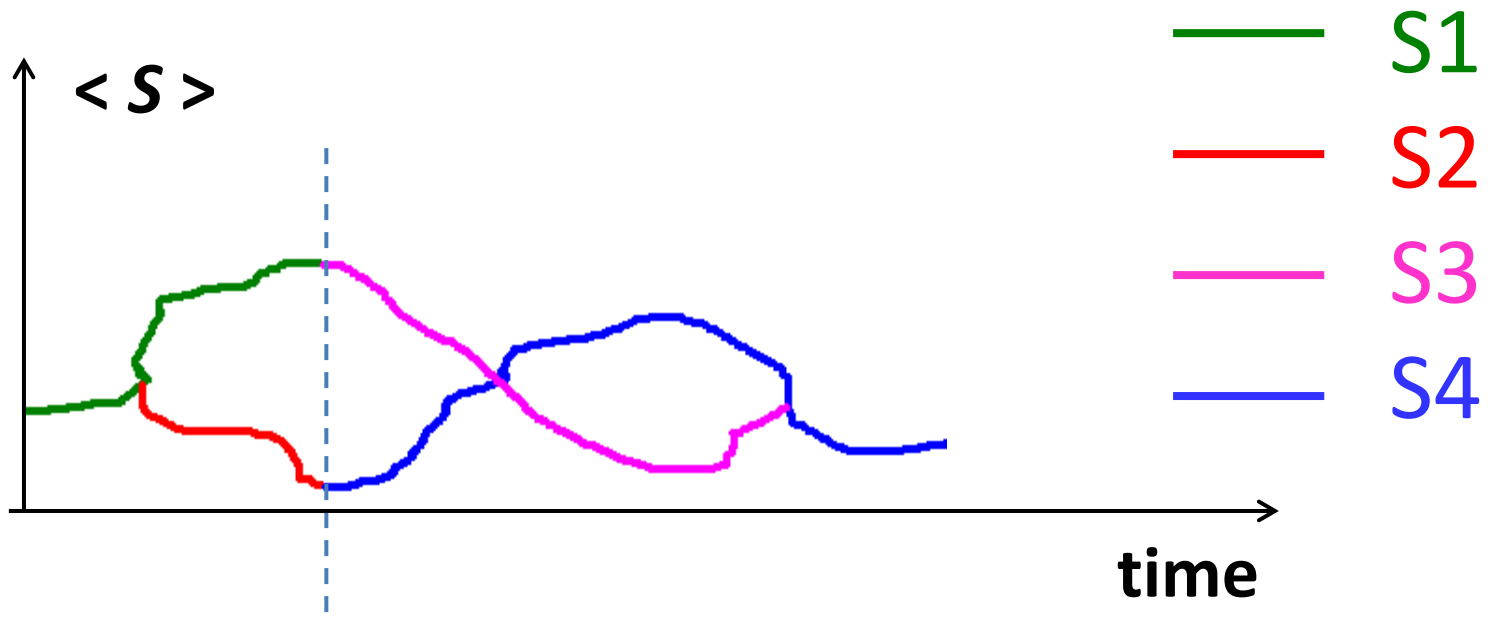
Numerical results – memory effect



Numerical results – it may happen



What we measure



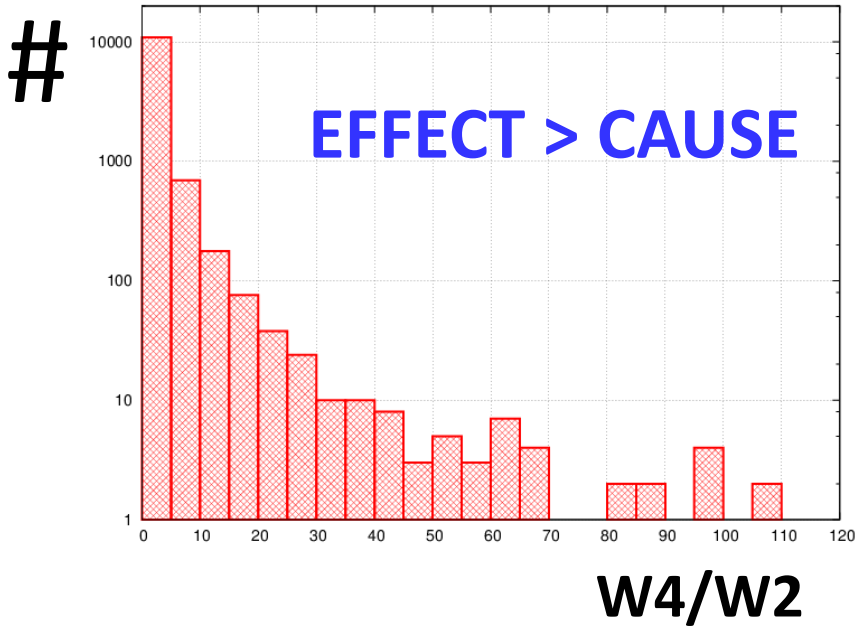
cause

$$W2 = \int_{0}^{\tau} |S1 - S2| dt$$

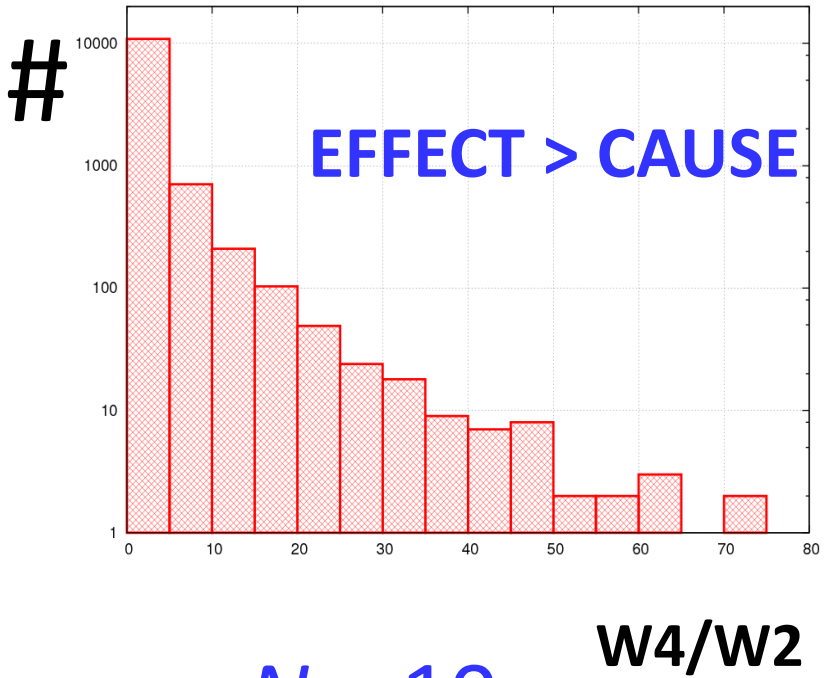
effect

$$W4 = \int_{\tau}^{\infty} |S1 - S2| dt$$

Numerical results

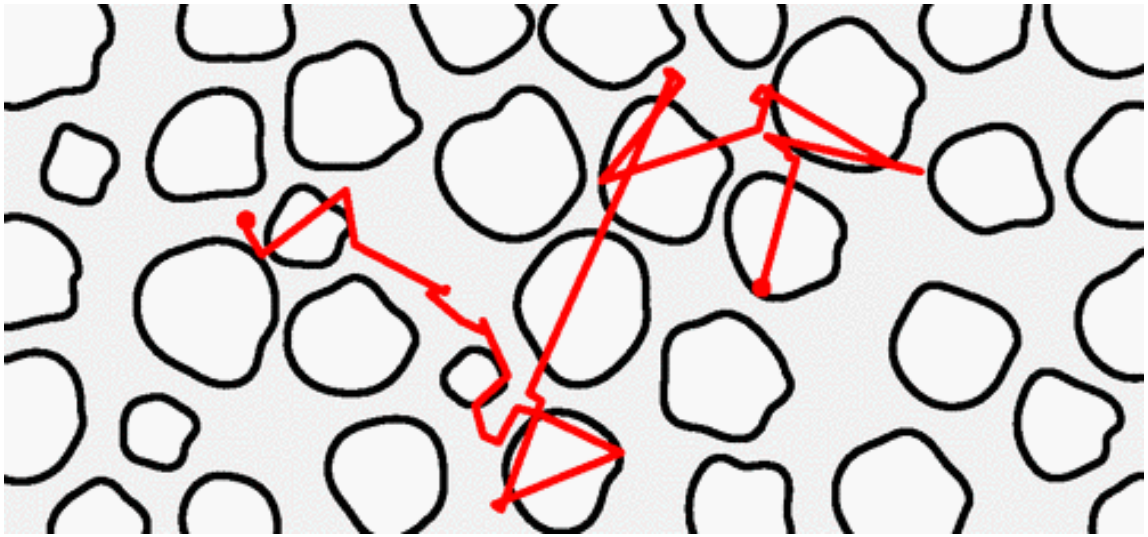


$N = 4$



$N = 10$

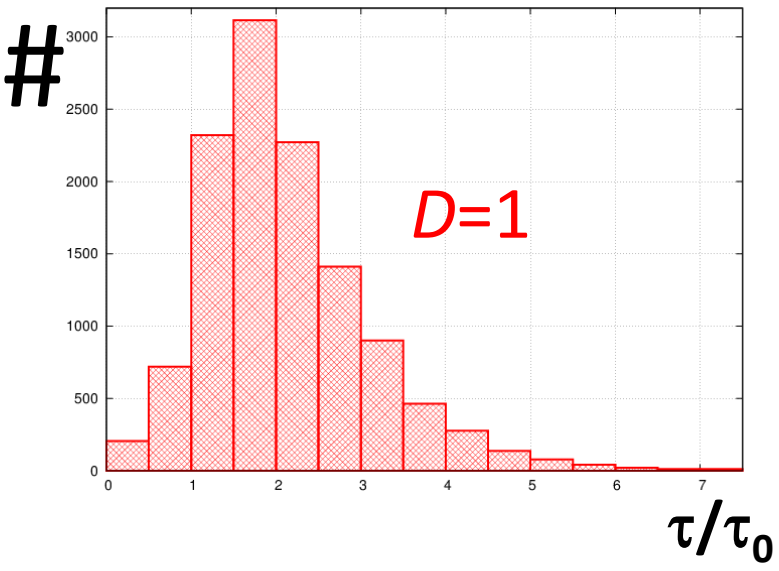
A link to physics: random walk in random medium

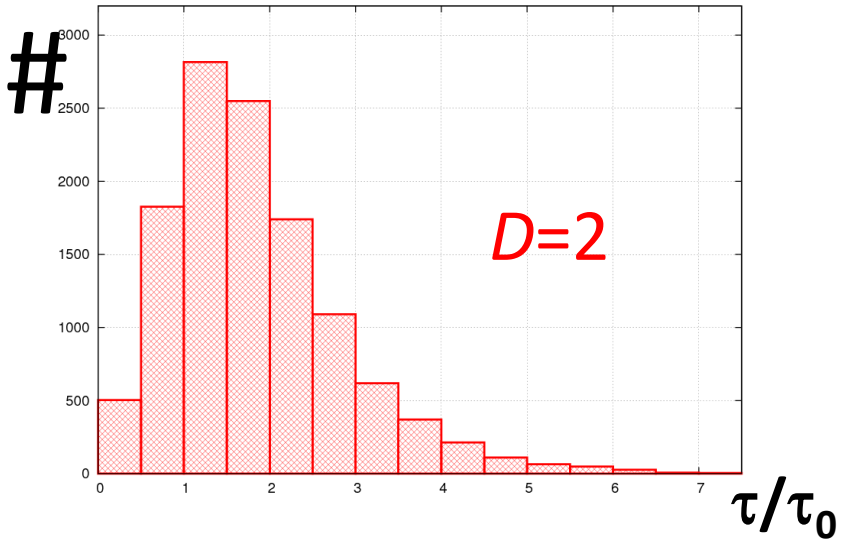


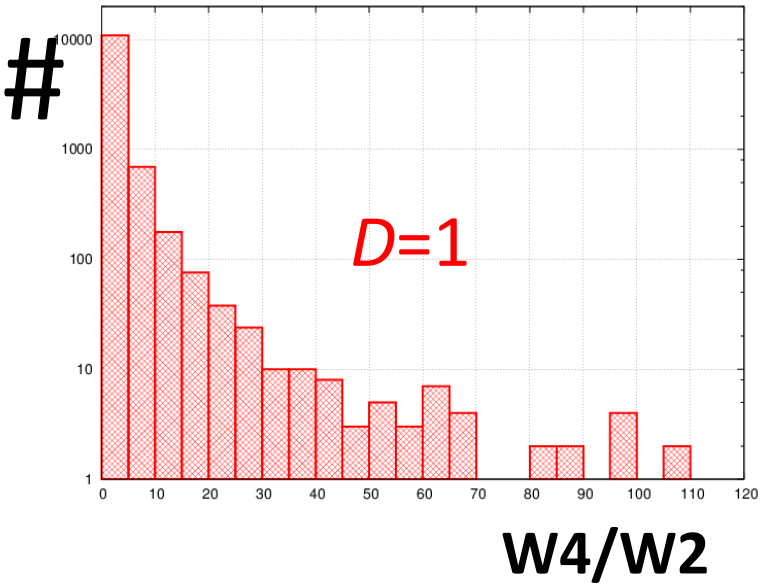
[T. Svensson et al., PRE 87 (2013) 022120]

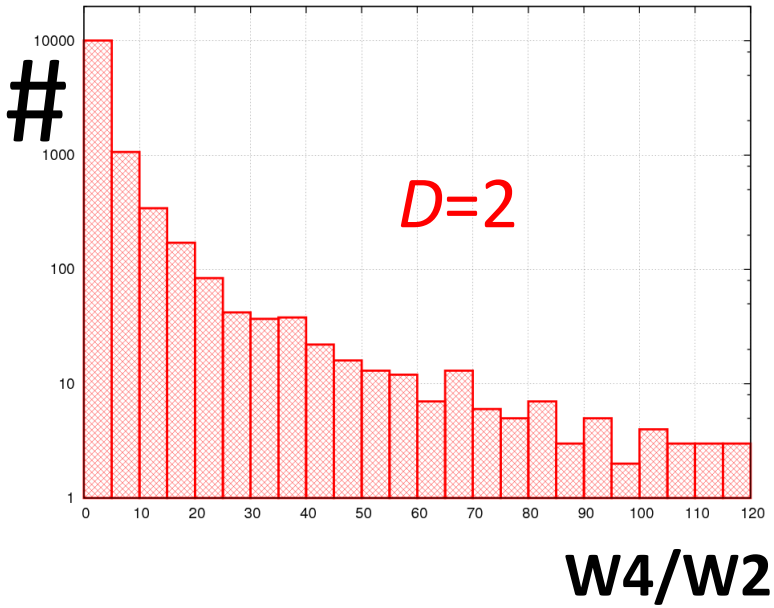
Perhaps a self-avoiding could change the results?

Two-dimensional opinions – a comparison. $N = 4$

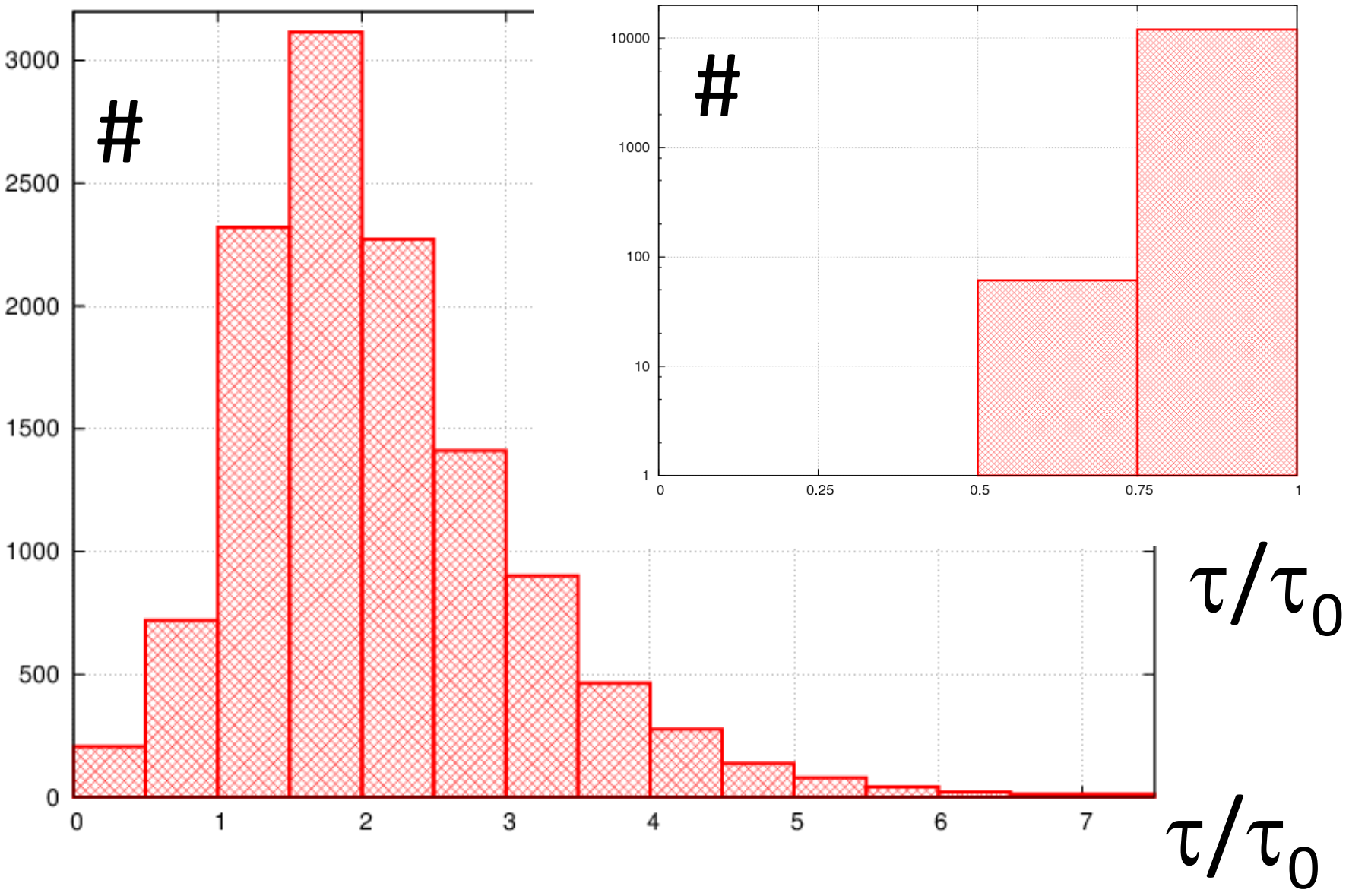




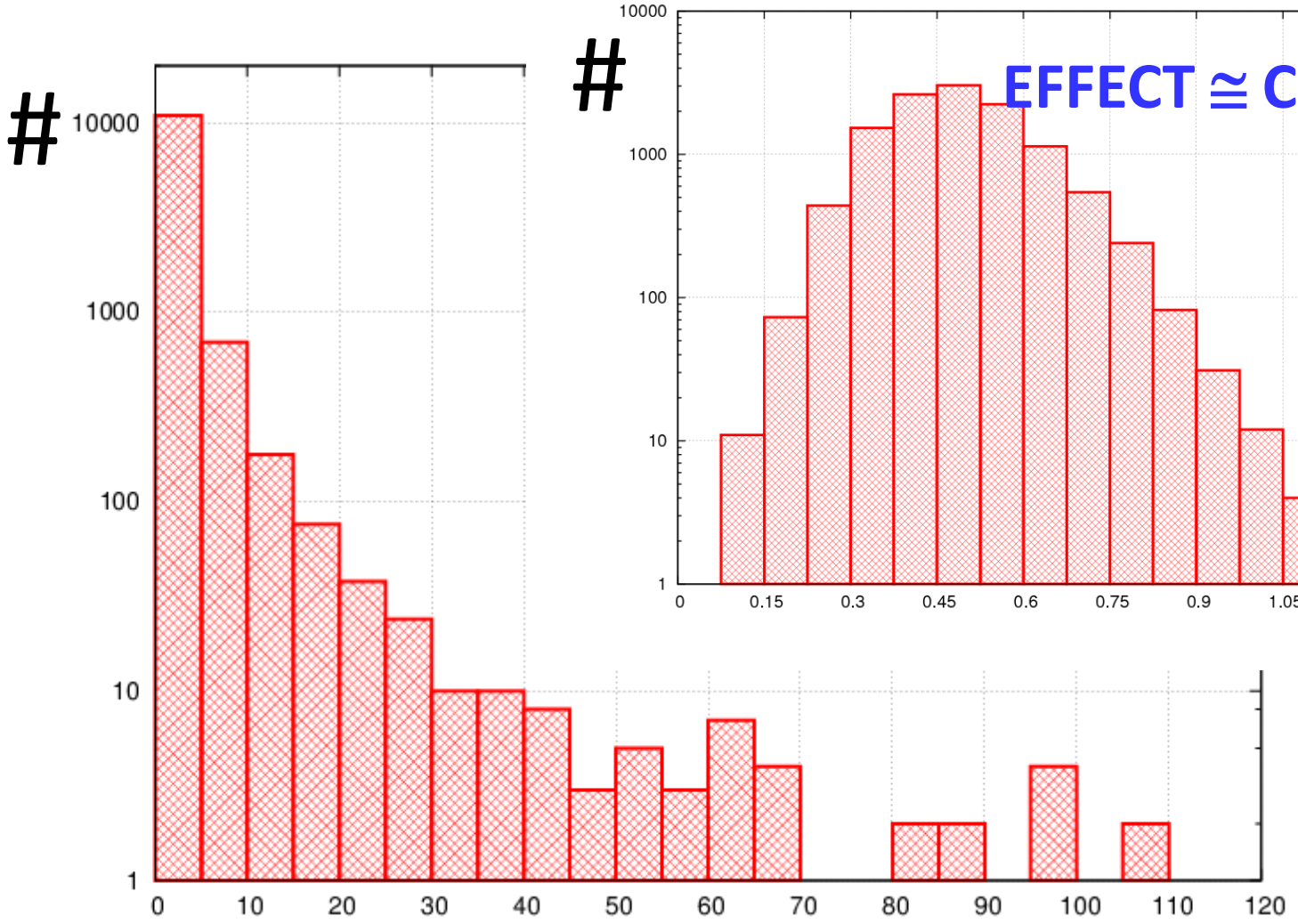




Without the spiral of silence – a comparison. N = 4



Without the spiral of silence – a comparison. N = 4



Conclusions of numerical results

1. As a consequence of the effect of spiral of silence, a leader is remembered longer than his lifetime.

1. In most cases, the sign of polarization caused by the leader persists. Yet its change may happen.

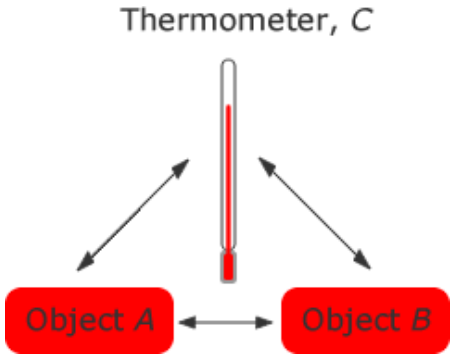
3. For a two-dimensional space of opinions the results remain qualitatively the same.

4. When the effect of the spiral of silence is removed, the memory effect is much smaller.

This slide is last **but one**

Yet nother link to physics:

Df: Two systems A and B are
„in contact”, if actors in both systems
perceive the same < *S* >.



Zeroth law of thermodynamics:
If A and C are in equilibrium with B,
then A is in equilibrium with C.

< *S* > acts like the chemical potential ?

pluralistic ignorance ⇔ metastability?

Problem of the barrier:
the perceived charismas can be different...

thank you