Belief Change in Social Context, Amsterdam, Dec 14-15th, 2012

PARTICIPANTS

LogiCIC Project:

THE LOGICAL STRUCTURE OF CORRELATED INFORMATION CHANGE

Friday, December 14th

08:45 – 09:00 *Coffee and Welcome*

Session 1 (09:00-10:30): chairing Sonja Smets

09:00 – 09:10 **Sonja Smets** Opening Words: The LogiCIC Project

09:10 – 09:50 **Erik Olsson** Should scientists communicate and, if so, how much?

09:50 – 10:30 **Vincent Hendricks and Rasmus Rendsvig** Social proof in extensive games

10:30 – 11:00 *Coffee, tea, and cake*

Session 2 (11:00-12:20): chairing Vincent Hendricks

11:00 – 11:40 **Nina Gierasimczuk** Conclusive Update and Computability

11:40 – 12:20 **Hans van Ditmarsch.** The Lying Game

12:20 – 13:40 *Lunch break*

Session 3 (13:40-16:00): chairing Nina Gierasimczuk

13:40 – 14:20 **Patrick Girard** Logical dynamics of belief change in the community

14:20 – 15:00 **Amanda Friedenberg** Bargaining under strategic uncertainty

15:00 – 15:20 *Coffee, tea, and cake*

15:20 – 16:00 **Andrés Perea** Plausibility orderings in dynamic games

19:30 – *Conference Dinner*

Saturday, December 15th

08:45 – 09:00 *Coffee*

Session 4 (9:00-10:20): chairing Erik Olsson

09:00 – 09:40 **Christian List** Reasons for (prior) belief in Bayesian epistemology

09:40 – 10:20 **Ziv Hellman** Deludedly agreeing to agree

10:20 – 10:40 *Coffee, tea, and cake*

Session 5 (10:40-12:00): chairing Andrés Perea

10:40 – 11:20 **Hannes Leitgeb** Rational belief: four approaches, one theory

11:20 – 12:00 **Alexandru Baltag** Collective learning versus informational cascades: towards a logical approach to social information flow

12:00 – 13:10 *Lunch break*

Session 6 (13:10-14:30): chairing Zoé Christoff

13:10 – 13:50 **Hans Rott** A Puzzle about Disagreement

13:50 – 14:30 **Johan van Benthem** Agents and strategies in a theory of play

THEME: CIC
Correlated Information Change

- Gathering Information via "learning acts"
  (Observations, Communication, Inquiries,
  Polls, Measurements etc.)

- Effect: Knowledge update, Theory change,
  Belief revision

- Model Theory Change (BRT, Bayesian Update)

**Focus on acts of learning that influence the result:
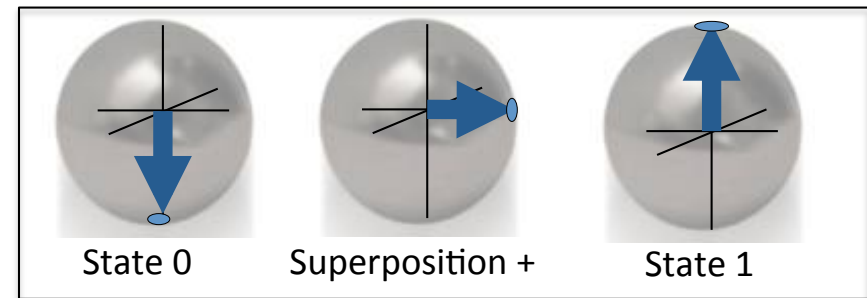They change the phenomena under study.**
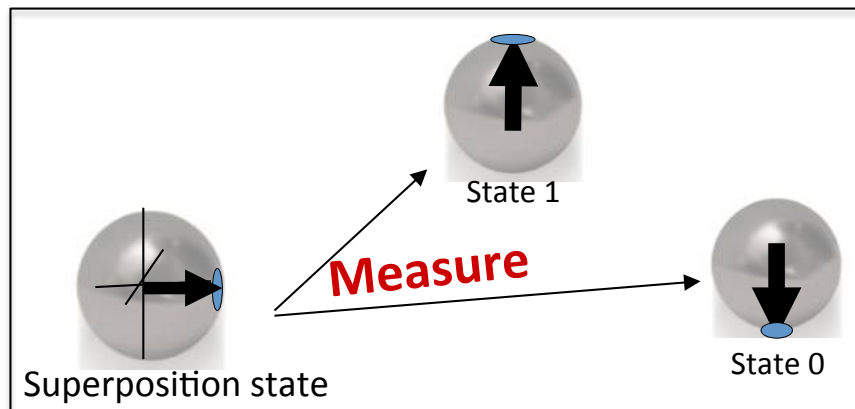
EXAMPLE: Quantum Correlations

- **Classical Information**

1 ↓ 0   1 ↑ 0

- **Quantum Information:**

State 0   Superposition +   State 1

- **Quantum Observer Effect:**

State 1

Measure

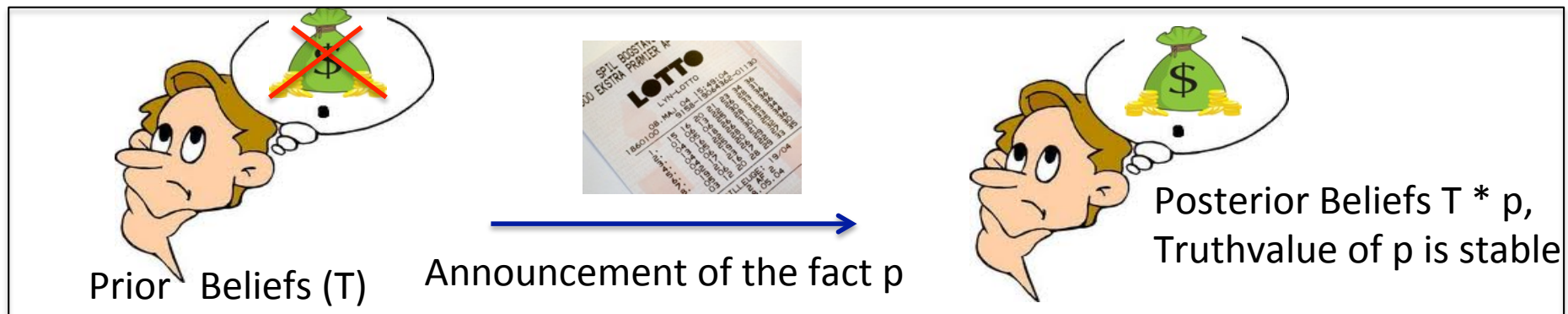State 0

Superposition state

Quantum Entanglement:

State 1   State 0

Correlated information change: 1) between observer and observed system, 2) between outcomes of measurements

EXAMPLE: Correlated Information Change in Belief Revision

- **Belief Revision Theory (AGM 85):**

Prior Beliefs (T) → Announcement of the fact p → Posterior Beliefs T * p, Truthvalue of p is stable

- **Belief Revision with Higher-order information:**

E.g. "you won the lottery but you don't believe it"

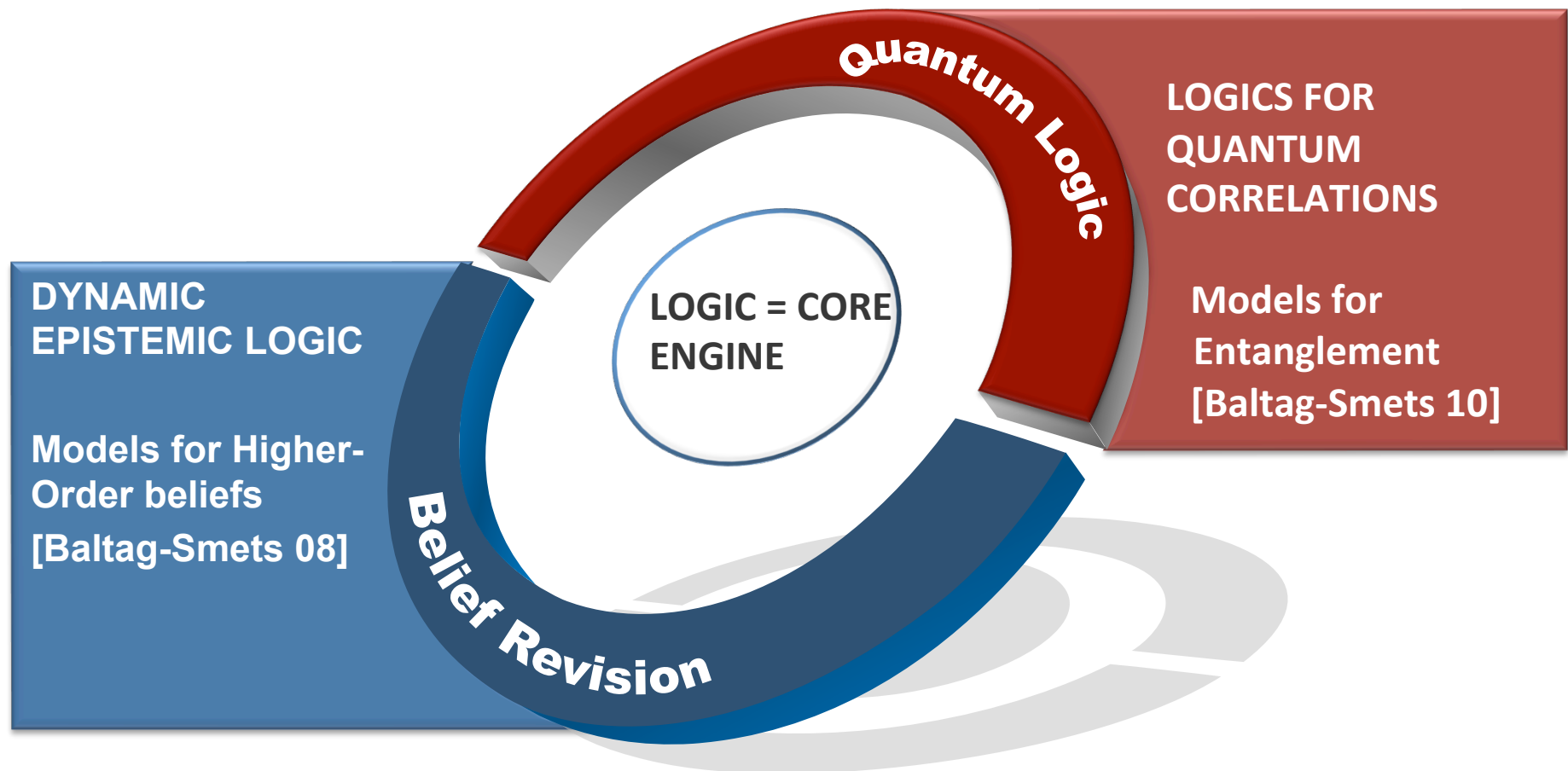The very act of trying to learn this more complex sentence changes its truthvalue.

Correlated Information Change between learner and incoming information.

Plan and Methodology

DEVELOPMENT OF A NEW LOGIC, STUDY OF EPISTEMIC AND DYNAMIC ASPECTS OF DIFFERENT TYPES OF CORRELATIONS:
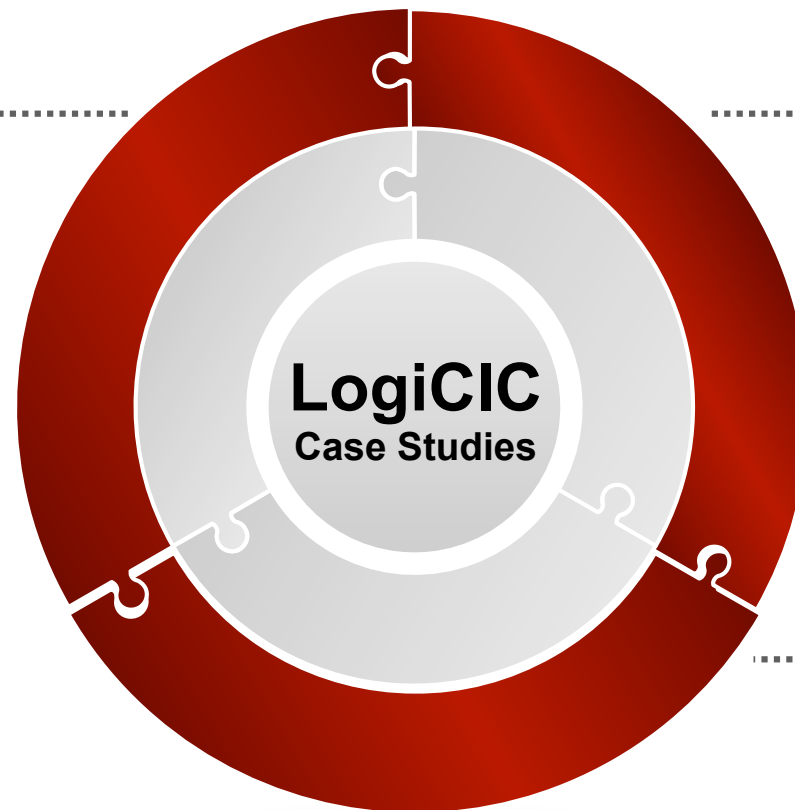

DYNAMIC EPISTEMIC LOGIC

Models for Higher-Order beliefs [Baltag-Smets 08]

Quantum Logic

Belief Revision

LOGIC = CORE ENGINE

LOGICS FOR QUANTUM CORRELATIONS

Models for Entanglement [Baltag-Smets 10]

LogiCIC: Three Case studies

Case studies of correlated information change:

Task A

Correlated (Higher-Order) Belief Change in Social Contexts.

LogiCIC
Case Studies

Task B

Quantum Correlations from a Logical perspective. (The observer effect, Entanglement and Correlated Information)

Task C

CIC meets Truth Approximation and Learning Theory

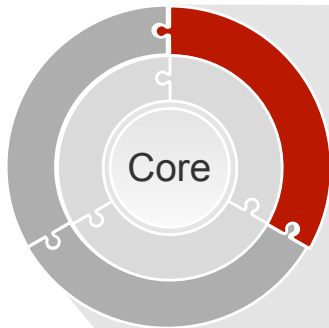# Task A: Higher-Order Belief Change in Social Contexts

Core
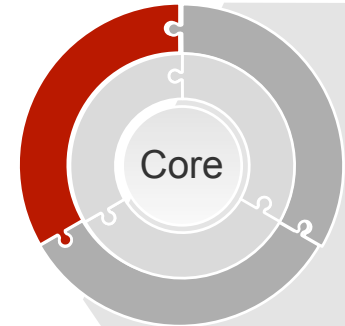
- **Study CIC in groups of communicating agents**, using Logic & BRT

- **Correlation of Belief Revision Policies**: El Farol Bar Problem, Epistemic Bandwagon Effect (Sorensen), Pluralistic Ignorance (Katz and Allport), Informational Cascades:
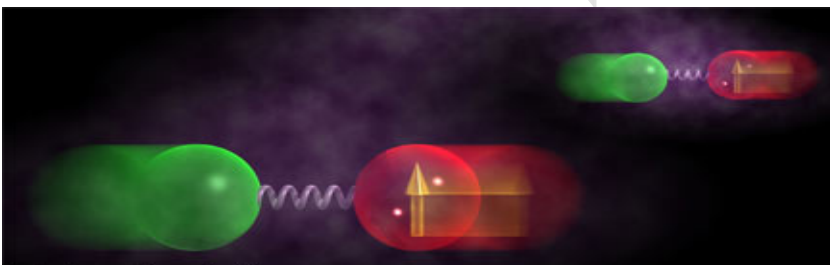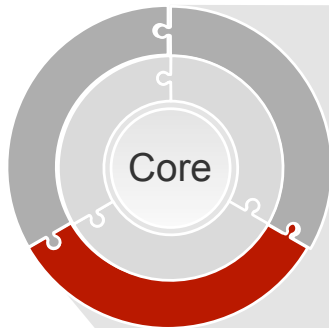
Task B: Quantum Correlations

Core

- **Quantum Observer Effect:** the mechanism for quantum information flow has to incorporate the dynamics of the observation itself.

- **Dynamic Epistemic Characterization of Entanglement:**
   modelling the non-local effects of observations.

Task C: CIC meets Truth Approximation & Learning Theory

Core

Truth Approximation

- **The agents' implicit goal is to change their beliefs in a way that reaches for the truth:**
  - Connect Learning Theory, Truth Approximation and Iterated BRT.
- **Study the distance from the truth of a theory** in the face of growing evidence:
  - Convergence to truth via iterated revision with higher-level doxastic information
  - Under what conditions can a group learn faster than single agents?

Truth   Knowledge   Belief
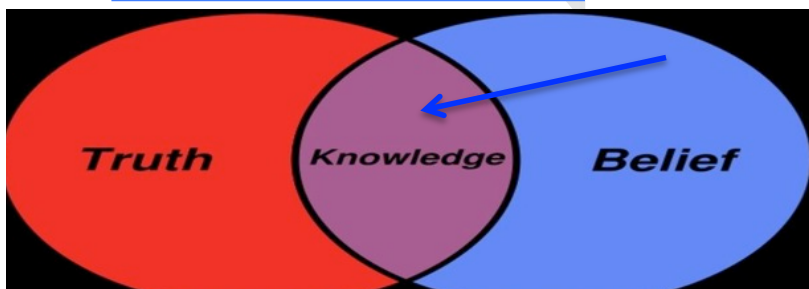
[Baltag, Gierasimczuk & Smets, "Belief revision as a truth-tracking process", TARK 2011]

Aim : A Unified Logical Setting for Correlated Information Change

Core
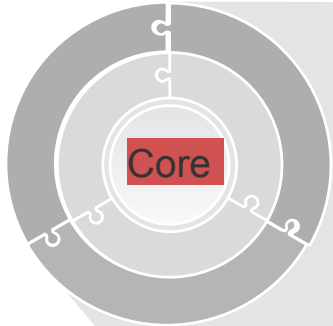
- **Analyse the difference between classical and quantum information by focussing on correlations**

- **Develop an enhanced dynamic epistemic logic framework for CIC**, adequate and general enough to model the correlation types studied in the different case studies.

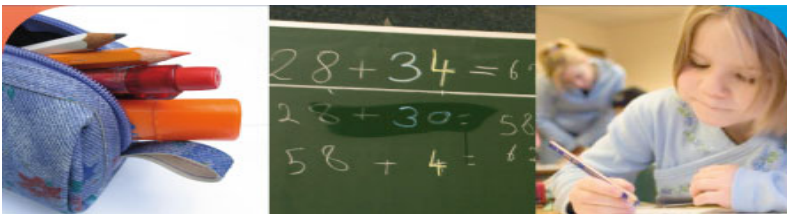Correlated Group Belief ≠ Distributed Belief, pulling together individual beliefs

A Glimps of Expected Results

- **Explain how the "revision pattern" of correlated group beliefs differs from individual beliefs**
  - ➢ New insight in social-informational phenomena such as informational cascades, voting behavior, public opinion formation etc.

- **When can we tell that a group's beliefs converges to the truth in a finite number of steps?**
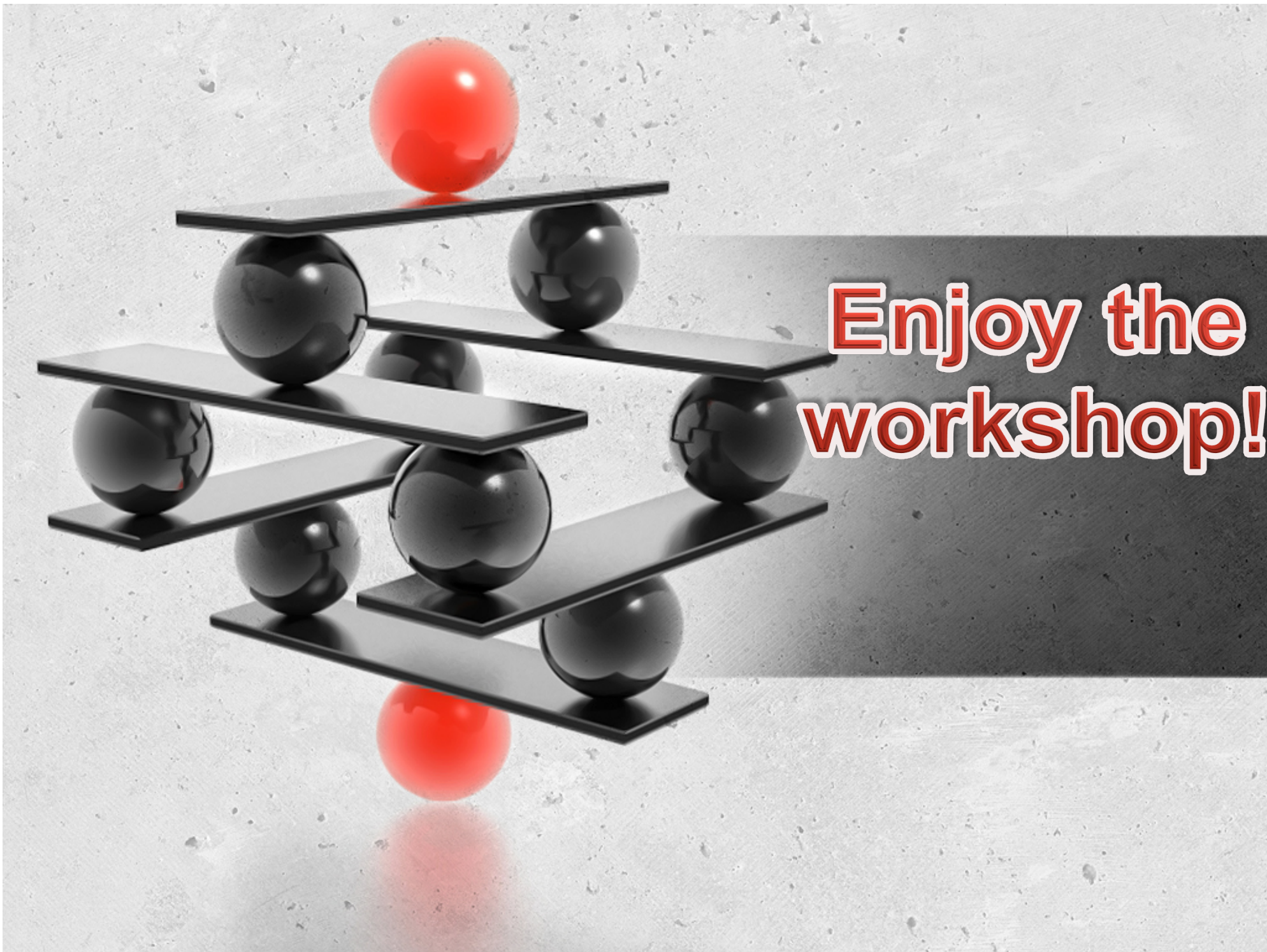 - ➢ Compare school group vs. individual assignments, how fast do we learn?

- **Provide an informational-epistemological understanding of quantum information flow in terms of correlations:**
  - ➢ entanglement is the most powerful ingredient in quantum computation and communication but also the least understood one.

Enjoy the workshop!