

Towards Conceptually Novel Oscillating Agent-Based Simulation of the Relationship Between Cultural Participation and Social Capital*

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Research Problem

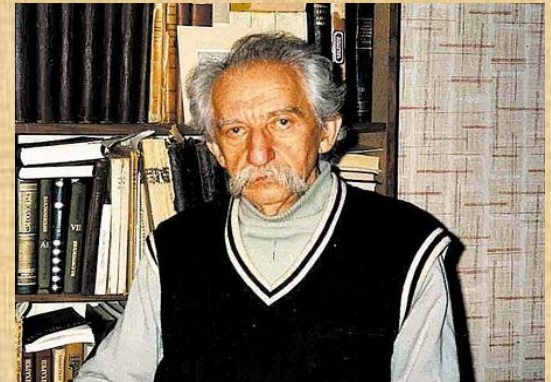
- the impact of cultural participation on social capital is one of the processes that is especially important for the development of society;
- the development of methods for understanding a mechanism of relationship between participation in cultural events and social capital is a major challenge for this kind of research;
- society >>> cultural participation >>> social capital
- the concept, to the concept and, to the another concept...

Sharing process

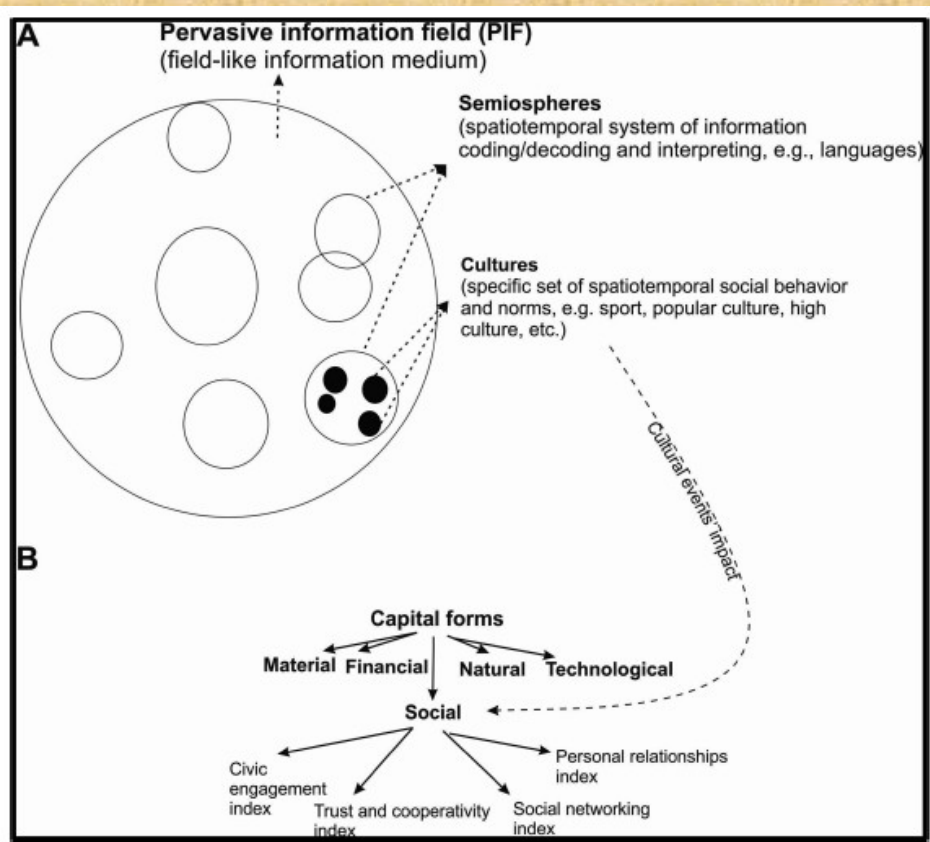
- the core process of social capital formation depends on shared actions that promote communication of behavioral information;
- traditional communication and information network research theoretical frameworks and methods can be applied for modeling such processes;
- we propose a framework of two mutually well-matching theories: Lotman's semiosphere theory and OSIMAS (an oscillations-based multi-agent system) paradigm.

Yuri Lotman's (1922-1993) semiosphere [semiospheres] theory

- gr. σημεῖον [sēmeion] - "a sign"
- It is spatial mechanism, the primary functions of which are to communicate existing information, to generate new information, and to preserve information
- e. g. biosphere: is the global ecological system integrating all living beings and their relationships, including their interaction with the elements of the lithosphere, geosphere, hydrosphere, and atmosphere.
- Y. Lotman. Universe of the Mind: A Semiotic Theory of Culture. Indiana University Press, 2001



From the concept to the mathematical framework



- semiosphere acts like a self-organized organism of codes, which are created, maintained, and interpreted by agents belonging to that semiosphere;
- meanwhile, PIF (pervasive information field) provides a framework of physical universal oscillations-based methods - like phonons, resonance, quantum entanglement, etc. - as a means to model the code.

The interoperability between semiosphere and PIF

Hypothetically can be represented into levels:

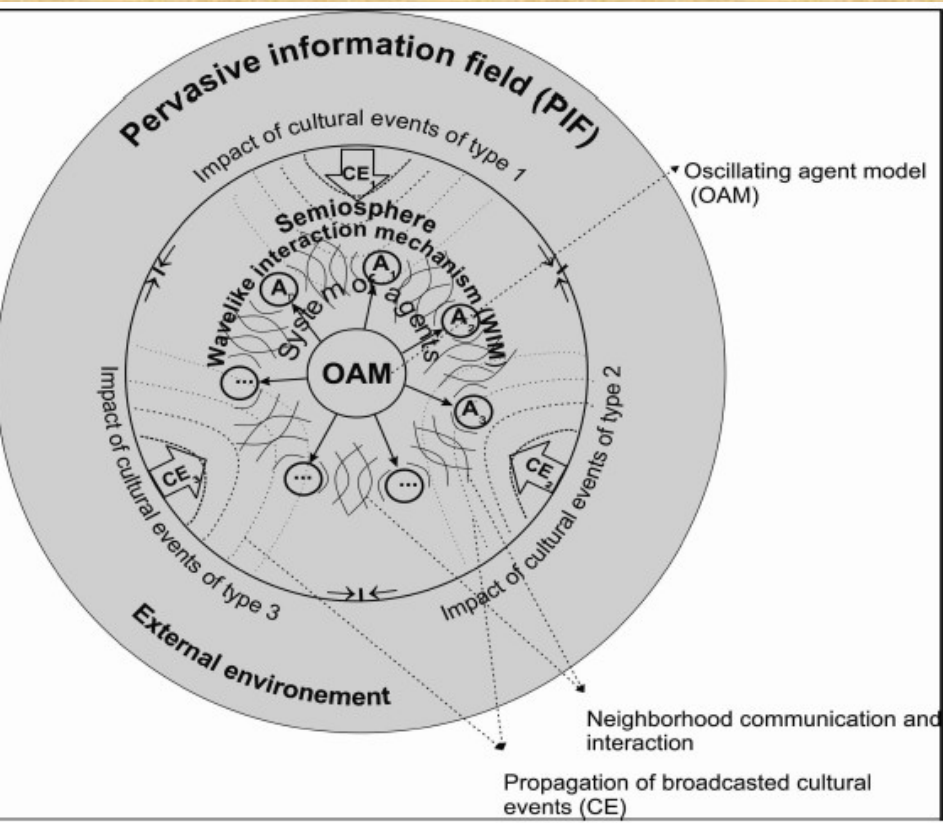
- (i) abstract (as concepts, universalities across different spatial scales and time horizons)
- (ii) concrete (as measured dimensions on particular spatial scales and time horizons).

The interoperability between semiosphere and PIF on the abstract level

- the semiosphere and PIF, are similar informative items;
- the semiosphere and PIF, are related to the collective behavior of the conscious and subconscious mind-fields of individual members;
- the semiosphere and PIF, function through information sharing;
- the semiosphere and PIF operate in a spatiotemporal framework;
- the semiosphere and in some sense PIF are multicentered structures with entirely relative centers and peripheries;
- actors of both, the semiosphere and PIF, are trended to semiosphere's creolization.

Basic principles of social capital sharing through cultural participation

- order in social systems can be interpreted in terms of social coherence happening through connections, interactions, and communications, which are taking place between individuals (simulated as agents);
- semiospheres act as coded systems of communication and cultural events act as broadcasted content itself;
- cultural events are interpreted as a form of formative communication, which is capable of influencing simulated agents' behavioral and communication patterns, and correspondingly their social capital too;
- cultural events can also be modeled as excitatory energy triggers of oscillatory nature;
- two neighboring agents interact if their natural oscillating frequencies and phases coincide; such interfering interaction can be described using the resonance principle.



- Sharing of social capital through neighborhood interaction and cultural events impact in the framework of oscillatory paradigm (events and agents emit their characteristic oscillating bands), which is composed of three major modules: oscillating agent model (OAM), wavelike interaction mechanism (WIM), and pervasive information field (PIF). OAM produces a set of oscillating agents $\{A_n\}$, which compose agent-based simulation system. Three investigated types of cultural events (CE) appear in the allotted zones.

Benefits / next steps

Sept. 18

<u>Vytautas Dulskis</u> Rimvydas Lauzikas Arunas Miliauskas Darius Plikynas Leonidas Sakalauskas	Probabilistic Model Of Cultural Participation Impact On Social Capital
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Sept. 20

<u>Darius Plikynas</u> Arunas Miliauskas Vytautas Dulskis Rimvydas Lauzikas	Agent-Based Simulation Model Of The Relation Between Participation In Cultural Events And Social Capital Dynamics
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Thank You for attention

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