

Mesoscopic Coherence and Machine Consciousness

Session Committee:

Gianfranco Minati, Italian Systems Society, Milano Italy

Peter Boltuc, University of Illinois Springfield, Springfield, Illinois

Stephen Thaler, Imagination Engines, Inc., St. Charles, Missouri

In this session we examine the emergence of cognition and consciousness through the onset of spatiotemporal coherence among ostensibly independent computational agents. Such collaborative behaviors are studied at the so-called mesoscopic level [Laughlin, et. al., 2000] as microscopic agents effectively bind their activities to produce transient structures and behaviors that recruit only a subset of the macroscopic collective. It is through such phenomena that we propose to examine spontaneously arising cognitive strategies, such as attention, contemplation, world representation, sense-making, adaptation, creativity, and phenomenal consciousness. One possible example of such coherent structures and the meta-structural properties best describing them have been introduced in the literature [Minati & Licata, 2013]. Another instance of mesoscopic coherence is represented by the ephemeral architectures formed among large collectives of artificial neural networks as they cooperatively originate information that is beyond their direct experience [Thaler, 1994, 1996, 2012, 2013]. Conceptual frameworks to be considered will include logical openness [Licata, 2008; Minati, Penna, & Pessa, 1998], dynamical usage of models (DYSAM) [Minati & Pessa, 2006], Creativity Machine Paradigm [Thaler, 1994, 2006], and the physics of mental acts [Arecchi, 2007, 2011].

Papers are welcome addressing a range of related topics including:

1. The emergence of collective intelligence over the Internet via bots or human communities.
2. Swarm intelligence among autonomous robots.
3. Lessons gleaned from collective behaviors of plants and animals.
4. Modeling environments used to create and monitor models of such coherence.
5. Spontaneous emergence of cognitive architectures among independent agents.
6. New development and testing environments to study such mesoscopic coherence.
7. Philosophical perspectives on any of the above topics.
8. The paleontology of consciousness.

Keywords: Apprehension, Collective intelligence, Consciousness, Creativity, Decision, Judgment, Mesoscopic Coherence, Mind, Multi-agent Systems, Neural Correlates of Consciousness (NCC), Self-awareness, Phenomenal Consciousness.

Arecchi, F. [2007] Coherence, Cognitive Acts, and Creativity (Di Renzo, Rome).

Arecchi, F. [2011] Phenomenology of Consciousness from Apprehension to Judgment, Nonlinear Dynamics Psychol Life Sci 15(3):359-75.

Laughlin, R.B.; Pines, D.; Schmalian, J.; Stojkovic, B.P.; Wolynes, P. The Middle Way: PNAS, 97(1), 2000, 32-37. <http://www.pnas.org/content/97/1/32.full.pdf+html>

Licata, I [2008] Logical Openness in Cognitive Models, Epistemologia XXXI(2008):177-192.

Minati, G., Penna, M. P., and Pessa, E. [1998] Thermodynamic and Logical Openness in General Systems, Systems Research and Behavioral Science 15(3):131-145.

Minati, G. & Pessa, E. [2006] *Collective Beings*, (Springer Science+Business Media, New York, NY).
http://books.google.it/books?id=OetFAAAAQBAJ&printsec=frontcover&dq=%22collective+beings%22+minati+pessa+2006&hl=it&sa=X&ei=5umuUp7AEOW_ywOWs4DIDA&redir_esc=y#v=onepage&q=%22collective%20beings%22%20minati%20pessa%202006&f=false

Minati, G. and Licata, I. [2013] *Emergence as Mesoscopic Coherence*, *Systems*, 1(4), 50-65.
<http://www.mdpi.com/2079-8954/1/4/50>

Thaler, S. L. [1994]. *Device for the Autonomous Generation of Useful Information*, US Patent 5,659,666.

Thaler, S. L. [1996] "A proposed symbolism for network-implemented discovery processes" in *World Congress on Neural Networks*, (WCNN'96), (San Diego, CA), pp. 1265-1268.

Thaler, S. [2006]. *Device for the Autonomous Bootstrapping of Useful Information*, US Patent 7,454,388.

Thaler, S.L. [2012] *The Creativity Machine Paradigm: Withstanding the Argument from Consciousness*, *The American Philosophical Association, Newsletter on Philosophy and Computers*, 11 (2), 2012, 19-30.
http://c.ymcdn.com/sites/www.apaonline.org/resource/collection/EADE8D52-8D02-4136-9A2A-729368501E43/v11n2_Computers.pdf

Thaler, S.L. [2013] *The Creativity Machine Paradigm*, *Encyclopedia of Creativity, Invention, Innovation, and Entrepreneurship*, Carayannis, E.G. (ed.) (SpringerReference).
<http://www.springerreference.com/docs/html/chapterdbid/358097.html#>