

1st KREYON workshop

“Unfolding the dynamics of creativity, novelties and innovation”

Rome, 13th-14th September 2015

Venue: Physics Department, Sapienza University of Rome
Meeting Room: Aula Conversi

13th September 2015

20:30 Social Dinner: Roof Garden of “I sofà di Via Giulia”,
Via Giulia 62, Rome

14th September 2015

9.00 - 9.30:	Registration and Coffee Break
9.30-10:00:	Opening (V. Loreto)
10.00-10:25:	Luc Steels
10.25-10:50:	Stefan Thurner
10.50-11:15:	Francesca Tria
11.15-11:45:	Coffee break
11.45-12.10:	Jacob Sherson
12.10-12.35:	Andreas Roepstorff
12.35-13.00:	Thomas Fink
13.00-14.30:	Lunch break
14.30-14.55:	Ilan Chabay
14.55-15.20:	Vito D.P. Servedio
15.20-15.45:	Mirko Degli Esposti
15.45-16:10:	Francois Pachet
16.10-16.40:	Coffee break
16.40-17:00:	Closing remarks

P.S.: All talks will be of 20 minutes plus 5 minutes for questions.

LIST OF ABSTRACTS



Luc Steels

“Creativity and problem solving”

Abstract: Creativity is inherently related to problem solving – more specifically, to a process of handling an impasse in a novel way. I will use examples of creativity in language, music, architecture, and product development to elaborate this point of view and examine its implications for learning and innovation.



Stefan Thurner

“Taking Schumpeter seriously: a simple evolutionary model for innovation”

Abstract: We propose a very simple model for the process of creating new products by combining previously existing components. Adding the possibility that a new product may drive out an old existing product, and with it its whole production chain, we are able to understand scaling exponents that are observed in the statistics of GDP fluctuations, patents, business failures, and other evolutionary time-series. We are further able to understand Schumpeterian ‘gales of destruction’ - periods in time that are associated with massive restructuring in a society, and economic transition phases. We

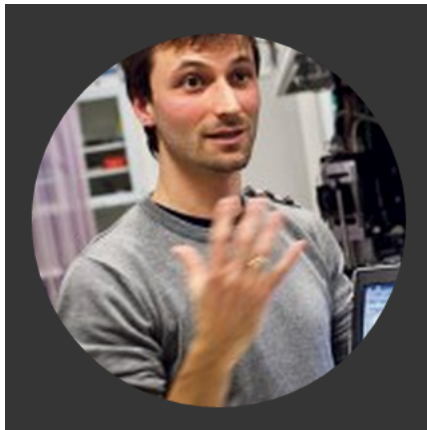
demonstrate that these 'gales of destruction' can be detected empirically in comprehensive world-trade data.



Francesca Tria

“Dynamics on expanding spaces: modeling the emergence of novelties”

Abstract: Innovation, the emergence and diffusion of something new (new technologies, new genes, new behaviors) drives the evolution of human society as well as of biological systems. A general concept that applies to innovation and the emergence of novelties, is what Kauffman called the expansion of the adjacent possible. By creating fresh opportunities, one novelty can pave the way for others, enlarging the space of possibilities in a self-consistent way. I will present a recent work aimed at grounding the notion of adjacent possible on real data, by the definition of quantitative measures and the development of a suitable mathematical framework.



Jacob Sherson

“Game based investigation of individual and collective problem solving: towards intelligent machine learning”

Abstract: The scienceathome.org project within the interdisciplinary Center for Community Driven Research at Aarhus University works on developing online citizen science games - enabling ordinary users of the internet to contribute to the solution of cutting edge research challenges. The first games within quantum physics and cognitive and social sciences have been played more than 500,000 times and clearly demonstrated the superiority of the human mind over computer algorithms for certain tasks. At the moment we study this individual and collective problem solving and attempt to

combine solution strategies from humans and biological systems to make machine learning more intelligent.



Andreas Roepstorff

“Creative couplings”

Abstract: How is it that two persons may solve a task better than each of them may on their own? Using a set of simple experiments, I will examine how people when solving simple tasks in interaction couple to each other in several domains. It seems that the dynamics of these interaction are shaped not just by the task at hand, but very much by the rules of the game. This may have implications for how to design creative settings.



Thomas Fink

“Anonymous collaboration and emergent creativity”

Abstract: Creativity has been hailed as a key force behind the economic success of businesses and nations. While many recognise that creativity is a universal human capability, popular views reduce it to the confined domain of a talented few. Yet it remains unclear what drives creativity, or how to promote it. We propose that anonymous collaboration with constrained freedom makes possible emergent creativity: the spontaneous display of creativity amongst non-cooperating individuals, greater than any could achieve alone. We outline a theoretical framework for predicting emergent creativity, and propose platforms for demonstrating it. Emergent creativity may profoundly extend the creative boundaries of mankind.



Ilan Chabay

“Building links and changing cultures for creativity in education.”

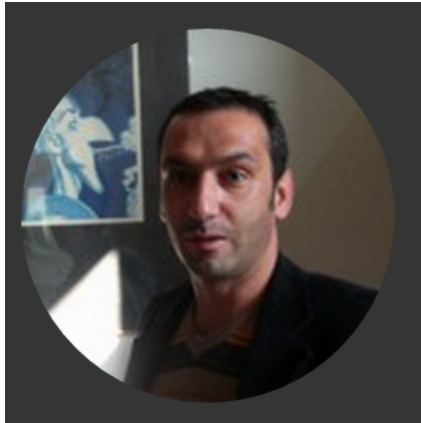
Abstract: Education must be improved substantially in order to help all people learn to think both creatively and critically over the full span of education from early childhood to university to life-long learning. I will discuss approaches to developing a coherent learning experience that helps people become better and more engaged learners and is better attuned to helping people deal with the urgent and vital global issues in local contexts (e.g., food, water, energy, environmental degradation).



Vito D.P. Servidio

“Optimal learning Paths in Information Networks”

Abstract: Each sphere of knowledge and information could be depicted as a complex mesh of correlated items. By properly exploiting these connections, innovative and more efficient navigation strategies could be defined, possibly leading to a faster learning process and an enduring retention of information. In this work we investigate how the topological structure embedding the items to be learned can affect the efficiency of the learning dynamics. I'll introduce a general class of algorithms that simulate the exploration of knowledge/information networks standing on well-established findings on educational scheduling. We focused both on synthetic and real-world graphs such as subsections of Wikipedia and word-association graphs. I'll highlight the existence of optimal topological structures for the simulated learning dynamics whose efficiency is affected by the balance between hubs and the least connected items. Interestingly, the real-world graphs we considered lead naturally to almost optimal learning performances.



Mirko Degli Esposti

“Universality and Creativity in written texts

Abstract: Like most human productions, language is the product of cultural evolution, and as such exhibits high levels of complexity. A natural representation of language is written text, the development of expressing language by letters or other marks. Developing of writing coincides with the developing of literature and both processes have been highly affected by the developing of technologies, up to the enormous proliferation (at least quantitatively) in our modern digital environment. In the talk we will address questions such as how to characterize originality in authors or texts, and how innovations originate amid universal features of language usage? Or again, how can we discriminate between artificially generated texts and human writings? We will do this while discussing two specific examples. The first one regards the detection of computer-generated papers in scientific literature, a problem of increasing practical importance. The second one concern the Voynich Manuscript and we will present some recent results.



Francois Pachet

“Modeling style from examples”

Abstract: Style is what makes an author (writer, composer, designer, etc.) recognizable. Can machines understand, model, predict and generate artifacts in a given style? In the Flow-Machines project, we address these questions for music and text. I will show several generative models of style able to capture characteristic traits of musical sequences, as well as polyphonies, both in the symbolic (score) and numeric (audio) domains. These models are based on the combination of combinatorial (so-called Markov constraints) and statistical perspectives on music. I will use various

reorchestrations of "Ode to Joy", the European anthem, to illustrate these various approaches. Along the way these increasingly sophisticated models in turn, raise more fundamental questions about nature of music and the mysterious mechanisms of taste and subjective appreciation.