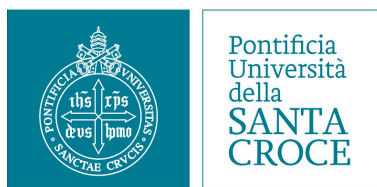


# PONTIFICAL UNIVERSITY OF THE HOLY CROSS



Research Seminar

***Creativity:  
innovation, transmission and motivation  
in animals, humans and societies***

January 21-24, 2024  
Rome

## PROGRAM & ABSTRACTS

Meeting organized in the framework of a planning grant  
by the Pontifical University of the Holy Cross for the project  
***De thesauro suo nova et vetera (Mt 13,52). A cross-disciplinary inquiry into human creativity***

Venue  
***Casa Bonus Pastor***  
Via Aurelia, 208  
00165 – Rome, ITALY

## **FOREWORD**

Looking at the program and the abstracts gathered in this document, it is striking that the topics to be discussed capture the very processes and dynamics that will actually happen during the meeting: collective thought in a specific environment, transmission of knowledge and experiences, peer-learning, creative use of articulate language.

Arranged as they are in the program here below, indeed, the talks will first bring to the fore, from different perspectives, two dimensions that are crucial for enquiring creativity: the social one and the environmental one. Then, without losing sight of the social and environmental components, the focus will move towards the transmission strategies – both in ancient and present times – as a key element in boosting the emergence of innovations. Finally, the focus will reach articulate language and its role in creativity.

Hence, the final general discussion will allow speakers and participants to attempt syntheses among the many topics brought in by the talks and previous discussions. Perspectives on further interaction and future research will be welcome as well.

## **INVITED SPEAKERS** (alphabetic order)

Francesco **D'ERRICO**, France CNRS, Bordeaux, France

Niels H. **GREGENSEN**, University of Copenhagen, Copenhagen, Denmark

Sheina **LEW-LEVY**, Durham University, Durham, UK

Pietro **MONTANI**, Sapienza University, Rome, Italy

Michael **MUTHUKRISHNA**, London School of Economics, London, UK

## **PROJECT TEAM MEMBERS** (alphabetic order)

Ariberto **ACERBI**, Pontifical University of the Holy Cross, Rome, Italy

Ivan **COLAGÈ**, Pontifical University of the Holy Cross, Rome, Italy

Elena **COLOMBETTI**, Pontifical University of the Holy Cross, Rome, Italy

Paul **O'CALLAGHAN**, Pontifical University of the Holy Cross, Rome, Italy

Stefano **OLIVA**, Pontifical University of the Holy Cross, Rome, Italy

Claudio **TAGLIAPIETRA**, Pontifical University of the Holy Cross, Rome, Italy

Giuseppe **TANZELLA-NITTI**, Pontifical University of the Holy Cross, Rome, Italy

## **OTHER PARTICIPANTS** (alphabetic order)

Alina **BALAJ**, Pontifical University of the Holy Cross, Rome, Italy

Sabrina **DI FORTE**, Pontifical University of the Holy Cross, Rome, Italy

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Paola **IADARESTA**, Biomedical Campus University, Rome Italy

Gennaro **LUISE**, Pontifical University of the Holy Cross, Rome, Italy

Jeffrey **PAWLICK**, Pontifical University of the Holy Cross, Rome, Italy

Brandon **VAIDYANATHAN**, Catholic University of America, Washington D.C., USA

## PROGRAM

### Sun. Jan. 21

*Arrivals*

7.30 pm Dinner together for the speakers and those lodging at the venue

### Mon. Jan. 22

9.00 am Welcome and introduction

9.30 am *Cultural evolution and creativity in the collective brain*  
**Michael MUTHUKRISHNA**

10.30 am **Discussion**

11.15 am Coffee break

11.45 am *Deep inhabitations: Revisiting niche construction theory from an ecological perspective*  
**Niels H. GREGERSEN**

12.45 am **Discussion**

1.15 pm Lunch

3.15 pm *Human creativity: the outcome of a long process of niche construction*  
**Francesco D'ERRICO**

4.15 pm **Discussion**

5.15 pm End of session and coffee break

7.30 pm Dinner

### Tue. Jan. 23

9.00 am *Socialization for innovation in hunter-gatherer societies*  
**Sheina LEW-LEVY**

10.00 am **Discussion**

10.30 am Coffee break

10.45 am *Meta-operativity and recursion. Two conditions for creativity*  
**Pietro MONTANI**

11.45 am **Discussion**

12:30 am End of session

1.15 am Lunch

ca 3.15 pm Transfer to the Pontifical University of the Holy Cross

3.45 pm Meeting with University representatives and tour of the building

5.00 pm **“Planning session”** in view of the *general discussion* of the following morning  
(at the DISF Centre)

6.00 pm End of session – Walk in Rome Centre (visit to places of interest)

7.30 pm Dinner out, downtown

### Wed. Jan. 24

9.30 am **GENERAL DISCUSSION**

11.00 am Coffee break

11:30 am **GENERAL DISCUSSION** (continued)

12:30 am Conclusion

1.00 pm Lunch and end of Seminar

## ABSTRACTS (order of presentations)

### *Cultural evolution and creativity in the collective brain*

**Michael MUTHUKRISHNA**

Associate Professor of Economic Psychology, Department of Psychological and Behavioural Science,  
London School of Economics, London, UK

#### **Abstract**

Innovation is often assumed to be the work of a talented few, whose products are passed on to the masses. Innovations are instead an emergent property of our species' cultural learning abilities, applied within our societies and social networks. Our societies and social networks act as collective brains. Many human brains, which evolved primarily for the acquisition of culture, together beget a collective brain. Within these collective brains, the three main sources of innovation are serendipity, recombination and incremental improvement. The rates of innovation are heavily influenced by (i) sociality, (ii) transmission fidelity, and (iii) cultural variance, with various forces affecting these factors. Large leaps in truly radical innovation are often the product of recombinations of ideas. These innovations are better modeled as a population level process. Indeed, the individual predictors of creativity such as the personality trait openness to new experiences, are also a product of culture and cultural evolution. I will discuss the relationship between cultural evolution and creativity, threading the needle between the individual and the collective based on the idea of the collective brain.

#### **References**

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# *Deep inhabitations: Revisiting niche construction theory from an ecological perspective*

**Niels H. GREGERSEN**

Professor in Systematic Theology at the Faculty of Theology and PI at the Centre for Science and Faith,  
University of Copenhagen, Denmark

## **Abstract**

First a word on the theological framework of my presentation: I am working on developing the Christological concept of deep incarnation into a concept of deep inhabitation. Indeed, the concept of the divine self-incarnation in Jesus and the concept of dwelling belong together, even in John 1:14: “And the Word was made flesh (sarx), and dwelt among us”. Deep incarnation argues for the view that by assuming the particular life-story of Jesus the Jew, God’s own Logos or Wisdom conjoins the material conditions of God’s world of creation (“all flesh”), shares and ennobles all biological life-forms (“grass” and lilies”), and experiences the pains of all sentient creatures (“sparrows and foxes”). In this view, incarnation is the story of God’s reach into the very tissues of material and biological existence. How to develop the creative aspects of divine co-dwelling?

In answering this question, I will revisit the theory of “niche construction” as part of an Extended Evolutionary Synthesis. Originally developed by Richard Lewontin in the 1980s, it was given a new shape via the work of Laland and colleagues (2000, see review by Lewens 2019). The concept of niche construction has also proven important for anthropologists and theologians (Mühling 2014; Deane-Drummond, Arner, and Fuentes 2016). What is promising about niche construction theory, in particular, is the fact that it seems to offer a supplement to standard evolutionary theory that focuses on organismic creativity by:

- (1) focusing on the evolutionary relationships between biota and a-biota, thus bringing the exploration and construction of ecospace to the foreground within evolutionary theoretical frameworks;
- (2) avoiding standard dichotomies between organisms and their environments, in which the latter are seen merely as passive templates for evolutionary processes while organisms are seen as responding to such templates, and never the other way around;
- (3) focusing on the creative aspects of evolution rather than only on the responsive or defensive aspects of evolutionary adaptation; and
- (4) giving an impetus to a broader ecological network view of evolutionarily relevant causes rather than postulating one single universal explanation behind all processes.

What I will do is to emphasize natural and human learning processes while focusing on how the creativity of human inhabitations always builds on natural propensities when seeking new alliances and hybrid constellations between human dwellers and natural environments. In what sense are humans the “ultimate constructors” (Laland), if we are always ecologically propelled and constrained?

## **References**

- Deane-Drummond C., Arner N., Fuentes A., (2016), The Evolution of Morality: A Three-Dimensional Map, *Philosophy Theology and the Sciences*, 3.2: 124.
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# *Human creativity: the outcome of a long process of niche construction*

**Francesco D'ERRICO**

Director of Research, UMR 5199 PACEA, Université de Bordeaux, Bordeaux, France, and  
Centre for Early Sapiens Behaviour (SapienCE), University of Bergen, Bergen, Norway

## **Abstract**

A growing body of evidence and models supports the view that human creativity can only be understood by focusing on the mechanisms and contextual factors that allow innovations to emerge, spread and be effectively passed on to new generations. Numerous attempts have already been made to identify those mechanisms and weight the role of factors at play. Virtually no studies, however, have tried to create empirically based scenarios to document and understand the tempo and mode of the processes that have led past hominins to the variety of situations that we observe today. In my presentation, I will first summarize, building on my past and ongoing work, archaeological evidence for the emergence of complex technologies and symbolic practices in Africa and Eurasia. This review will show that cultural innovations emerged at different times, in different parts of the world, among different populations, including so called archaic hominins, and some of them were lost and reacquired later on in different forms. The timing, location, and pace of innovation appearance is inconsistent with scenarios attributing the emergence of “modern” creativity to a biological event giving raise to our species in Africa. It is instead consistent with the idea that cultural innovations were triggered by several interconnected and dynamic factors, both environmental and social. These factors, many of which are the enduring results of previous innovations and ensuing environmental modifications, can be understood as an effective process of niche construction – where the niche encompasses also social, symbolic and institutional dimensions. They are the outcome of complex and non-linear population dynamics and cultural trajectories that need to be understood and traced at a regional scale. As a consequence, it becomes essential to focus our attention on the conditions and mechanisms that may have triggered cultural innovations at regional scale, and on the factors that have enabled them to be preserved and disseminated. Among those factors, special attention should be given to shifts in modes of cultural transmission. We will report preliminary results of a joined research project, conducted by the presenter in collaboration with Ivan Colagè, in which evaluation of modes of cultural transmission necessary to pass 103 cultural traits emerged in the last 3.2 Ma reveals long term trends and tipping points in the process that have allowed innovations to be transmitted from one generation to another.

## **References**

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# *Socialization for innovation in hunter-gatherer societies*

**Sheina LEW-LEVY**

Assistant Professor in the Department of Psychology and Co-director of the Durham Cultural Evolution Research Centre, Durham University, Durham, UK

## **Abstract**

Hunter-gatherers are communities that rely on non-domesticated resources that shift in availability seasonally, yearly, and across generations. Behavioural flexibility and increased rates of innovation may help mitigate against such resource fluctuation. Several modelling studies indeed suggest that rates of innovation increase in fluctuating environments. An ethnographic survey of 20 hunter-gatherer societies further showed that communities living in environments with a higher risk of resource failure had more diverse toolkits. Since diversity probably results in better group-level problem solving skills because individuals can draw upon a breadth of different experiences, interpersonal variability may be adaptive to hunter-gatherers because it allows societies to continuously develop diverse toolkits that are better suited to novel environmental circumstances. Thus, in this talk I focus on the unique childhood socialization practices which foster innovation in hunter-gatherer societies.

To do so, I use cultural evolution as a theoretical framework. Humans thrive in diverse ecological niches through acquired culture rather than biological adaptation alone. Acquired culture includes the instrumental skills that help us find food in our environments, and the conventional skills that help us cooperate. These skills are refined across successive generations. Aspects of human cognition likely evolved to help humans acquire instrumental and conventional skills via high-fidelity knowledge transmission. This includes cultural learning, defined as instances of social learning in which intersubjectivity or perspective-taking plays a vital role. Cultural learning is dynamically shaped by children's interaction with their environment at multiple scales, including culture, history, and evolution – leading to cross-cultural variation and similarities throughout development.

In my field-based work on hunter-gatherer child and adolescent learning, I show how play, teaching, participation, and imitation biases contribute to children's acquisition of skill and cooperative norms. One striking cross-cultural similarity is the primacy of learning with and from peers in the mixed-gender multi-age playgroup. I argue that peer learning may contribute to more rapid, and potentially less costly, knowledge transfers in humans, and may also generate novel social norms and subsistence practices. I then review the existing ethnographic and developmental literature to suggest that socialization practices emphasized in hunter-gatherer societies, including learning through autonomous exploration, adult and peer teaching, play and innovation seeking may bolster children's ability to innovate new norms and tools.

## **References**

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## *Meta-operativity and recursion. Two conditions for creativity*

**Pietro MONTANI**

Honorary Professor of Aesthetics, *Sapienza* University of Rome, Rome, Italy

### **Abstract**

The evolutionary transition from gestural-mimic language to phonetically articulated one is the subject of contrasting interpretations depending on whether it is seen as a gradual conversion or as an event responsible for a certain discontinuity. In my contribution, I would like to draw attention to a property of verbal language – its semantic formativeness – and discuss its dependence on a more general capacity to act meta-operationally and recursively. I would like to suggest that the necessary embodiment of these two modes of reflexive control over action triggers an open series of feedback with its modes of externalization – from hand to brain and vice versa – which phonetically articulated language has helped to increase in a mode only in part comparable to forms of gestural and mimic expression.

I will start with four scenarios that show from different angles the point I would like to put forward for discussion. Two of these refer to behaviors of non-human animals (the symbolic language of bees and the unpredictable meta-operational resources of macaques), while the other two refer to the human being (a radical change in lithic manufacturing recorded in the Middle Paleolithic and the device of the “arbitrariness” of the linguistic sign). The authors I will refer to are respectively: Emile Benveniste, Atsushi Iriki, André Leroi-Gourhan, Ferdinand de Saussure.

At this point we can imagine a *fifth scenario* in which the emergence of an articulated language can be seen in this way: a hand emancipated from the spatial constraints of deixis and able to operate recursively transfers this precious competence to a very refined articulatory apparatus that *discovers* of being able to apply it indefinitely to the world of experience in the sense of Saussure's arbitrariness-formativity. This is the model of creativity that I would like to submit for discussion.

### **References**

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## CONCEPT NOTE

(originally sent to the invited speakers to prepare their talks)

### *Overall Framework*

This research seminar is the first step of the research project “*De thesauro suo nova et vetera* (Mt 13,52). **A cross-disciplinary inquiry into human creativity**”, funded in its current planning phase by the Pontifical University of the Holy Cross.

The general objective of the project is an interdisciplinary enquiry on creativity hinged on the most recent developments in the fields of cultural evolution and human progress, and focusing on the dichotomies individual/social, transmission/innovation, necessity/desire. Creativity has been often understood as a character of individuals, but it actually unrolls in social contexts that can promote, canalize or hinder it. The notable outcome of creativity is innovation – a breakthrough with respect to the “already known” – but no innovation is possible without effective transmission of previously devised solutions, and of novelties themselves. It is often claimed that *mater artium necessitas* (“necessity is the mother of invention”), but many innovations in human history and prehistory seem to be rather a consequence of “desires” (from curiosity, to taste and “strive to thrive”) than of pressure to solve immediate challenges.

The project is intended to have a wide interdisciplinary breadth, encompassing the relevant natural and human sciences (biology, ethology, neuroscience, psychology, anthropology, archaeology, sociology, economics, etc.) as well as philosophy, religion studies and theology. The aim is letting the team members and external experts in those disciplines interact openly and (contribute to) build up an empirically-based, interdisciplinary conceptual framework on creativity as a key human character.

Creativity is, thus, regarded as a window to go deeper in our understanding of the human being and of humanity, its past and future evolution. It is a theme around which topics ranging from language and pedagogy, technology and economics, arts and institutions, free will and pro-sociality/altruism coalesce and can be framed fruitfully.

From a theological and philosophical perspective, the project aims at promoting a more mature and updated understanding of “human uniqueness”. According to the Judeo-Christian tradition humankind is conceived as being “*imago Dei*”. Creativity can help distilling the import of the “*imago Dei*” doctrine, perhaps more interestingly than it can be done focusing on characters such as, e.g., articulate language, symbolic thought or cumulative culture. Even more fundamentally, creativity and its consequences might be philosophically and theologically regarded as the way in which humanity introduces real – ontological – novelty in the world (in creation).

### *The Research Seminar: priorities and expectations*

On the above-sketched background, this Research Seminar is intended as a key step in framing the future interdisciplinary research that the project’s implementation phase (2025-2028) will pursue.

Expertise is gathered to the aim of discussing recent developments in key disciplines relevant to enquiring creativity as a human characteristic. The invited speakers have competence in cultural evolutionary studies, ethology, ethnography, archaeology, economy, psychology, aesthetics, systematic theology, and varied anthropological perspectives (from paleoanthropology to cultural, philosophical and theological anthropology). The other participants (mainly the project’s team members) will bring in expertise in other sectors of philosophy (philosophy of knowledge, of science, of mind and of language, ethics and bioethics, sociology and fundamental theology).

With all these disciplinary settings involved, we aim at discussing creativity starting from many different angles and trying to converge on its core. As the title of the Research Seminar suggests, “innovation” will be a central topic as the outcome of creativity. “Transmission” seems to be essential to (human) cumulative cultural evolution, in both its social-learning and teaching sides. The interplay between creativity and transmission will be a topic of discussion.

The “motivation” to be creative – to innovate – will be another central topic – both in its individual and social facets. Data are amassing about when, who and from whom one learns or is taught, and which are the social contexts either prompting or hindering innovative processes.

Anthropology “feeds on” comparative studies since decades. Hence, aspects of animal cognition, culture, learning and teaching will be relevant, as well as insights possibly coming from high-tech and AI. Archaeology – mainly intended as “cognitive archaeology”, or even as what could be called “etho-archaeology” (i.e., the study of our ancestors’ *behavior*) – will bring in additional insights and challenges. As mentioned, the interaction between individual features and social settings in shaping creativity and the innovative process will be in the focus – possibly opening windows on human uniqueness. Finally, the social level is relevant not only “up-stream” creativity, but also, so to speak, “down-stream”: in the way in which it affects acceptance, reception, promotion and investment on incipient innovations, both in small-scale collectives and larger institutions. All this convinces us of the need to build up a *theory* about creativity, able to synthesize the many available data and the main approaches currently under development.