Agency and Individuality

Kraków, 14–16 April 2026

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Conference Programme & Abstracts

Meta-Abstract

Agency and individuality are among the most fundamental – and most contested – concepts across the life sciences, philosophy, and the physical sciences. This conference brings together diverse perspectives to examine how entities come to count as individuals, how agency emerges or is attributed, and how these notions operate at different levels of organization, from cells and organisms to collectives and social groups.

The contributions gathered here explore internal conflict and cooperation within living systems, the dynamics of evolutionary and developmental processes, the role of memory, goal-directedness, and creativity, and the conceptual frameworks that structure scientific debates. Some speakers analyze organisms as complex, self-organizing systems capable of reshaping the conditions of their own persistence. Others investigate the limits of reductionist explanations, the legitimacy of teleological language in biology, or the emergence of agency within physical systems. Still others extend the discussion to collective and social forms of agency.

Rather than presupposing fixed definitions, this conference reflects an ongoing effort to clarify, compare, and sometimes challenge the assumptions underlying our understanding of individuals and agents. Together, the talks of the speakers map a rich and evolving conceptual landscape at the intersection of biology, philosophy, and beyond.

Schedule

Tuesday, 14 April

09:50–10:00 *Welcome*

10:00–11:00 **Javier Suárez**
University of Oviedo
"Agency, Capabilities and the Body Plan: The Case of Fungal Agency"

11:00–12:00 **Jana Švorcová**
Charles University
"Evolving by Norms, Habits, and Creativity: A Bio-Philosophical Perspective on Organismal Evolution"

12:00–13:00 **J. Arvid Ågren**
Case Western Reserve University & Cleveland Clinic Research
"The Paradox of the Organism"

13:00–14:00 *Lunch Break*

14:00–15:00 **Andrzej Gecow**
Polish Academy of Sciences
"Definitions of Life and the Resulting Draft of the Deductive Theory of Life"

15:00–16:00 **Guglielmo Militello**
University of Bordeaux & CNRS / Paris 1 Panthéon-Sorbonne University
"Functional Integration: A Theoretical Enquiry into the Biological Unit of the Individual"

Wednesday, 15 April

10:00–11:00 **Zofia Prokop**
Jagiellonian University
"Emergent Strategies to Mend the World Broken by Being Reduced ad Absurdum – An Angry Biologist's Perspective"

11:00–12:00 **Jan Czarnecki**
Jagiellonian University
"Is Life Inherently Agential, or Is Agency Not Enough About Living? A Sketch of an Agency-First Theory of Life"

12:00–13:00 **Jan Baedke**
Ruhr University
"Why Organisms Are Different Agents than Other Biological Individuals"

13:00–14:00 *Lunch Break*

14:00–15:00 **Thomas Müller**
University of Konstanz
"Agency as an Emergent Physical Phenomenon"

15:00–16:00 **Tomasz Placek**
Jagiellonian University
"What Memory for an Agent?"

Thursday, 16 April

10:00–11:00 **Szymon Miłkoś**
Polish Academy of Sciences
"Agency, Individuality, and Identity: Through a Metacognitive Continuum"

11:00–12:00 **Ciprian Jeler**
Alexandru Ioan Cuza University of Iaşi
"Selective Paths and the Units of Selection"

12:00–13:00 **Pierrick Bourrat**
Macquarie University
"Agency, Goal-Directedness, and the Levels of Biological Organisation"

13:00–14:00 *Lunch Break*

14:00–15:00 **Mariano Martín-Villuendas**
Complutense University of Madrid
"Tensions in Biological Individuality: A Metascientific Diagnose"

15:00–16:00 **Adrian Stencel**
Jagiellonian University
"Who Controls the Holobiont? Agency, Symbiosis, and Control"

Abstracts

Javier Suárez

University of Oviedo

Title: *Agency, Capabilities and the Body Plan: The Case of Fungal Agency*

Abstract. The adaptive behaviour exhibited by organisms has been recently taken to suggest that organisms can exhibit agential capabilities, exhibited in the form of flexibility and goal-directedness. A problem with such an approach is that it is hard to test whether organisms do really have goals, or they just direct their behaviours in a mechanistic manner. Recent research has explored two ways of deciding such a question: by focusing on the organismic body plan, or by focusing on whether they exhibit some other capabilities that can be taken as proxies of agency. Two of such capabilities are memory and optimization behaviour. In this talk, after examining some experimental research, I will argue that fungi can be taken as agents because they exhibit memory and optimization behaviour. Finally, I will link this to the fungal body plan.

Jana Švorcová

Charles University

Title: *Evolving by Norms, Habits, and Creativity: A Bio-Philosophical Perspective on Organismal Evolution*

Abstract. My lecture presents an alternative perspective on the evolutionary agency of organisms based on three key principles developed in my research over the past six years: norms and closures, evolution by habit, and organismal creativity. The first point, *norms and closures*, emphasizes that life evolves within shared structural and functional foundations – regulatory networks, signalling pathways, and cellular organization – which act as norms interpreted differently across individual lineages. These constraints are not obstacles but enable stability, coordination, and the emergence of new forms of interaction, for example in symbiotic or in plastically overlapping *Umwelten*. The second principle, *evolution by habit*, draws on Charles S. Peirce's concept of habit and his notion of open, developmental teleology. Organisms accumulate experience within historically formed memory structures that influence their ontogeny and epigenetic plasticity. Evolutionary novelty thus arises not primarily from changes in genes but through modifications of regulatory architectures, timing, and context of gene expression – through material traces of experience that are stabilized, forgotten, or further transformed into new habits. The third point, *organismal creativity*, argues for the presence of creativity (or at least of processes analogous to it) even in the "simplest" organisms. It shows that creativity does not emerge from unlimited combinatorial possibilities but from the interaction between constraints and open potentials. Organisms generate novelty through structurally guided noise, enabling novel adaptive innovations and meaning-making responses to the environment. Creativity is therefore an integral property of living systems, which can be activated in response to unpredictability, yet remains anchored in historical memory and in their capacity to co-construct their *Umwelten*. The lecture draws on current knowledge from theoretical biology, epigenetics, and developmental biology, while also attempting a bio-philosophical synthesis that is aware of how similar topics have been addressed in the past and seeks to engage with them without invoking vitalism.

J. Arvid Ågren

Case Western Reserve University & Cleveland Clinic Research

Title: *The Paradox of the Organism*

Abstract. Multicellular organisms are not inherently harmonious systems, but collectives vulnerable to exploitation from within. Although they arise from the coordinated activity of thousands of genes and millions of cells, selfish genetic elements and selfish cell lineages can increase their own fitness at the expense of other genes, cells, or the organism as a whole. Yet organisms exist. This is the paradox of the organism: despite ample opportunities for internal conflicts to undermine the organism from within they usually do not. In this talk, I will discuss how different kinds of internal conflict pose different threats to organisms, how these threats can be quantified, and when organisms may be torn apart by them. Taking internal conflict seriously forces us to re-evaluate the concepts of both agency and individuality.

Andrzej Gecow

Polish Academy of Sciences, emeritus

Title: *Definitions of Life and the Resulting Draft of the Deductive Theory of Life*

Abstract. This talk is a summary of my article "Two coherent definitions of the life process derived from the half-chaos theory and the (unintentional) purposeful information theory." It describes the core part of my book *Draft of the Deductive Theory of Life*, published in Polish. Both definitions have a foundation in original theories grounded outside of biology. From these definitions, fundamental properties of the process are derived, which turn out to be similar to the life process. The fundamental feature of the approach is the attempt to organize known biological knowledge into a deductive structure based on indicated assumptions. This method is currently not tolerated in biology, yet it allows for the explanation of currently unresolved problems. In the discussed range, this method allowed the detection of half-chaos, which resolved the problem of the identity of the evolving object, the tautology in the Darwinian definition related to the elimination, and corrected Kauffman's hypothesis of "life on the edge of chaos" to "life evolves in the half-chaos of not-fully-random systems." The "theory of purposeful information" allowed for a separation of the concept of purpose from intention, a simple concept of "information" suitable for describing nature, a differentiation of the dimensions of purposeful information and its relationship to biological information, and the construction of a model of an evolving object accumulating purposeful information. Using this conceptual framework, the only possible goal toward which purposeful information can accumulate independently and the mechanisms for such accumulation were identified. The problem of evolutionary progress was further explored.

Guglielmo Militello

University of Bordeaux & CNRS / Paris 1 Panthéon-Sorbonne University

Title: *Functional Integration: A Theoretical Enquiry into the Biological Unit of the Individual*

Abstract. Biological individuality is a fundamental issue in the metaphysics of biology, with significant consequences for how biological practice conceptualizes and operationalizes experiments on organisms. The philosophical literature generally agrees that an individual is a biological unit understood as either a physiological unit, an evolutionary unit of selection, or both. Central to these metaphysical frameworks is the concept of functional integration, which broadly refers to the causal interdependence of biological functions in producing a cohesive whole with systemic properties. In this talk, I provide an overview of my book (published in September 2025), which develops an account of functional integration through an examination of the major evolutionary transition from prokaryotic to eukaryotic cells. I conclude by outlining promising directions for future research opened by this framework.

Zofia Prokop

Jagiellonian University

Title: *Emergent Strategies to Mend the World Broken by Being Reduced ad Absurdum – An Angry Biologist's Perspective*

Abstract. As so many other scientists, I was trained under the reductionist paradigm which was, however, never explicitly acknowledged as paradigm; rather, it permeated our education and training as underlying, unquestioned assumption about the nature of reality. In this talk I will draw on scholarly, artistic and activist sources which shaped the evolution of my own thinking, to argue that this unquestioned reductionist perspective (1) leads to profusion of absurdly incorrect conclusions being drawn and perpetuated in biological sciences (hence my borrowing the phrase *reductio ad absurdum* for this context) and (2) much worse, lies at the root of the interlocked local and global crises including climate, biodiversity, economy, wars, food production, health, education etc., because the "false assumption of separation" ingrained in reductionist thinking prevents us from adequately perceiving and engaging with the profoundly systemic nature of reality. I will then reflect on how finding (some) agency in the face of the overwhelming scale of contemporary polycrisis can be possible by training the perception of complexity and interconnectedness.

Jan Czarnecki

Jagiellonian University

Title: *Is Life Inherently Agential, or Is Agency Not Enough About Living? A Sketch of an Agency-First Theory of Life*

Abstract. Defining the phenomenon of life or attempting to frame it within a single theory is a daunting task that has been worked on since the dawn of philosophy. Some argue that this endeavor is of little use to science and completely unnecessary, pointing to the limitations of the main theories. I believe that while most theories of life allow us to understand the mystery of the constitutive aspect of life, the regulative aspect remains unexplored, even though it could usefully inform our attempts to define the phenomenon of life. Two fields that are rarely brought together are helpful in defining it: cognitive psychology and cell biology.

Jan Baedke

Ruhr University

Title: *Why Organisms Are Different Agents than Other Biological Individuals*

Abstract. This paper examines the relationship between organismality, biological individuality, and agency. I argue that organisms are agents in a way that other biological individuals are not. While recent philosophy of biology distinguishes forms of individuality, like metabolic and reproductive individuality, it has not clarified how organismality differs from other biological individuals. Traditional accounts describe organisms as self-maintaining "persisters." But this view fails to distinguish them as agents from holobionts or colonies, and overlooks key developmental dynamics. Organisms uniquely de- and reorganize their own individuality over time, shifting, for example, between metabolic and reproductive modes to become qualitatively new wholes. Drawing on cases of sexual parasitism, mammalian life cycles, and eusocial insects, I develop a conception of organisms as "overcomers." This framework highlights their distinctive explanatory role as agents capable of restructuring the conditions of their individuality – an ability central to understanding evolutionary novelty and major evolutionary transitions.

Thomas Müller

University of Konstanz

Title: *Agency as an Emergent Physical Phenomenon*

Abstract. Agency is an everyday phenomenon, but it is also a philosophical and a physical conundrum. We readily attribute agency to ourselves, to our fellow human beings, and to many animals – and soon, perhaps, also to certain robots. But it is not really clear what exactly it is that we are attributing, and how agency can fit into the natural world.

The problem of agency can be illustrated by considering scientific experiments. As agents, we can meaningfully influence the world, and as scientists, we use these agentive capabilities to conduct experiments to understand nature. But at the level of the physical interactions that many of our experiments are about, there is no agency. Agency, that is, does not seem to be fundamental, and may therefore be a candidate for reduction. On the other hand, agency is invoked as an unanalysed primitive in some foundational discussions, e.g., in the QBist approach to quantum mechanics. Which position is right? Can agency be physically real? And if so, how?

In this talk I discuss an approach to agency modelling based on collaborative work with Hans Briegel (Innsbruck). I will sketch an understanding of agency as an emergent phenomenon that incorporates embodiment, learning, and historicity – based on, but also going beyond, physical principles.

Tomasz Placek

Jagiellonian University

Title: *What Memory for an Agent?*

Abstract. In debates over agency, it is commonly held that free agents and their free actions require the agents to possess memory. But which kind of memory, exactly, should be ascribed to free agents? The natural sciences, as well as epistemology, have developed a variety of concepts of memory. I will argue that a minimal concept of memory – one that can be implemented in simple physical systems – is sufficient.

Szymon Miłkoś

Polish Academy of Sciences

Title: *Agency, Individuality, and Identity: Through a Metacognitive Continuum*

Abstract. This presentation proposes a cognitive science perspective on the relationship between agency, individuality, and identity. I suggest that cognition, metacognition, and reflection – understood as problem solving, monitoring and control of problem solving, and self/other representation – generalise, respectively, to agency, individuality, and identity. Drawing on examples across scales (from volcanoes, through plants and humans, to social institutions), I explore how these notions unfold as a continuum. The presentation is intended as a big-picture view and an invitation to discussion, connecting threads across the different discussions rather than advancing a narrow thesis.

Ciprian Jeler

Alexandru Ioan Cuza University of Iaşi

Title: *Selective Paths and the Units of Selection*

Abstract. A "selective path" is understood here as a causal path that links differences in a phenotypic trait to differences in actual reproductive success. At least some of the mediating variables on this path constitute, using Stevan Arnold's terminology, "performance traits," whereas selective agents are taken to be, following Michael Wade and Susan Kalisz, moderators of the relationship between some of the variables on this path. Looking at the selective paths from well-known cases of the venerable "units of selection" debate (e.g. cases involving group selection for socially advantageous traits, species selection and holobiont-level selection) helps bring to the fore the sources of the selectively relevant variation and leads to what might be called a "qualified conventionalism" about the units of selection. Depending on the ecology of particular cases, both higher-level and lower-level descriptions might be legitimate, without necessarily being equally justified.

Pierrick Bourrat

Macquarie University

Title: *Agency, Goal-Directedness, and the Levels of Biological Organisation*

Abstract. Life and evolution often appear purposeful, and yet goals and purpose are not parts of reductionist sciences (e.g., modern physics, chemistry). This contradiction has been an enduring conundrum. Traditionally, explanations that invoke goal-directedness and agency have been treated cautiously, but a new move argues that we should recognise multiple levels of biological organisation – cells, tissues, and organisms – as agents with agendas. Here I offer clarity on when and why the concept of goal-directedness is applicable in biology. I offer grounds for distinguishing whether something is a candidate for goal-directedness and consider whether explanations involving goal-directedness (teleonomic explanations) are useful. Teleonomic explanations can be briefer and less computationally demanding than algorithmic explanations, and they can help pose hypotheses for how something might function. However, they risk omitting critical details and misdirecting conclusions. Thus, while there is a place for goal-directed explanations in biology, they should be used with care.

Mariano Martín-Villuendas

Complutense University of Madrid

Title: *Tensions in Biological Individuality: A Metascientific Diagnose*

Abstract. Concepts structure scientific inquiry by guiding observation, experimentation, and inference. In the philosophy of biology, we find prominent concepts such as species, genes, and lineages, with biological individuality gaining increasing importance. Twentieth-century debates on individuality focused on evolutionary perspectives centered on units of selection, while recent organism-centered approaches have emphasized physiological integration and functional autonomy, generating persistent tensions between the two. This talk does not propose a new definition or methodological stance, but asks a second-order question: what explains the persistence of multiple, divergent, yet scientifically and philosophically respectable approaches to individuality? I argue that these tensions stem from the implicit adoption of metascientific principles – philosophical assumptions that structure scientific practice but may bias reasoning if unexamined. Making these assumptions explicit reveals that the sources of disagreement lie outside strictly scientific inquiry, helping explain the debate's resistance to unification and suggesting ways to ease tensions between competing conceptions of individuality.

Adrian Stencel

Jagiellonian University

Title: *Who Controls the Holobiont? Agency, Symbiosis, and Control*

Abstract. The discussion about agency is an important topic in contemporary biology and philosophy. There seems to be something unique about organisms: they appear to function as if they pursue certain goals. This makes them, at first glance, similar to human beings, who are agents with motivations and who pursue goals. Yet, there also seems to be an important difference between, for instance, bacteria and a philosophy student. Nevertheless, this raises an important question: are they both agents, at least to some extent, and what makes something an agent? In this talk, I will argue that control lies at the foundation of agency, and I will explore who the agent is when it comes to holobionts. A holobiont is a combination of a host and its symbiotic microorganisms.