

Self-organization, Autonomy and the Bounds of the Self

Workshop international, 18-19 mars 2024, organisé par Florian Moullard et Louis Virenque
avec le soutien du Labex *Who Am I?* et l'IHPST
Université Paris-1 Panthéon-Sorbonne, site Centre Panthéon (12 place du Panthéon), salle 6

Lundi 18 mars

9h00-9h15 : Ouverture du workshop/opening session : **Florian Moullard** (Bordeaux-Montaigne, SPH; Paris I, IHPST) et **Louis Virenque** (CNRS, IHPST, Paris I), *The Problem for Defining Agency*.

9h15-10h45 : **Anna Ciaunica** (Université de Lisbonne), *Hybrid agencies*,

Recent technological advances have opened the doors to new forms of life, new forms of reality, new forms of agents, new forms of cognition and behaviour. Hybrid systems combining human cognition and behaviour with robotics, virtual reality characters, chatbots, xenobots and artificial intelligence are becoming increasingly part of our lives. The term 'agency' is used widely across disciplines, from philosophy to cellular biology, neuroscience and artificial intelligence. Yet, no common ground exists on defining what exactly an 'agent' is and what counts as 'agency' in biological and artificial systems. This question is even more urgent in the light of recent developments of hybrid systems combining natural cells and artificial systems. In this talk I will address the question: how can we define the notions of agent and agency in a world where the boundaries between biological and artificial systems are increasingly blurred? Specifically, I will focus on the notion of self-organisation in biological and artificial systems. I propose a differentiation criterion based on how these systems make use of its bodily and physical/energetic resources to solve survival- and persistence related problems, and autonomously adapt in an everchanging environment.

10h45-11h : pause/break

11h00-12h30 : **Mathilde Tahar** (Université de Lille), *Playful Memory: Making Sense of Biological Agency*.

In recent decades, biological agency has increasingly come to the fore of the epistemic scene, both in theoretical biology and in the philosophy of biology, as a potential counter to the previously dominant reductionist views. However, this concept is characterised by a diverse range of definitions, whether it is employed to understand development, organisation, or evolution, or applied to genes, cells, organisms, or even natural selection. Moreover, its interpretation varies significantly depending on the disciplinary perspective of those employing it, be they biologists or philosophers. In some instances, the concept is used merely as a metaphor, with a risk of anthropomorphism, while in others, it serves a genuinely operational role, being incorporated into biological theories or even acquiring ontological significance. Such a multiplicity of definitions of agency, usually opportunistically produced to suit the needs of the argument at hand, complicates establishing a clear set of criteria for agency. This ambiguity hinders distinguishing its appropriate from inappropriate uses and providing a cohesive theoretical basis for its various manifestations.

The aim of my presentation is to identify the criteria that unify the concept, while exploring how their various articulations produce different forms of biological agency. Starting both from a broad definition, according to which agency implies an action for which the individual agent appears as the full cause, and reflecting on the concept's assorted applications within biological contexts, I will first delineate the criteria of biological agency. I will then analyse the ways in which these criteria are articulated through various expressions of biological agency: organisation, memory, choice, and invention. Finally, I will interrogate the connections and differences between these three forms of agency and explore their respective implications for scientific practice.

12h30-14h30 : repas/lunch

14h30-16h00 : Hugh Desmond (Université Leibniz de Hanovre, Université de Antwerp), ***What Roles do Agency and Autonomy Play in Evolutionary Explanations?***

As per a common diagnosis, the active role of the organism was unjustifiedly downplayed in 20th century evolutionary biology, and a “return of the whole organism” is imperative for the 21st century. In this talk, I offer both evidence and a rationale for the important but typically neglected counterpoint scenario: the whole organism will never return. The *rationale* lies in an analysis of the distinctively scientific explanatory power of evolutionary explanations, which I argue requires all forms of agency – organismic, human, divine – to be rendered superfluous. More fundamentally, the scientific goals of prediction and control are at odds with the phenomenon of agency, and as long as prediction and control are prioritized, agency – and by extension, the whole organism – will never play an indispensable role in scientific explanations. The *evidence* I offer that this rationale is playing out is that a range of advocates of whole-organism approaches, once they confront the task of generating novel predictions, tend to inadvertently revert to functional-mechanistic explanations.

16h00-16h30 : pause/break

16h30-18h00 : Thomas Reydon (Université Leibniz de Hanovre), ***Challenges for agential explanations in evolutionary science.***

Organismal agency is increasingly being advanced as an explanatory factor for a range of phenomena in evolutionary biology, developmental biology, and ecology. In particular, the notion of agency is invoked to fill four explanatory gaps: aspects of the developmental causes of variation that are unaccounted for; aspects of the mechanism of inheritance; the origin of major evolutionary novelties; and key aspects of niche construction. These explanatory gaps are seen as pointing to a role of organisms as “active” participants in evolution, i.e., as entities that actively shape the evolutionary processes in which they are participating rather than just being “dragged along” in the process as passive subjects to selection pressures and spontaneous mutation events. Because of its alleged explanatory force, the notion of agency is sometimes seen as providing a new theoretical framework to understand how evolution works. This talk will critically examine the prospects of such a new theoretical framework by taking a close look at the explanatory roles of the concept of agency that have been suggested. We will show that these explanatory roles are still removed from yielding genuine scientific explanations and that the view of organisms as active participants in evolution still is underdeveloped. To advance the development of an explanatory concept of agency, we point to some challenges that still must be met before agential explanation can be accepted as a mode of scientific explanation in the life sciences. (This talk is based on joint work with Hugh Desmond.)

Mardi 19 mars

9h00-10h30 : Alvaro Moreno (Université du Pays-Basque), ***What is the significance of Agency in the History of Life?***

There are different concepts of Agency in Biology and it is difficult to find a consensus definition. In this talk I will propose to address the question from the perspective of its origin and evolution. First, I will analyze how different systems that can be qualified as agents appear during Biogenesis. But of all of them, I will focus on the appearance of individuated systems capable to modify their close environment through secretion or movement, because only these systems can extend functionally their internal machinery, opening this way a wider functional domain (i.e., communicative and cooperative interactions, which has permitted the creation of colonies or new MC organisms and to conquer new niches). Second, I will argue that the key factor in the evolutionary path towards complexification of agency is motility, because only motile agents have the possibility to control continuously the direction and speed of its movements, and even to combine different simultaneous moving mechanisms. What makes motility more interesting for understanding the complexification of agency is the pressure that the speed and versatility of motile action creates on the sensory organs. In order to achieve successful detector-action correlation cycles, increasing speed and versatility requires in turn increasingly sensitive detectors to guide action. In addition, as size increases, evolution towards more complex motile agency is necessarily accompanied with a higher degree of integration, and in turn, bigger size allows more complex machinery supporting agent behavior. I will show how these factors explain the different evolution of agency in

animals compared to that of other MC organisms. I will conclude by analyzing how these considerations can help us to re-think our understanding of biological agency.

10h30-11h : pause/break

11h00-12h30 : **Daria Zakhorava** (London School of Economics), *The Arthropod Style of Cognition? Embodied vs. "Higher" Cognitive Explanations of Intelligent Behavior in Portia Jumping Spiders.*

This paper addresses the ongoing debate concerning the nature of intelligent behavior in *Portia* spiders, juxtaposing two predominant theories: the recent proposition of mental simulation ability by Cross et al. (2020), grounded in novel experiments on expectancy violation and numerosity, against the deflationary view advocating for embodied heuristics, primarily based on interpreting the (older) detour pre-planning experiments and research of *Portia's* visual system (Barrett 2011, Tarsitano and Andrew 1998). We extend the embodied heuristics framework to encompass recent findings, specifically by drawing parallels with sequential scanning behaviors observed in bees, and thus offer a nuanced explanation that relies neither on the assumption of processes akin to mental simulation, nor solely on the mechanism posited by the deflationary account. Given the absence of direct neural evidence in *Portia* spiders that could reliably adjudicate the debate, and the sole reliance on behavioral observations in the experiments, we argue that neither the mental simulation model nor the embodied heuristics account could so far conclusively claim superiority. Moreover, we argue that Cross et al. do not in fact offer a positive case for preferring the simulation-based account. We also reject privileging the embodied heuristics account simply on the grounds of parsimony or simplicity of explanation. However, by leveraging an independent line of evidence from other arthropods, we advocate for the advanced embodied heuristics explanation, emphasizing the likelihood of a shared "arthropod cognition toolkit." This approach not only aligns with the observed capacities of *Portia* spiders in the novel experiments but also challenges the necessity of positing cognitive abilities that are more akin to those found in mammals in explaining *Portia* spiders' intelligent behaviors. We thus propose a positive case for the embodiment-based explanation that can account for the novel experimental observations and offer a path forward to understanding the arthropod style of cognition.

12h30-14h00 : repas/lunch

14h00-15h30 : **Michael Tomasello** (Duke University), *The Evolution of Agency* (session hybride).

Nature cannot build organisms biologically prepared for every contingency they might possibly encounter. Instead, Nature builds some organisms to function as feedback control systems that pursue goals, make informed behavioral decisions about how best to pursue those goals in the current situation, and then monitor behavioral execution for effectiveness. Nature builds psychological agents. I propose a typology of different types of agency in creatures that were ancestral to humans: goal-directed agency in early vertebrates, intentional agency in early mammals, rational agency in early apes, and shared agency in early humans.

15h30-17h00 : **Matteo Mossio & Philippe Huneman** (CNRS, Paris I, IHPST), *Conclusive remarks: Agency, pro et contra.*

This presentation will consist of two successive presentations, the aim of which is to synthesize previous work in two different directions: one will defend a point of view internal to the proponents of the theory of biological autonomy, the other will defend a skeptical point of view.

Voici le lien zoom pour assister au workshop en ligne :

<https://pantheonsorbonne.zoom.us/j/99156490869?pwd=WFPcNRRNm0vak5QZTd1eXBVRjJFUT09>

Here is the zoom link to attend the workshop online :

<https://pantheonsorbonne.zoom.us/j/99156490869?pwd=WFPcNRRNm0vak5QZTd1eXBVRjJFUT09>