

# Australia/New Zealand Philosophy of Biology Workshop

## 26–28 June 2024 at the Bundanoon Hotel

Short talk slots are 20 minutes: 10–15 minute talk + 5–10 minute Q&A

Long talk slots are 40 minutes: 20–30 minute talk + 10–20 minute Q&A

### Day 1: Wednesday June 26th

- 11:30–12:30 Pre-workshop ECR professional development discussion 1: Networking and collaborating (Kate Lynch & Emily Parke). Meet at DeliLicious (5 Railway Ave)
- 1:00–1:20pm Welcome
- 1:20–1:40pm Short talk: **Rachael Brown and Katie Deaven**, “On a Par? Can Niche Construction Be a True Cause of Evolutionary Change?”
- 1:40–2:00pm Short talk: **John Matthewson**, “Model Types and Population Types”
- 2:00–2:40pm Long talk: **Rebecca Mann**, “Metabolic Wholes: The Organism as Having a Centred Metabolic Network”
- 2:40–3:10pm Afternoon tea break
- 3:10–4:10pm Keynote: **Rachel Ankeny**, “Why environmental and ecological modellers should CARE”

### Day 2: Thursday June 27th

- 9:00–9:40am Long talk: **Pietro Allegritti**, “The Importance of Non-Adaptive Processes in the History of Evolution: The Debate on the Importance of the Exaptation Concept”
- 9:40–10:20am Long talk: **Thomas Graham**, “We Don’t Need Miracles; We Have Ochre”
- 10:20–10:50am Morning tea break
- 10:50–11:10am Short talk: **Annie Sandrussi**, “Shifting Ontologies of the Material”
- 11:10–11:30am Short talk: **Armin Schulz**, “It’s Only Human: The Evolution of Distinctively Human Cognition”
- 11:30–11:50am Short talk: **James Ley**, “Cutting Nature at the Joints or Just Chunking It? The Parts of Madness in Plato’s Phaedrus”
- 11:50–1:30pm Lunch (pre-ordered at a nearby restaurant, details TBC)
- 1:30–2:10pm Long talk: **Lorena Sganzerla**, “RECTifying Information Processing from a New Mechanist Perspective”
- 2:10–2:50pm Long talk: **Alexandre Duval**, “Does Neurobiology Show the Existence of Mental Maps?”
- 2:50–3:20pm Afternoon tea break

- 3:20–3:40pm Short talk: **Peter Takacs**, “Lineage Fitness: A Deflationary Account”
- 3:40–4:00pm Short talk: **Pierrick Bourrat**, “Reproducees, Reproducers, and Darwinian Individuals”
- 4:00–4:20pm Short talk: **Chris Lean**, “Engineering Ecocide is Morally Wrong”
- 4:30–5:30pm ECR professional development discussion 2: Preparing for the job market (Rachael Brown & Emily Parke).

### Day 3: Friday June 28th

- 9:00–9:40am Long talk: **Hilary Bowman-Smart**, “Connecting the Metaphysics of Pregnancy with Accounts of Biological Parenthood”
- 9:40–10:20am Long talk: **Lucia Neco**, “Beyond Dichotomies: Embracing an Integrated Approach to Social Relationships”
- 10:20–10:50am Morning tea break
- 10:50–11:30am Long talk: **Andra Meneganzin and Anton Killin**, “Beyond Reasonable Doubt: Reconsidering Neanderthal Aesthetic Capacity”
- 11:30–11:50am Short talk: **Riin Koiv**, “Population vs. Individual-Level Causal Explanations: A Unified Framework for Integrating Existing Discussions”
- 12:00–1:00pm Post-workshop ECR professional development discussion 3: Understanding the publication process (Rachael Brown & Kate Lynch)

Lunch available at the Bundanoon Hotel from 12:00pm.

---

## Abstracts

### Day 1: Wednesday June 26th

#### **On a Par? Can Niche Construction Be a True Cause of Evolutionary Change?**

**Rachael Brown** (Australian National University) and **Katie Deaven** (University of Wisconsin-Madison)

Niche construction encapsulates the myriad of processes by which organisms modify their environments, impacting their selective niche and future evolutionary trajectories. Classic examples include earthworms altering soil structure, beaver dams, and termite mounds. Advocates of niche construction theory (NCT) argue that it is a cause of evolution and on a par with natural selection. While significant to understanding some specific ecosystems and individual level processes, niche construction, they argue, is not an evolutionary cause, and certainly not comparable in importance to standard factors like natural selection and drift. This may seem to be a verbal dispute, but it is far from it; the status of niche construction goes to the heart of how we should model and understand evolution.

This debate parallels another. The causal and explanatory nature of selection itself has (in)famously been the focus of significant debate amongst philosophers of biology. Statisticalists argue that natural selection is not a population-level cause but a higher order effect of many lower-level causal events. Causalists, on the other hand, argue natural selection is a causal process acting at the population level. This paper exploits the parallels between this debate and that concerning niche construction to critically assess the question of whether natural selection and niche construction are on a par.

### **Metabolic Wholes: The Organism as Having a Centred Metabolic Network**

**Rebecca Mann** (University of Sydney)

The organism concept is central to the biological sciences. Yet, there is still much disagreement about what features should underlie the concept. I contend that we should adopt a materially restricted concept of the organism, grounded by particular biological functions, substances and/or processes, instead of more abstract concepts that rely solely on generalised notions like cooperation or integration. Organisms are the quintessential living entity and to be alive is to metabolise. As such, we should turn to accounts of metabolism to define the organism. However, metabolic reactions alone are not sufficient. In this talk, I develop an account of the organism as an entity that has a centred metabolic network. Centred metabolic networks consist of many single metabolic transformations and have a network topology dominated by a few highly connected reactions and substrates. Such networks have been found across all three domains of life (Jeong et.al 2000). An organism could thus be defined as a cooperative collection of biological parts that are unified by a centred metabolic network, self-maintaining and resisting the forces of entropy by turning energy from the environment into usable energy for the whole organism. They are metabolic wholes.

### **KEYNOTE: Why environmental and ecological modellers should CARE**

**Rachel Ankeny** (University of Adelaide/Wageningen University), co-authored with Cassandra Sedran-Price (CSIRO), Riley Taitingfong (University of Arizona), Rose Barrowcliffe (Macquarie University), Lydia Jennings (University of Arizona), Jess Melbourne-Thomas (CSIRO)

For millennia, Indigenous Peoples have engaged in activities related to understanding the environment and ecological relationships within it (Jennings et al. 2023), including describing and tracking species, ecosystems, and broader processes now recognised as associated with climate change. Indigenous Peoples manage or have land rights over approximately 38 million square kilometres in 87 countries or politically distinct areas on all inhabited continents, representing over a quarter of the world's land surface (Garnett et al. 2018). Throughout the world, Indigenous Peoples also have important cultural connections to marine environments (Fischer et al. 2021); however rights related to Sea Country are generally not well recognised in legal frameworks (Perez-Alvaro 2023). Data has been a fundamental part of Indigenous culture; however, most have been collected by non-Indigenous entities, such as research institutes and governments, with little input by Indigenous peoples. Environmental and ecological modelling are used extensively to guide decision-making in a broad range of contexts, from natural resource management to sustainable agrifood systems, climate change adaptation and mitigation, biodiversity conservation and emerging technologies such as gene drives. These models are, in turn, informed by data from a variety of sources and at different spatial and temporal scales, which determine parameter values, initial conditions, model calibration/fitting, decision triggers and thresholds, and, for simulation models, can define and drive scenarios. However First Nations people's voices and Indigenous decision-making are absent from these modelling processes. In most scientific fields, there is widespread acknowledgment and application of the FAIR Principles (Findable, Accessible, Interoperable, Reusable) for data (Wilkinson et al. 2016). But there has been less attention to the CARE Principles for Indigenous Data Governance (IDG) as part of scientific practices, despite the fact that FAIR and

CARE are closely related and complementary to one another (Carroll et al. 2021). This paper argues that the CARE Principles are essential for generating high-quality ecosystem and environmental modelling and data, to facilitate stronger evidence-based decision-making within communities, and to support the self-determination and self-governance required for nation re-building.

## **Day 2: Thursday June 27th**

### **The Importance of Non-Adaptive Processes in the History of Evolution: The Debate on the Importance of the Exaptation Concept**

**Pietro Allegretti** (University of Waikato)

I will provide a new argument for using the concepts of constraints and by-products in evolutionary studies. My argument will be divided into different steps. First, I will suggest that the hierarchical theory developed by the paleontologist Niles Eldredge can both shift the focus to different evolutionary aspects of a trait and highlight important processes other than adaptation (Eldredge et al., 'Evolutionary Theory: a Hierarchical Perspective', 2016). Here I will also focus on Pievani and Sanguettoli's arguments in 'The Evolution of Exaptation' (2020) in favour of using the concepts of exaptation and spandrel as a possible reply to the 'non-operationality objection', that is a rejection of the importance of other concepts than adaptation in evolutionary studies (see Pievani and Serrelli 'Exaptation in Human Evolution' (2011)). Second, I will provide the novel argument that the Pievani and Sanguettoli's exaptation explanation has the further benefit that it enables us to not just identify constraints and by-products, but also, consequently to this identification, to provide indirect arguments to corroborate or confute different hypotheses of the evolutionary history of a trait. I will suggest that these benefits give further support to the argument that exaptation is an important concept in evolutionary studies.

### **We Don't Need Miracles; We Have Ochre**

**Thomas Graham** (Australian National University)

Material symbols emerge in the archaeological record suddenly at about 142kya. Some have taken this sudden emergence to be an indicative of a sudden genetic change, creating 'symbolic cognition'. Notable proponents of this view include Berwick and Chomsky, in their book *Why Only Us*. I concur with other theorists that this view is anti-Darwinian: it posits either a large genetic change, or a series of genetic changes without fitness benefit. My aim in this talk is to give an alternative account of the evolution of material signals. To do so, I draw on the signaling literature, making the account deflationary: it undermines the connection between material symbols in the archaeological record and any cognitive change. I also draw on Planer and Sterelny's gradualist account of the evolution of language, and from my analysis I find that there are five features of signals that explain their evolution: signals must be attention-directing, referential, intentional, replicable, and memorable. I then argue that ochre-based signaling could plausibly serve as an early system of material signaling. It has all five features from above, and hominins could implement the system with only modest cognitive capacities. Finally, the system could gradually evolve to become more complex.

## **Shifting Ontologies of the Material**

**Annie Sandrussi** (Macquarie University)

In this project, I examine the way that innovations in synthetic biology are pivotal to disruption of hegemonic ontologies that underpin norms governing human use and consumption of the organic. In so doing I show the way that particular uses escape moral valence on the basis of their normative hegemonic underpinnings, and argue therefore that ethical deliberation around biological innovation should consider how innovation can be productively harnessed to disrupt hegemonic ontologies of the material.

## **It's Only Human: The Evolution of Distinctively Human Cognition**

**Armin Schulz** (University of Kansas)

I here argue that underlying the evolution of distinctively human cognition is a complex, looping dynamic. At the heart of this dynamic is a positive feedback loop: sophisticated cultural learning makes possible the creation of tools that increase the sophistication of our innately-based representational decision-making, which in turn allows for yet further increases in the sophistication of cultural learning and tool manufacture. I present the outlines of the account and show how it improves on alternative accounts presented in the literature.

## **Cutting Nature at the Joints or Just Chunking It? The Parts of Madness in Plato's Phaedrus**

**James Ley** (University of Sydney)

I will argue that philosophers of science should avoid the talk of cutting or carving nature at the joints that they derive from the passage at 265e in Plato's Phaedrus. They should avoid this talk because a wider reading of the Phaedrus suggests that Plato confuses the metacognitive division of information described by George A Miller as 'chunking' for a metaphysical division of nature into real or true kinds. I will trace some of the implications of this confusion by looking at the classification of the parts of madness that Plato produces in the Phaedrus and our present efforts to provide a proper classification of mental disorders.

## **RECTifying Information Processing from a New Mechanist Perspective**

**Lorena Sganzerla** (University of Wollongong)

Information processing is ubiquitous in the cognitive sciences. It is a foundational notion shaping a common thread in a constellation of accounts and theories; a key component supporting and underling different related perspectives. While Information Processing does not necessarily entail committing to a particular theory, that information is processed entails a series of cognitive actions involving the use and manipulation of information: storing, transforming, picking it up. This notion is so deeply-seated in conceiving cognitive activity that it seems unintelligible to think of cognitive activity differently. So much so, the majority of models of cognition construe their posits in terms of IP at some level of description. Bechtel (2022) provides a reductionist view evidencing specific chemical reactions as crucial to IP. Reductionist research seeks to ground explanations in the most basic processes effecting the mechanism underlying the phenomenon to be explained. He argues that privileging electrical models and properties of IP ignores and mischaracterises the critical work in information processing, that is at the level of chemistry. Interrogating at the level of organisation at which the components of a mechanism emerge and enable the work that generates the phenomenon is critical to IP; and viewing the mechanisms it engenders under this new mechanistic light is crucial for a rectified understanding of IP.

## **Does Neurobiology Show the Existence of Mental Maps?**

**Alexandre Duval** (Australian National University)

John O'Keefe is one of the three laureates of the 2014 Nobel Prize of Medicine, which he received for his discovery of place cells, neurons in the mammalian hippocampus that fire when an animal represent itself as being in a specific location in an environment. Up until recently, it was widely assumed that the discovery of such cells provide extremely strong evidence that mammals acquire and use 'cognitive maps' for navigation, i.e., metric, Euclidean mental maps of environments that they visit. And it is in fact one of the main theses of O'Keefe's highly influential book *The Hippocampus as a Cognitive Map*. However, this consensus has crumbled in recent years, with many influential neuroscientists researchers proposing alternative interpretations of the firing activity of place cells. In this talk, I will provide a new argument for maintaining that place cells do in fact underpin the existence of cognitive maps in mammals and I will then argue that the existence of cognitive maps so conceived undermine a number of influential positions in philosophy and cognitive science about the architecture of human and non-human animal minds.

## **Lineage Fitness: A Deflationary Account**

**Peter Takacs** (University of Sydney)

The exuberance of late surrounding lineages as the so-called 'bears of fitness' predominantly but not exclusively in the scientific literature, is unwarranted. It rests on a questionable move from fitness metrics, which hypothetically assume that a particular type of biological entity instantiates fitness, to the ontological conclusion that the entity corresponding to a preferred measure (e.g., lineages marked by genes) must be \*the\* true bear of fitness. I offer several reasons for this skeptical outlook, some of which are already well known to philosophers of biology. Despite my deflationary take, lineage fitness can and should be retained as an insightful fitness metric.

## **Reproducees, Reproducers, and Darwinian Individuals**

**Pierrick Bourrat** (University of Sydney)

This paper investigates the concept of reproduction in an evolutionary context. It draws a distinction between objects that are reproduced (reproducees), objects that reproduce thanks to some reproductive autonomy (reproducers), and Darwinian individuals that are reproducers with a high degree of reproductive causal control. This threefold distinction is then applied to different biological objects classically invoked in reproduction processes (e.g., genes, viruses, cells) to explain why they do not have the same status with respect to reproduction. The distinction also provides some fuel for the view proposed by Griesemer: that material overlap during reproduction is a condition for reproduction.

## **Engineering Ecocide is Morally Wrong**

**Chris Lean** (Macquarie University)

Recently a crop of transhumanist longtermist philosophers have argued that genetically engineering predators to become herbivores is a morally viable option (Bramble 2020; Pearce 2015). Others have argued that high fecundity high mortality life strategies should be engineered into low fecundity low mortality breeding life strategies (Johannsen 2017). This is part of a larger movement in philosophy, untethered to the realities of biology or human society which has looked to intervene to remove predators from the wild (Mackaskill and Macaskill 2015; MacMahan 2015; Naussabaum 2022). While Delon and Purves (2018) provide a solid critique of interventions to alleviate animal suffering,

focusing on ecological resilience and the uncertainty of the effect of these interventions, their argument is too weak. Uncertainty of the effect is not the issue. These interventions are not acceptable due to the basic structure of population biology and will result in rolling extinctions and animal suffering in different forms. The policies proposed would amount to ecocide, if successful, and even if they are failures the act to try these interventions will undermine the norms of conservation and establish damaging precedents for human society. If we as a field have, hopefully, come around to the idea that genocide is morally wrong we can muster some effort to reject ecocide.

### **Day 3: Friday June 28th**

#### **Connecting the Metaphysics of Pregnancy with Accounts of Biological Parenthood**

**Hilary Bowman-Smart** (University of South Australia)

Much ethical and social debate relating to reproduction rests on underlying conceptions of the metaphysics of pregnancy. There are a range of models of the relationship between the foetus or embryo (the foster) and the organism gestating it (the gravida). However, pregnancy is often also linked to parenthood. There is thus a connected debate on how we can understand the concept of biological parenthood, which may include gestational or genetic parenthood. Accounts of pregnancy and biological parenthood draw on similar ideas, such as the role of material or physical overlap, and have implications for each other. Attempts to define both gestational and genetic parenthood have been complicated by possible uses of novel reproductive technologies, including in vitro gametogenesis, ectogenesis, and genome editing. The philosophical debates around both pregnancy and parenthood also must account for and respond to social practices such as surrogacy and adoption. Understanding what constitutes biological parenthood, and its connection to pregnancy, is important because rights and duties are often established based on it. This talk will describe the various models and accounts for pregnancy and biological parenthood; the connections between the metaphysics of pregnancy and biological parenthood; and the implications for the ethical and social debate.

#### **Beyond Dichotomies: Embracing an Integrated Approach to Social Relationships**

**Lucia Neco** (University of Western Australia)

In this paper, I contend that relationships are a fundamental aspect of sociality. They emerge from differential patterns of interactions that are sensitive to the identity of the individuals in the social system. I address the tension between the way in which social relationships are characterized in humans versus nonhuman animals. While some philosophers and social scientists view social relationships as subjective or mind-dependent and exclusive to humans, biologists often explain them through factors such as genetics and physiology. I argue for an approach that avoids these extremes and defines the development of social relationships as comprising objective and subjective components. Social relationships are influenced by biological properties and subject to evolutionary processes, yet they cannot be reduced solely to these properties and processes. Instead, they involve active interacting agents who flexibly perceive and respond to these interactions. Since cognitive agency is not restricted to humans, relationships are not restricted to human social systems. Rather, they are essential to all social systems.

**Beyond Reasonable Doubt: Reconsidering Neanderthal Aesthetic Capacity**  
**Andra Meneganzin** (KU Leuven) **and Anton Killin** (Bielefeld University)

While an aesthetic sense is often assumed to be a distinctively *H. sapiens* phenomenon, recent paleoanthropological research is revealing its archaeologically visible, deeper roots. Here we take a diachronic, evolutionary perspective and assess ongoing scepticism regarding whether, and to what extent, aesthetic capacity extends to our evolutionary cousins, the Neanderthals. The goal of this paper is twofold. First, it serves as a defence of the attribution of Neanderthal aesthetic capacity; second, it offers an opportunity to make progress on understanding some epistemically relevant features of the wider debate in evolutionary aesthetics. First, we outline and analyse a range of distinct 'sceptical arguments' that aim to dial down the case for Neanderthal aesthetic capacity. We show that these arguments not only miss their target, they divert the debate away from more compelling questions. We then consider the case for protoaesthetic capacities and sensitivities in the Acheulean stone tool industry and argue that Neanderthals likely inherited the protoaesthetic package from ancient ancestors that they shared with *H. sapiens*. Finally, we sketch and defend a research agenda for framing Neanderthal aesthetic niche(s) beyond *H. sapiens*-derived standards, which we see as a priority for future archaeological, cognitive, and philosophical research.

**Population vs. Individual-Level Causal Explanations: A Unified Framework for Integrating Existing Discussions**

**Riin Koiv** (University of Sydney / Macquarie University)

In the philosophy of biology literature, there are different clusters of discussions on whether the explanans or explanandum of certain causal explanations (e.g., natural selection explanations, behavioral genetics explanations) is a population- or individual-level entity. Although these discussions appear to address similar issues, there has been little attempt to assess how they interrelate and how arguments and theories in one area bear upon those in another. I (together with Pierrick Bourrat) aim to address, and fill, this gap. The first step towards this goal is to place these different discussions within a shared conceptual framework. I do this by articulating the content of these discussions through the interventionist account of causal explanation and using causal graphs. In this talk, I will outline the core idea of this approach and how it will be developed further in the future.