

PROCESS

(Proceso)

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According to the theory of the correlatives, the nature of a being is something defined by its activity. Therefore, being and activity are inseparable and identified.

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Keywords

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Palabras clave

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ABSTRACT: In this paper I discuss the process ontology that has been the central focus of my research for almost 20 years. I explain what this is, and illustrate how it applies to biology through the example of the organism. I also aim to show how naturally process ontology fits with the disordered world I described in the preceding article. Finally, I show how process philosophy illuminates a number of topics relating to the human condition, including personal identity and freedom of the will, and provides a deeper understanding of the issues around human classification, notably by sex and gender and by race.

RESUMEN: En este artículo discuto la ontología de procesos que ha constituido el foco central de mi investigación durante casi 20 años. Explico en qué consiste e ilustro cómo se aplica a la biología a través del ejemplo del organismo. También me propongo mostrar cómo la ontología de procesos encaja de forma natural con el mundo desordenado descrito en el artículo que precede a este. Finalmente, muestro cómo la ontología de procesos ilumina una serie de cuestiones relacionadas con la condición humana, incluyendo la identidad personal y el libre albedrío, y proporciona una comprensión más profunda del problema de las clasificaciones humanas, en particular por sexo y género y por raza.

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1. Introduction

In the last lecture (Dupré 2025b) I described some of the thinking that led me to see the world as largely disordered, a world in which the perfect order sometimes assumed by philosophers was, far from being omnipresent, a rare and fragile thing. Aspects of partial order made possible a variety of different ways of categorising, these categorisations themselves being ways of imposing order. I also explored some of the more value-related implications of this view.

My general assumption at this point was that this view of the world was simply an empirical one; it was what careful observation and our best science showed to be the case. It neither included nor required any deeper explanation of why it was like that. It just was. However, for a period now approaching 20 years I have been drawn to a more systematic understanding of the chaotic universe.¹ I believe that the reason that the disordered, chaotic universe seems so counterintuitive to many is that we are committed to a fundamentally misguided metaphysics. Whereas the world view I have been criticizing —what I sometimes call, abusively, the billiard ball view— assumes a world of discrete and autonomous things, I now see the world as composed solely of processes. While the things in the billiard ball world are autonomous, have reasonably clear boundaries, and generally possess essential properties that make them the kinds of things they are, none of this is true of processes. A process is always only partially and temporarily stable, as its stability depends on activity that sustains it. In fact, I define a process as requiring change for its continued existence.

A world of process, then, is a world of constant change. In the words attributed in antiquity to Heraclitus, 'Everything Flows'. Much of this process, like the swirls of air in the wind or the Brownian motion of particles in a fluid is directionless and chaotic. The challenge for a process philosopher is to explain the appearance of coherent and persistent patterns in this flow that has led so many philosophers to propose a world of things. The starting point for my processualism comes from the observation that such explanations are what a large part of biology is concerned with.

My main concern has always been with the life sciences, and they will be my focus today. However, I shall say just a few words about physics. Although everyone knows that the real world described by contemporary physics is nothing like the billiard ball world perhaps imagined by Laplace, the deterministic world, entirely determined by the exceptionless laws of microphysics still has many adherents among philosophers.

About microphysics, I shall say only that the idea of billiard ball-like atoms is far behind us. Nowadays the fundamental constituents of reality are seen as waves, multi-dimensional strings, and suchlike. These strike me, and some I talk to more expert in physics, as much more process-like than thing-like. But for reasons of both space and competence, I won't pursue that debate. If I am wrong, then the fundamental nature of stuff is very different from the parts of the universe I am more directly concerned with. Fortunately, however, this won't greatly alter much of what I want to say about biology. But perhaps more immediately relevant than microphysics is cosmology. Current orthodoxy is that the universe began with a bang.² Of course there are worries about what happened before this. Perhaps there has been an infinite cycling of similar universes. But here, fortunately, we are at a level of speculation beyond the pay grade of a mere philosopher, and I leave that to the physicists. After the big bang, at any rate, we are told of an inconceivably short period of time of almost complete chaos, and eventually, after a long stretch of around one ten thousandth of a second stable items such as protons and neutrons begin to emerge. After a few 100,000 years some of these captured electrons and

¹ I first attempted to articulate a process view of biology in my Spinoza Lectures at the University of Amsterdam, published as Dupré 2008. More recent elaborations can be found in a number of essays in Dupré and Nicholson (2018), especially the extended introduction, and in Dupré (2025a).

² See https://en.wikipedia.org/wiki/Timeline_of_the_early_universe. I do not rest anything on the details of the current story. For example, the theory of inflation, which claims that the early universe expanded by a factor of the order of 10^{26} over a time of the order of 10^{-33} to 10^{-32} seconds, is not easy to take seriously for the outsider to cosmology, or anyhow for me. That the history of the universe was a process during which various entities at many different spatial and temporal scales gradually emerged and stabilised seems much less controversial, and is sufficient for present purposes.

formed the atoms we know today. Within a couple of million years the gravitational attractions between these atoms had led to the formation of the first stars. And so on.

My point in referring to this story is just to note that it is a story of emergence of more or less stable entities from chaotic and formless processes. Some atoms have expected life spans exceeding the expected duration of the universe, and are, therefore as stable as it gets. Stars have life cycles, though these last for billions of years. From our point of view they are pretty stable most of the time, but of course this stability is a mark of the vast quantity of energy, ultimately exhausted, that maintains them in the state we now know them. But nothing is absolutely stable, and no thing has existed for ever. Biological evolution, though, certainly generating vastly more complex structures than any that preceded it, is very much of a piece with this story of the self-assembly of more complex forms from processes in which no such forms existed. The question of how a set of eternal things governed by precise and universal laws, might eventually have led inexorably from pure chaos to the structures we find today is probably best answered by appeal to an omnipotent creator. But fortunately for those who struggle to imagine such a creator, this is not a question we have to answer in the world of process.

2. Organisms

My view of this unifying picture of the universe did not start from cosmology, however, but from biology, so that is where I shall now turn. The natural place to start in biology is with the organism. Though it is not at all easy to define an organism, more people are confident, to borrow a phrase famously used by a US judge to describe pornography, that they know one when they see one. If you are standing by an impressive tree, or there is an elephant in the room, it seems easy enough to identify the organism. On the other hand, it is easy to show that things are not so simple. Suppose you are standing instead, by a famous grove of quaking aspens known as Pando. Pando is, according to Wikipedia, "the world's largest tree ... A male clonal organism, Pando has an estimated 47,000 stems that appear as individual trees, but are connected by a root system that spans 106 acres". If I dig one of these stems up and plant it in my garden am I the proud owner of a tiny fraction of a tree in Utah, or has it now become a new organism?

I'll return to the question of defining organisms, but first I want to move to a more abstract level, metaphysics. Assume I am confident that the elephant in my room is an organism. What kind of an entity is an organism? The traditional philosophical answer, dating from Aristotle, is a substance. Unfortunately this is a technical term with several different meanings, but a rough more familiar equivalent is a thing —the word I shall generally use. What is a thing, in this philosophical sense?

All things but the very smallest are made of other things, ultimately molecules and atoms, themselves made of elementary particles. A thing typically has clear boundaries, and its existence is not dependent on other things; it is autonomous. Things do, of course, sometimes change, so one question that has been important in the metaphysical theory of things is what changes are consistent with the continued existence of a thing. The general answer to this, which again stems from Aristotle is that things have properties that divide between the essential and the accidental. Accidental properties may change, but for the thing to persist it must retain its essential property or properties. The essential property is what makes the thing it is, in John Locke's words, "the being of anything whereby it is what it is".³

Note that while I have been talking about individual essences, not the essences of a kind that I criticised extensively in my earlier work, these are closely connected. In fact what makes the thing the thing it is generally equated with what makes it the kind of thing it is. For the individual essence of Dumbo is generally assumed to be the property of being an elephant, which is to say, the possession of the essential property of elephants. As discussed in my last lecture, I do not believe there are any such essences of biological kinds, so here is a problem for the substantialist, or thing theorist. A natural response might be to appeal to the (often) unique genetic sequence of the individual. There are many prob-

³ Locke (1689/1975), bk. III, chap. 3, sec. 15, p. 417.

lems with this idea, which I won't go into detail on here.⁴ I will only note the curious consequence that if you have a monozygotic (i.e. identical) twin, you only become a separate entity from the twin when your genome first mutates in a unique way. Only through change, therefore, do you become an individual. But other problems with the substantialist view of the organism are clearer, and to these I now turn.

While an organism may look stable, autonomous and sharp-boundaried, we now know well that none of this is the case. First, we know that the stable form of an organism, a dog or an oak tree, is not just a default condition, but is maintained by trillions of chemical and physiological events happening every second inside it, the processes we call metabolism. I mentioned above that I like to define a process as an entity requiring change for it to persist. This is obviously true for a chaotic process such as Brownian motion, which just is movement, but it is equally true for the dog or the tree. Though the changes that sustain it may not be obvious, they are certainly real. An unchanging dog is a dead dog —though in truth a dog does not cease to undergo change when it dies, it merely moves from life-sustaining activity to the processes of decay.⁵

Second, organisms have life cycles. To take one familiar example, the life cycle of a beetle contains periods of time as an egg, a larva, devoted to eating, a pupa only metamorphosing, and an imago, or adult, mainly concerned with mating. These stages of the life cycle take on drastically different structures. Is a beetle egg a beetle? As a semantic question I assume little turns on this. But what is surely true is that it is the same organism as the beetle it later becomes (if it's lucky). If a thing is distinguished as a particular structure of its more fundamental elements, as traditional substantialism assumes, it is very hard to believe that an egg and a beetle could be the same *thing*. But of course they are stages in the same process.

Finally, and I think most importantly, organisms are not autonomous because, as we have increasingly come to understand, symbiosis is everywhere. We have all heard that 50% or more of the cells in our bodies are bacterial; and we are increasingly told of the benefits that we gain from having the right symbiotic microbes. As we become increasingly aware of the extent to which such symbionts are essential for our well-being, several philosophers are questioning whether these should not be thought of as mere collaborators in our lives, but as real parts of us (e.g., Triviño and Suárez 2020). Harking back to a term generally attributed to the great champion of symbiosis, Lynn Margulis,⁶ they suggest we are really holobionts, composite organisms deriving from many evolutionary lineages. In further support of such a view it is beginning to appear that even viruses, which outnumber the cells in our bodies by a factor of ten, far from being potential enemies held in check by our ever-vigilant immune systems, may play essential roles in the symbiotic whole (Dupré and Güttinger 2016). Some protect against genuinely pathological agents; others store DNA that may be needed by our bacterial symbionts; and, most importantly, they may regulate the numbers of these bacteria.

I don't want to enter here into the debates about whether the organism is the holobiont. The important point for present purposes is just the difficulty of seeing a clear answer to this question. If we are interested in the totality of processes that promote the stability and survival of the human, then it is hard to see what sense there could be in excluding these vital parts of the total system. On the other hand, there is a plausible argument that for evolutionary purposes we may need to consider the discrete lineage that constitutes human cells, and that may share little of their history with many of their symbiotic partners. Echoing the promiscuous realism that I advocated in my earlier career, I have more recently proposed a *promiscuous individualism*. This is the idea that there may be no unique optimal way of carving individuals from the deeply entangled processes of life; only the best way of doing so for specific purposes.

This reflects a more general point about the entanglement of processes. Two entities interacting in such an intimate way that it is unclear whether there is one entity or two is a situation very hard to make sense of in a world of autono-

⁴ But see Dupré (2010).

⁵ One might wonder, I suppose, whether a dead dog was a dog. Happily, this is very much a problem for the substantialist, for whom the existence of a thing is expected to have sharp boundaries both spatially and temporally. For the processualist, such boundaries need be drawn only if and when they are required.

⁶ But incorrectly so, according to Baedke *et al.* (2020) who trace the term to the German theoretical biologist Adolf Meyer-Abich in the 1940s.

mous, hard-boundaried things. Think, for instance, of a relatively simple symbiotic system, such as a lichen. This is a functional whole composed of a fungus and a population of photosynthetic microbes.⁷ Is this one thing, two things, or many things? Sometimes the interacting partners can survive on their own, sometimes not; but the particular mode of existence of the lichen is quite distinct from that of its constituents even when they have one. Individual processes, recall, are not typically autonomous, since dependent on interactions with their environments for their persistence, and seldom have sharp boundaries. There is no problem at all in thinking of the lichen as a living process within which constituent living processes may be identified as distinct individuals as we wish.

It should now be possible to see why a pluralistic metaphysics and epistemology fits so naturally with a process metaphysics. Pluralism is grounded in the observation that there is no unique way of dividing the world into kinds, and different projects of enquiry may call for different taxonomies. A simple way of understanding this is just to note that, at least in biology, every individual is different from every other and attention to different properties will distinguish different sets of items. The kinds distinguished are not unreal —hence the realism in my promiscuous realism— but they are not unique. Appreciation of the processual and entangled nature of biological individuals adds another dimension to this pluralism, what I have referred to as promiscuous individualism. The way we distinguish individuals from the complex and interconnected flow of biological process is also determined by the questions we are trying to answer or the goals we hope to pursue. If we are interested in the evolutionary history of a fungus that is sometimes part of a lichen, sometimes not, we will treat populations of fungal cells as the relevant units of analysis, only contingently connected to photosynthetic symbionts at particular times. But if we are interested in the physiology of the lichen, the fungus is merely a part of that whole.

We might think that this last example fits perfectly well with the now standard ontology of things and mechanisms. Things are composed of smaller things, and the interactions between them constitute mechanisms that explain the behaviour of the composite. A lichen, then, is a mechanism composed of fungal and microbial parts. In defence of such an interpretation, it is often remarked that scientists often think of themselves as looking for mechanistic explanations, and this perspective has been highly fruitful. The success of mechanistic thinking is at least something that the processualist had better give some account of.

Fortunately, this is easily done. Mechanism explains biological phenomena, conceived as the behaviour of an entity, as resulting from the behaviour and interactions of the parts of which that entity is composed. Both the entity referred to in the explanandum and the parts in the explanans are conceived of as things. The most famous modern statement of mechanism, the essay "Thinking about Mechanisms", by Peter Machamer, Lindley Darden and Carl Craver (2000) is explicitly ontologically dualist. What I have called "things" they refer to as "entities" and their behaviour and interactions are processes. I prefer to use the word "entity" as ontologically non-committal, but the point is clear enough. For me their entities are stabilised processes. The condition for their mechanistic explanations to be successful, in my view of the matter, is just that the things should be sufficiently stable for the time period over which they contribute to the mechanism (Dupré 2013). This is no doubt highly variable. If we are interested in the mechanism of continental drift, entities such as continents must be stable over many millennia. In the mechanisms of molecular biology sometimes milliseconds are sufficient.

If mechanism is translatable into process language, does the difference between these perspectives matter? Yes. It can matter very much if the theorist loses sight of the temporary nature of the stability of its objects and important dimensions of instability. Sabina Leonelli and I have given a detailed account of how just this treatment of very unstable processes as objects led to serious mistakes in the understanding and consequent policy relating to the Covid-19 pandemic (Dupré and Leonelli 2022).

Viruses, to begin with, are fascinating processes (Dupré and Güttinger 2016). It is tempting to identify the virus with the particles, virions, that we find on door handles and in the air we breathe, but this is quite wrong. The virus has a life

⁷ Unsurprisingly, there are other symbionts involved in at least some lichens (Hodkinson *et al.* 2006), so the simplicity of the system should not be exaggerated.

cycle and the most interesting part of the life cycle is that which occurs after a cell has been infected. During that time, there is actually no individual entity that has a strong claim to be the virus; there is just a sequence of chemical activities in the cell. But more relevant to the pandemic is the epidemiology of a virus and, as we all came to understand during the pandemic, at this time scale viruses evolve rapidly. One problem to which this gave rise was with the naming of virus strains, which often gave people license to think that there was a name for a fixed kind of entity. In fact, this was never more than a phase in the evolution of a particular population; different names were given to relatively similar entities, and the same name was sometimes applied to very different entities.

A second problem concerned the scale at which we think of viral infection. If we were dealing with a homogeneous population of identical objects, this might not matter much. But the heterogeneity turns out to matter a lot. The severity of a viral infection appears often to turn precisely on the diversity of viral genomes, and the proper object of a particular infection is a diverse population, sometimes referred to as a quasispecies. More diverse populations can evolve more rapidly and thus more effectively evade the immune system. On the other hand if viral mutation is too rapid this may prevent the establishment of a stable infecting population, which has led to the investigation of mutagenic agents as possible therapies for viral infections.

All this raises a vital epistemological or methodological problem of maintaining the connection between changes in the phenomena and changes in the representations that attempt to track the phenomena. Both of these involve what we called reifications,⁸ treating a phase of a process as a fixed entity, and reifications are essential for the scientific investigation of phenomena. But enabling the theoretical reifications to track the phenomenal reifications is a very difficult problem. Frequently the pandemic was described in terms that no longer adequately tracked the phenomena, and this led to problems in naming, as just mentioned, in testing, in monitoring infection rates, and in developing therapies and vaccines. In scientific management of such a rapidly changing process it is essential to develop methodologies that are firmly grounded in awareness of the dynamic character of the phenomena.

So far I have been concerned with arguing that process ontology better describes our scientific understanding and can lead to better science and science-based policy. But the implications extend beyond this. Humans are, of course, organisms, and I have been especially interested in recent years in exploring some of the implications of processualism for particular problems of human life, and it is to these that I now turn.⁹

3. Personal Identity

Let me start with a very traditional philosophical problem, that of personal identity. As most of you will know, this is the problem of understanding what it is for a person to persist over time. In what sense am I now the same person as the child who grew up in England in the middle of the last century? The problem is often set up with a problem such as John Locke's story of the prince and the cobbler (or shoemaker). These two people, according to the story, wake up one day each with all the memories and thoughts of the other. The story indicates the tension between two views of the problem. One that has much immediate appeal is that my continued identity is a mental matter; I have a continuous series of interconnected memories stretching into my distant past. On this view the prince now resides in the body of the cobbler, and vice versa. On a more materialistic view, both have undergone some bizarre psychological break.

The problem with the mentalistic view of personality is that it seems to assume a mind-body dualism that many now find incredible. The mind of the prince seems to be entirely detachable from his body and, therefore, presumably, something immaterial. Such a view lives on in the rather bizarre idea that we might perhaps survive forever in a computer

⁸ In Dupré and Leonelli (2022), we referred to the former as target reifications and the latter as means reifications.

⁹ The implications of seeing humans as processes are considered in more detail in Dupré 2025a.

programme, but for the more materialistically inclined, including myself, the mental is a feature of the organism, and not so easily detached. It is worth remarking that in the case Locke describes, a cobbler who wakes up and declares he is a prince is generally considered to have gone mad, and is probably in considerable danger for his life; safer to say he is Napoleon or Jesus Christ. The prince who has gone mad can probably expect more sympathetic treatment. It is important to recognise that it is only the simultaneity of these sudden onsets of insanity as the story is told that makes the mind exchange interpretation immediately plausible.

Increasingly over recent years, it has become more popular to accept the materialistic answer to the question, and personal identity has been associated with a spatio-temporally continuous body. A natural development of this idea has been to say that the identity of a person is just the identity over time of a particular (human) animal. This idea runs into problems, however, with the traditional view that an animal is a kind of thing. For the identity of a thing requires the continuity of certain properties, some of which are essential for that continuity. But the animal was once a zygote, a fertilised egg. I doubt whether I have many properties in common with a fertilized egg. The solution, of course, is to recognise that the animal is a process. Its continuity inheres in the causal connections between its temporal stages, not in any conserved essential property. Just as one stage of the organism *Rana temporaria*, the Common Frog, is a tadpole, but a tadpole is not a frog, so some part the life cycle of *Homo sapiens* is, or may be, a person.

This is important, because there are things we do, such as scientific research on embryos, that we would find quite inappropriate to do to a person. In the context of standard metaphysics this has led to some truly bizarre argumentation. The current policy in the UK is that it is permissible to experiment on human embryos until they are 14 days old. A common justification for this is that is the latest stage at which twinning can occur, when the embryo may divide into two parts, both of which may develop into human persons. If we considered the human life to have begun before this we have a potential contradiction: both twins would have been identical to the same embryo and, therefore, as identity is transitive (if A = B, and B = C, then A = C), to one another. But they aren't.

If the proposal that the point at which I began depends on an unrealised possibility seems odd, it is because it is. Fortunately, all of this trouble goes away when we move to a process ontology. Many processes divide: rivers, cells, species, political parties and much else. Identity of processes is certainly not transitive, or all life on earth would belong to the same species. How we name parts of a bifurcating process is a matter of convention rather than metaphysical fact. I am the same animal as my originating zygote, but no more the same person than I am the same adult: a zygote is neither a person nor an adult. The decision to designate part of the human life cycle as a person is a conventional decision based on whatever purposes we have in mind as attaching to that designation. And as I have already mentioned, distinguishing individual organisms from the flux of life is always partly conventional. The claim that Pando is one tree is exactly parallel to the argument that homozygotic, or identical, twins are one organism; thankfully, we have no overwhelming reason to adopt the latter —or for that matter the former— convention.

The process perspective, incidentally, has further interesting implications for the metaphysics of mammalian pregnancy.¹⁰ This, it seems to me, is a paradigmatic instance of process bifurcation. There are interesting stages in this bifurcation that we may find relevant for various conceptual decisions. The process of a human life surely begins at fertilisation of the egg, though most such events do not lead a lot further. Implantation is important at least in marking a great increase in the probability of continuation of the process. Viability of the foetus is important in providing more options for the continuation of the life cycle, outside the mother's body. And birth is important in providing a massive reduction in the interdependence of the mother and child, though surely not a total one unless we equate interdependence with necessary interdependence. This perspective gives us much more tractable, though no doubt still difficult, approaches to questions about abortion, foetal and maternal rights and much else including embryo research.

¹⁰ For a detailed elaboration of a processual view of pregnancy, see Meincke (2022).

4. Human development and classification

Another set of questions for which a process perspective is transformative are those arising in the often highly controversial classification of humans, a topic I discussed in the previous article. A deeper understanding of the difficulties faced by human classification comes from the recognition that humans are not things with essences but developmental processes, and developmental processes with huge sensitivity to both external and internal influences. This results in a great diversity of properties among adult humans. I say adult humans, because the diversity develops as the process continues.

A perhaps surprising thinker to recognise this point clearly, one of the most misunderstood of philosophers, was Adam Smith. Smith is, of course, famous for his emphasis on what is undoubtedly a crucial feature of the human species, the division of labour. Especially among right wing enthusiasts for his work, this is often connected with differences in innate ability, taken to justify differences in status and wealth. But as Smith writes in *The Wealth of Nations*:

The difference of natural talents in different men, is ... much less than we are aware of; and the very different genius which appears to distinguish men of different professions ... is not ... so much the cause, as the effect of the division of labour. The difference between ... a philosopher and a common street porter, for example, seems to arise not so much from nature, as from habit, custom, and education. ... [F]or the first six or eight years of their existence, they were, perhaps, very much alike ... About that age ... they come to be employed in very different occupations. The difference of talents ... widens by degrees, till at last the vanity of the philosopher is willing to acknowledge scarce any resemblance. (Smith 1776, bk. 1, ch. 2, para 4.)

The point has very wide applications to human kinds. Generally we should look for an understanding of the differences between humans of different kinds in the diversity of developmental histories, much of which is due to different environmental conditions. This insight provides a deeper understanding of the complexities of sex and gender and of race that I discussed in the previous paper, and I shall now briefly return to these.

I mentioned in my last paper that we should see sex and gender classifications as the outcomes of a complex and multicausal developmental process, and I hope in this paper to have made the grounding of this claim clearer. The core biological distinction of production of gametes of different sizes, as well as other biological distinctions based on physiology, genes or hormones all generate their own, sometimes divergent classifications, and social factors add another level of complexity. The diversity of relevant kinds of people is well-captured by the ever-growing acronym, LGBTIQA+. I think it is helpful to follow feminist biologist Anne Fausto-Sterling (2012) in attributing to people a sex/gender rather than either a sex or a gender tout court. This leaves us open, in our more careful talk, to use strictly sex-referring terms, male and female, in the sense recommended by Paul Griffiths (2021), to refer to a property of some organisms at particular stages of their life cycles, as they produce gametes of a particular size. I say "our more careful talk"; I assume we can still use the words male and female to refer to the primary way most —but not all— people choose to present themselves, but the more technical usage reminds us that these terms group together a great variety of developmental outcomes. Any fine-grained classification of sex/gender is difficult, variable and imprecise. And we should, as I stressed in the previous paper, always be prepared to ask exactly why it is necessary or important to classify people at all.

A final look at the concept of race requires me to digress a little and introduce more explicitly another concept that is central to a processual biology, that of lineage. For race is not an essential property of individuals but, if anything, a group level characteristic of the human species as a whole, a division of the human lineage into sublineages. A lineage is an ancestral/descendant sequence of populations, connected to one another, and more or less separated from other populations. It may be a very long-lasting process, stabilised by natural selection but also by sexual reproduction, which connects the individual members of a lineage and enforces boundaries between lineages, and in some cases by cooperation between the organisms that make up the populations. Lineages are now the vital context in which most evolution takes place. They are not, however, essential for evolution, at least in the form we now know them; indeed they are themselves evolved and evolving processes. Sexual reproduction, which provides the boundaries for many of the most successful currently existing lineages, is something that evolved. Similarly cooperation, the feature that does most to explain the great success of our own species, is a variable feature of lineages, largely absent from many or most.¹¹

Lineages, I have said, are processes —like organisms, structures more or less stabilised within the flow of life. Philosophers of biology will be reminded of the once shocking and controversial claim by David Hull and evolutionary biologist Michael Ghiselin, that species, assumed to be lineages, branches of the tree of life, were individuals. The shocking nature of this claim, I suggest, derived from the assumption that this consigned species to the category of thing, and in many ways this seemed bizarre.

But the realisation that they are processes that can persist over long periods of time, removes much of this concern. It also has great positive benefits. It is no surprise that, as processes, lineages should lack clear boundaries and require pragmatic and partly conventional decisions as to how they are distinguished within the general flow of biological reproduction and change. We now know that hybridisation is extremely common between related species, and all kinds of temporarily more or less isolated currents can exist within them. Debates between so-called lumpers and splitters on the correct fineness of grain of our classifications are generally questions of pragmatics rather than debates about the nature of reality.¹²

And so finally back to race. The human species is very numerous and widely spread geographically. Though genetically remarkably homogeneous, it is phenotypically and culturally diverse. There are barriers within it such as oceans and mountain ranges, as well as distinct cultures, more or less impermeable to one another. Inevitably this implies many transitory subcurrents within the overall evolutionary —broadly construed to include cultural as well as biological factors— trajectory of the whole. As noted in the preceding paper, some superficial features, notably skin colour, change rapidly in response to environmental conditions, and such features can provide easily applied markers for temporary human currents. But crucially, it is also a species that is genetically surprisingly homogeneous, and highly migratory. Migrating humans cross oceans and climb mountains. Human groups adopt cultural innovations from other groups with which they interact.

So within the turbulent flow of the human lineage it is possible, if we wish, to pick out countless temporary subcurrents. We distinguish one another by religion, nationality, language, cultural and artistic tradition, and much else besides as well as race. These subcurrents, providing a vast diversity of technologies, arts, philosophies and much else, offer huge potential benefits to the species as a whole. But, as I emphasised in the previous paper, we must always ask of such distinctions what purpose they serve. The trouble with race as a category for distinction, is that these purposes have been almost uniformly malign, an excuse for the exploitation of and expropriation from vast numbers of people. Seeing races as no more than temporary eddies within the flow of human change undermines any possible biological justification for these ills. And, as I noted in the last paper, the apparent stability of these eddies is largely explained precisely by the malign purposes to which they are put, racism.

It is sometimes assumed that this kind of denial of sharp boundaries between kinds is a kind of antirealism about distinctions. But the point is not that there are no boundaries, but there are many, and these are complexly nested and cross-cutting.¹³ We can find real distinctions between kinds of people, but these are not distinctions between different kinds of thing, demarcated by their unique essences, but one of many ways of dividing people into different categories for particular purposes. The real question to ask about both sex/gender and race distinctions is what exactly these purposes are. Often the answer to this question is distinctly unedifying.

¹¹ Cooperation, together with massive diversity of developmental trajectories, is what makes possible the division of labour that, in turn, enables the vastly complex societies in which we live. I would love to say more here about the absurdity of the frequent attempts to ground in biology the competitive individualism that has so disastrously dominated so much recent social and political thought, but limits of space dictate that I leave that for another time and place. The topic is discussed, still too briefly, in Dupré 2025a.

¹² Lineages as processes are discussed in detail in Dupré 2025a, chap. 2.

¹³ The "realism" in "promiscuous realism" is intended to be taken seriously.

5. Free Will

Let me mention one final topic to which I think the metaphysical perspective I advocate is relevant, the freedom of the will. Philosophical orthodoxy sees humans as complex machines, parts of a deterministic world. Compatibilists reassure us that we still have as much freedom as we have any reason to expect or want. Many are understandably unconvinced, but if the alternatives are either to see ourselves as unique exceptions to an otherwise seamless web of causality, or as random action generators, we are probably better off with the consolations of deterministic compatibilism.

If, however, as I argue, the world is one of open-ended processes providing pockets of partial order in a generally disordered world, a robust concept of freedom does not require that we see ourselves as exceptions of kind to the rest of the natural order. Freedom as autonomous self-direction remains a tricky concept to articulate properly, but it is not hopeless in the way that it is in the context of the deterministic billiard ball world.

I can only summarise the way this goes in the present paper.¹⁴ Much discussion of human action still begins with the assumption that freedom requires no more than that we act to pursue what we want most in the light of what we believe will best achieve those ends. This is how the machine ideally works; unfreedom comes when we are prevented from acting in this personal utility-maximising way by external interventions of various kinds.

I object that when I lie in bed knowing that I need to work on my Lullius lectures, it may well be that what I want to do most is to go back to sleep, and I believe I can do this if I turn off the alarm. Nonetheless, I get out of bed and get to work. Freedom, I suggest, is precisely the ability *not* to do what I want to do most at the moment, but rather to pursue longer term goals that ultimately shape the world around me in ways that I choose. This is not a particularly novel perspective; it is perhaps a very soft version of Kant's austere vision of freedom as duty. What the metaphysics of disorder and process contributes is just to deprive such a story of philosophical mystery. The disordered world offers many affordances of many different kinds for the partial creation of order, and plans, principles or long term goals are all ways of engaging such affordances.

I must add that the question can, of course, be pushed further back. Commitments and principles of action allow me to —no doubt very slightly— shape the world rather than merely allowing it to shape me. But where do my commitments and principles come from? Much that shapes the process that I am —my upbringing, education and culture, for example— is largely a matter of luck. Perhaps there is some individual reflection on who I want to be for which I can claim more credit. But for now, I will only say that freedom, like explanation, has to stop somewhere. We are not self-creating pure wills, but parts of a complex and deeply interconnected lineage. The possibilities for autonomous action within that bigger context is really all the freedom that is worth having.

6. Conclusion

I end these papers (Dupré 2025b and this) with two very general reflections. First, I have heard friends and colleagues express amazement that, having spent half my philosophical career defending pluralism against reductive monism —there are only physical particles and structures of those— I now seem to have embraced a radical metaphysical monism: there is only process. I do not see this as particularly strange. I am a pluralist about the structures that emerge in our world, with their novel and distinctive properties and capacities. But metaphysically there is surely only one world. Of course, one world might contain both substances and processes, and perhaps other entities besides. But this is a quite different question from the pluralism at the level of the empirical world. Moreover, and this is the main point, the metaphysical monism of process precisely explains the empirical pluralism. That is something I have tried to show in the present work.

¹⁴ The argument is presented in more detail in Dupré 2025a, ch. 6.

Finally, is there anything to be said about why the world is, if it is, the kind of world I have tried to describe. I have remarked that cosmologists now largely agree that the universe began with complete chaos. Gradually, over billions of years and across vastly different time scales, pockets of order emerged, from inconceivably minute particles to immense galaxies. But why was the original chaos disposed to settle, here and there, into these stable forms.

David Hume offered part of the answer in a lovely passage from the *Dialogues concerning Natural Religion*:

Suppose ... that matter were thrown into any position, by a blind, unguided force; ... this first position must, in all probability, be the most confused and most disorderly imaginable ... [S]uppose that the actuating force, whatever it be, still continues in matter, this first position will immediately give place to a second, which will likewise in all probability be as disorderly as the first, and so on through many successions of changes and revolutions. No particular order or position ever continues a moment unaltered. ... Every possible situation is produced, and instantly destroyed. ...

Thus the universe goes on for many ages in a continued succession of chaos and disorder. But is it not possible that it may settle at last ... so as to preserve an uniformity of appearance, amidst the continual motion and fluctuation of its parts? This we find to be the case with the universe at present. Every individual is perpetually changing, and every part of every individual; and yet the whole remains, in appearance, the same. ... [T]his adjustment, if attained by matter of a seeming stability in the forms, with a real and perpetual revolution or motion of parts, affords a plausible, if not a true solution of the difficulty. [Hume (1779/1947), pt. 8, paras. 8-9.]

This survival of the stable is the powerful tautology at the heart of Darwin's theory of natural selection, articulated into a detailed empirical theory by almost two centuries of subsequent scientific work. And surely a similar account can be given of the earlier emergence of physical structures that cosmologists and theoretical physicists have described more recently.

There is, of course, still a further question we may want to ask. Why should this matter first thrown into its "confused and most disorderly imaginable" position have the capacity to form itself into the exquisite structures we see today? Why for instance should the particles of matter attract one another to form the stars and planets our universe contains? Far more remarkably, why should the particles have the ability to come together to produce objects with the extraordinary properties of water or of carbon atoms that seem so remarkably designed to contribute to living metabolism? This, I think, is the last resting place for natural theology: if some omnipotent being had lit the fuse that set off the big bang, surely She might have imbued its matter with just such properties as to make the emergence of complex structure possible.

Sadly or otherwise, as Hume so powerfully argues in the Dialogues, this is a woefully inadequate abductive argument for a creator, let alone any particular kind of creator. Philo, the character most closely reflecting Hume himself in the Dialogues, has no trouble rattling off equally improbable hypotheses. This really is where, at least for now, explanation has to stop or, in Hume's words: "A total suspense of judgement is here our only reasonable resource".

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