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**STORIES  
ABOUT BODIES**  
COMPLEXITY THEORY, ENERGY  
AND THE EMERGENCE OF ETHICS

*John Daniels*

**TEMPLE ETHICAL FUTURES**



**Stories About Bodies:  
Complexity Theory, Energy and  
the Emergence of Ethics**

**John Daniels**

*Temple Ethical Futures: Book 3*

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# Introduction: A story about stories about bodies - reframing ethics

*Jerusalem, c. 30 AD.* A beggar sits at a roadside. His body is a marked in a particular way: he is blind, and always has been. This particular body, and its particular condition, are about to have three different, incompatible stories told about them. Each story will reflect a different ethical value and lead to different actions.<sup>1</sup>

According to the first story, the man's condition is evidence of sin. Whose sin is not clear, but the upshot is the same. The passer-by can walk on with a clear conscience. No action is the right action.

According to the second story, the man's condition does not represent judgment but rather opportunity: God's opportunity to show what God can do. So, one passer-by acts by transforming the man's condition.

According to the third story, the man's transformed condition and his response to it are evidence of sin. The right action involves excommunication, his ejection from respectable society.

*London, March 2020 AD.* A group of scientists publishes a report entitled *Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and health-care demand.*<sup>2</sup> It too tells a story about bodies. According to this story, a recently

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<sup>1</sup> John 9.

<sup>2</sup> <https://www.imperial.ac.uk/mrc-global-infectious-disease-analysis/covid-19/report-9-impact-of-npis-on-covid-19/>

discovered body—a virus—if unchecked, will infect the bodies of most UK citizens and go on to kill more than half a million of them. It tells how, if government persists with existing policy, a quarter of a million will die and hospital services will be completely overwhelmed. As a result of this story, government actions change and, unprecedentedly, much of British society and its economy are shut down for several weeks.

Stories are powerful things. They can make a big difference. But where do they come from, these stories that give shape to our lives, which lead to our acting this way rather than that?

In this tract I want to present ethics as an outworking of the stories we tell about bodies, stories about ourselves and the world. Bodies have a life of their own of course, which they would get on with even if no-one ever told any stories about them. But telling stories about them issues in changes to the way bodies interact: the bodies of those acting, the bodies of those being acted on, the bodies of those unable to tell stories. And, as these examples show, different stories can lead to very different actions.

Yet, for all the power of stories, I want to propose that every story told also depends on the prior interaction of bodies. To do this I will be drawing on complexity theory, which studies the way order can emerge spontaneously from apparent disorder. I will then take that a step further by considering human societies as assemblages, co-evolving mixtures of different kinds of bodies, out of which emerge cultural artefacts such as ethical values.

Chapter 1 describes the typical features of a complex system, taking its cue, in part, from ecology. Chapter 2 gives an account of ethics as an emergent product of a particular kind of complex system, namely human society. Chapter 3 unpacks a provocative suggestion about how ethical values depend on the amount of energy available to a given society. And Chapter 4 begins to consider what all this means for doing ethics at this point in history.

If stories need complexity then complexity in turn needs energy, and lots of it. More accurately it needs gradients, steep ones at that, down which energy can flow. Physicists talk about three kinds of systems: isolated, with no flows of matter or energy across their boundaries (think the perfect thermos flask); closed, with flows of energy only (think the planet Earth, excepting the odd meteorite and spacecraft); open, with flows of energy and matter (think your own body, or human society). Complexity

can only arise in a non-isolated system which is far from thermodynamic equilibrium, that is, one which is traversed by strong flows of energy and/or matter, which are caused in turn by steep gradients. For example, you would not be reading this now were the Earth not suspended along the temperature gradient existing between the sun's surface (6000 °C) and deep space (-270 °C).

With steep gradients, interesting things can start to happen. Take a simple, everyday example. If you turn on the gas under a saucepan of water, you set up a vertical temperature gradient. To start with, this will cause a modest flow of heat energy via conduction—the transfer of heat between molecules. If you turn up the gas, the temperature gradient grows until a threshold is crossed and large-scale vertical movements of water, convection cells, start to form. Eventually the gradient grows so steep that a further threshold is crossed and the water boils.

The so-called Bénard cells provide a colourful example of the striking forms which can arise during the intermediate convective phase.<sup>3</sup> Set within the random flux of simply heating a fluid we encounter an interval in which structure emerges spontaneously, uncaused by any external agency. As Stanley Salthe has proposed, orderly convection gives us the simplest example of the extraordinary secret which underpins all life: morphogenesis, or order out of chaos.<sup>4</sup>

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<sup>3</sup> Ilya Prigogine and Isabelle Stengers, *Order Out of Chaos: Man's New Dialogue with Nature* (London: Verso, 2017), pp. 142-144; <https://www.youtube.com/watch?v=gSTNxS96fRg>

<sup>4</sup> Stanley Salthe, 'The natural philosophy of work' in *Entropy*, 2007, Vol. 9, pp. 83-99.

# Chapter 1

## Order out of chaos: what nature can teach us

As we saw in the Introduction, a basic requirement of complex systems is that they exist far from thermodynamic equilibrium, as non-isolated systems traversed by strong flows of energy and/or matter. In order to find out what makes the systems which can develop in these situations so special, I want to look at a few examples from the natural world.<sup>1</sup>

### 1.1 The slime mould and the snowflake

Slime moulds are a remarkable example of a living complex system.<sup>2</sup> *Dictyostelium discoideum*, to give it its proper name, exhibits several distinct life stages. Initially, when food is plentiful, it exists as a crowd of countless amoebae, each single-celled creature a rugged individualist, foraging for bacteria on which to feed. But if the availability of bacteria drops below a certain threshold, things change. Thousands of individual amoebae clump together to form ‘slugs’ some 2-4 mm long, which then start to roam the environment as collective entities. Eventually, when food runs

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<sup>1</sup> A concise and accessible introduction to complex systems can be found in Paul Fieguth, *An Introduction to Complex Systems: Society, Ecology and Nonlinear Dynamics* (Cham: Springer, 2017), Ch 3.

<sup>2</sup> Prigogine & Stengers, *Order Out of Chaos*, pp. 156-159.

out, each slug takes root in a particular spot. Its cells then differentiate into three distinct types, each type constituting a distinct part of another transformed entity: a base, a stalk and a spherical fruiting body made up of thousands of spores. A further environmental trigger causes the spores to be released, each one potentially a new amoeba which will start the cycle over again.<sup>3</sup>

The slime mould lifecycle illustrates a number of features characteristic of complex systems. The first is the way their behaviour depends on the strength of flows of matter and energy. In this example food supply is the key trigger, with behaviour changing radically at certain thresholds. Different energy flow regimes enable and sustain particular ways of being and acting. Complex behaviour can only arise in systems which are open to such flows, importing high quality energy (fuel) and exporting low quality energy (waste).

The existence of thresholds, at which ways of being and acting change in discontinuous ways, is a second feature of complex systems. Typically, this also means that changes are irreversible: the sequence is always amoebae – slug – fruiting stalk, never the other way around. The slime mould’s story runs in one direction only. In some complex systems, the particular circumstances prevailing at the start and as the story unfolds impart unique characteristics to the evolving system. This is known as path-dependence and is famously illustrated by the way in which no two snowflakes end up exactly alike: each snowflake’s unique history is imprinted on it as it grows.<sup>4</sup> In Alicia Juarrero’s words:

... unlike the near-equilibrium processes of traditional thermodynamics, complex systems do not forget their initial conditions: they ‘carry their history on their backs’. Their origin constrains their trajectory.<sup>5</sup>

A third feature relates to the fact that the slime mould not only changes behaviour but also changes form at these thresholds, from individual amoebae to a collective slug to the different components of a fruiting stalk. This is an example of self-organisation or morphogenesis, the process by which components interact to spontaneously create or change structure—order out of chaos.

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<sup>3</sup> See for example: <https://www.youtube.com/watch?v=5h8WOWEqP6o>

<sup>4</sup> <https://www.noaa.gov/stories/how-do-snowflakes-form-science-behind-snow>

<sup>5</sup> Alicia Juarrero, *Dynamics in Action: Intentional Behaviour as a Complex System* (London: The MIT Press, 1999), p. 140.

But not only does the slime mould change form during the course of its lifecycle, it also exhibits so-called emergent behaviour, often summed up in the phrase ‘the whole is greater than the sum of its parts’.<sup>6</sup> Strikingly, this is seen when the slug transforms into a stationary fruiting stalk, each individual cell developing one of a set of specialist functions. The fruiting stalk possesses emergent properties which could not possibly have been deduced from examining either the slug or its constituent cells in isolation. New, functional relationships between the pre-existing individual parts generate a new emergent whole.

Paul Fieguth provides the following examples of other emergent phenomena.<sup>7</sup>

Individual units	Emergent collective behaviour
Sand particles, water molecules	Sand dunes, water waves
Ants, bees	Colony ‘intelligence’
Termites	Mound structures
Birds	Complex flocking dynamics
Neurons	Consciousness, self-awareness
Humans	Societies, civilisations

What distinguishes emergence from mere morphogenesis is that it entails some form of hierarchy. Once established, an emergent whole enacts ‘top-down’ control over its parts, shaping the role each plays. Of course, the emergent whole remains the ‘bottom-up’ product of those same parts and their chemical, or other, interactions, but once established the whole acquires an identity and an agency of its own. You could fairly describe it as a higher-level form of life relative to the individual parts which comprise it.

<sup>6</sup> See Philip Clayton and Paul Davies, *The Re-emergence of Emergence* (Oxford: Oxford University Press, 2008).

<sup>7</sup> Fieguth, *An Introduction to Complex Systems*, p. 257.

## 1.2 The bladderwort, the algae and the water fleas

To examine the process of emergence further I will summarise an example provided by ecologist Robert E. Ulanowicz.<sup>8</sup> This involves dipping our toes into a subtropical freshwater lake, where we find three actors whose cooperation shows that the whole really can be greater than the sum of the parts. First, the bladderwort, an insectivorous plant anchored to the lake floor. Second, the microscopic water flea, one of the species on which the bladderwort feeds. Third, the blue-green algae, which exploit the bladderwort's leaves as a growth substrate, and on which the water fleas graze.<sup>9</sup> In this simple ecosystem, each component has its own individual identity and acts as an agent in its own right. In principle, each can live quite independently of the others. But, together, they can also form a new, emergent structure which works as follows.

The fleas are drawn to the bladderwort because it hosts the algae on which the fleas graze. Whilst in the vicinity of the bladderwort they can easily end up getting sucked into one of its bladders and consumed. This promotes the growth of the plant, which in turn means more plant surface for the algae to colonise, which in turn means more algae, which in turn means more water fleas, and so on.

This is an example of a positive feedback, or autocatalytic, loop. Such mutualism, as it is sometimes called, is commonplace in complex systems and basic to the process of morphogenesis, the occurrence of new, higher-order structures. In an ecosystem such as the one just described a particular autocatalytic structure can become so well established that, in a sense, it can be regarded as an emergent entity in its own right. This is shown by the way in which the structure can survive the change of one or more of its components. Imagine a new insectivorous plant species appears, functionally similar to the bladderwort but with a more elaborate, crenulated surface such that the new plant species can host a greater density of algae. The same autocatalytic process will mean that it will tend to out-compete the bladderwort by attracting more fleas. Eventually the bladderwort might die out through lack of food; but the three-fold structure would survive, albeit with different components.

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<sup>8</sup> Robert E. Ulanowicz, *Ecology, the Ascendent Perspective* (Chichester: Columbia University Press, 1997).

<sup>9</sup> More accurately, the fleas feed on a film comprising algae, bacteria and diatoms.

An emergent structure might even come to dominate an ecosystem such that many other, less competitive components (plants and microfauna) decline and eventually disappear because they are not included in the dominant flow circuits. Ulanowicz stresses how such a well-developed system can be both highly efficient and highly vulnerable to external shocks because of the loss of species diversity. For comparison, just think of a small community where Tesco, which has already driven all the smaller shops out of business, decides to close.

### 1.3 The virus and the humans

The humble slime mould, along with the bladderwort – algae – water flea system, can get us a long way to understanding what makes for a complex system. But there is one further key characteristic which is crucial to understanding complexity in general.

Whereas each of the above examples is drawn from a single field—biology, biochemistry or ecology—complex systems in the fullest sense are systems of systems. That is to say, they are made up of interacting components which are different in kind, each of which may well be a miniature system in its own right.

An excellent example of this is provided by the COVID-19 pandemic. To understand why this is we need to think in terms of flows. We have already noticed how fundamental flows of energy are in conditioning complex systems. These, in turn, cause other things to flow together and to interact in various ways.

Let us start with a biological system: our physical bodies. We usually treat them as solid items, and yet they would be mere corpses without the flows that are essential for life and health: the oxygen entering our lungs and the carbon dioxide exhaled; the blood coursing around our bodies, supplying that oxygen and nutrients to its parts, and removing wastes; the electrical currents which constitute our brain function, impossible without differences of electrical potential; the selective flows of molecules and ions across the semipermeable membranes surrounding all living cells.

Social systems, too, only exist because of flows: flows of people, of information, of money, of things that people buy and sell. Just like our physical environment and our own bodies, societies only exist as living things because of these flows. Stop the

blood flow to an organ for just a minute, and the result can be permanent damage. Stop the flows that sustain society, and the results can, in their own ways, be just as lethal. Things do not necessarily spring back to life again once the flows are restored.

Because economies—flows of money, people, goods and services—across the world were deliberately closed down in response to COVID-19, lasting damage has been done to aspects of these societies. That small independent retailer which has gone bankrupt is not going to spontaneously re-open once restrictions are lifted; it is likely that it is gone for good. And the tax that it generated which went back to the government will have stopped flowing too.

Why did this wholesale and deadly shut-down of flows happen? Because they were interrupted by another kind of flow, invisible to the naked eye, which started in China towards the end of 2019. The virus SARS-CoV-2 probably originated in a bat, flowed on through animals kept in inhumane conditions in an urban market, and into the human population, thanks in turn to the huge flows of human bodies transported daily across the world in aircraft. Because of the human response to this microbial flow, those planes stopped flying for a time—a striking example of negative feedback. Consequently, with far fewer people burning fossil fuels in planes, cars, lorries and factories, flows of greenhouse gases into the atmosphere dropped dramatically—again, for a time.

So, we see in this example a bringing together of different kinds of flow: the microbial, the cultural, the economic, the political, the geophysical and the “everyday”. In their book *A Thousand Plateaus*, Gilles Deleuze and Félix Guattari call this bringing together an assemblage.<sup>10</sup> Notice how an assemblage is irreducibly heterogeneous: you cannot express all these different kinds of factors in a single common currency. Rather, mixed together, they generate a complex, emergent set of outcomes—some good, some bad. What happens next will be shaped by the history of what has already happened, as we noted above, but that does not mean that it can be predicted in advance.

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<sup>10</sup> Gilles Deleuze and Félix Guattari, *A Thousand Plateaus*, trans. Brian Massumi (London: Continuum, 2004).

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To sum up, a complex system must be open, that is, subject to strong flows of matter and/or energy, or in other words it must be far from (static) equilibrium. It must also be heterogeneous, comprising many different kinds of components. Its processes are essentially non-linear, such that outcomes are not analytically predictable and can exhibit sudden thresholds. Consequently, a complex system is continuously evolving, in the sense that changes undergone by the system are irreversible, such that a unique history becomes recorded within it. Finally, it exhibits morphogenetic properties: self-organisation takes place, yielding emergent forms and behaviours whereby ‘the whole is greater than the sum of the parts’.

# Chapter 2

## Stories about bodies: ethics emerging

In the last chapter we noticed how higher-level structure can appear of its own accord when you stir up the right mixture of different kinds of things. Or, to say the same thing in a more sophisticated way, complex, heterogeneous assemblages far from equilibrium can issue in emergent morphogenesis. In this chapter I want to take this a stage further and apply it to human societies so as to present ethical regimes as particular ways of joining the dots.

### 2.1 Joining the dots

Imagine these four consecutive figures in a puzzle book.

1. The first just looks like a random, even jumble of unnumbered dots. Try as you might, you cannot make out any particular shape among them. It is a picture of nothing. Or, equally, with enough imagination you could make out any and every shape by arbitrarily picking only those dots needed to outline a leg, a nose, a wing.
2. The second remains unnumbered, but this time the dots are not scattered so evenly. They are clustered here and there, suggestive of shapes such as perhaps a flower or a wheel. There is an incipient order here, but it is still not clear what is depicted. There seems to be something, but exactly what we cannot yet tell.

3. The third figure is a proper join-the-dots puzzle: the same spread of dots that we found in the second but, magically, numbers have now appeared next to some of them. All that is needed is a pencil to join them up, and...
4. Bingo: figure four reveals a charming woodland scene.

Viewed through the lens of complexity, the four figures just mentioned could be seen as parts of a two-stage process in the emergence of form. Remember that, at equilibrium, in a closed system, everything is entirely random and dead; a stagnant pond, cut off from the life-giving flow of the stream. This corresponds to figure 1. Then someone somewhere opens a door or lights a fire: there is a draught of air, a flow, movement and life. What had been an even, random distribution of bodies is not random any more, rather like when you shake a jar of variously sized pebbles and the smallest ones end up at the bottom. New associations begin to be made between hitherto distant and dormant components; new possibilities arise. In the pond, different forms of life get introduced and start to interact. This corresponds to figure 2.

But things really move up a gear in the shift to figure 3. When the numbers appear some of the possible associations in figure 2 get selected and so stand out in relief, while others do not. It was not obvious in advance which ones these would be; there is a discontinuity of sorts here. The numbers provide a code, a set of instructions which do two things: they highlight some of the dots; and they tell you in which order the dots are to be connected. In other words, figure 3 takes the incipiently ordered distribution of figure 2 and provides a pattern for organising it—into figure 4, the final product, the well-defined picture of some recognisable thing.

Notice the pronounced shift between figures 2 and 3: it is as if a new factor comes into play at this point. So, we might say that what we have here is really a two-stage process. The first (figures 1-2) enables the emergence of certain possible shapes; the second (figures 3-4) selects one actual shape from among the many possible ones.

## 2.2 The warp and the weft

Deleuze and Guattari saw this two-stage pattern cropping up everywhere: in the formation of sedimentary rock, in the combining of organs into organisms, in the establishment of particular customs in human societies. In each case, flows act on

certain content to generate various possible ways in which the content can be ordered or shaped. Certain of these are then selected to cement a particular, organised expression of that content. They called this the double articulation of an assemblage.<sup>1</sup>

Recall the example of the freshwater lake in the previous chapter. The transition between figures 1 and 2 is paralleled by the opening of a stagnant pool to a flow of fresh water and the introduction of various life forms. Miscellaneous associations between organism and substrate, predator and prey spontaneously arise in the new ecosystem. These include the establishment of autocatalytic feedback loops, whereby some associations prosper and grow. A mature ecosystem typically expresses its content through a signature of well-established flow circuits (such as bladderwort – algae – water flea). This represents the second stage of the double articulation and reflects the transition from figure 3 to figure 4. Hence the two stages can be helpfully summed up in the adage “the lower level proposes, the higher level disposes”.<sup>2</sup>

So, as our interest is in ethics, let us apply this to how human societies, as social assemblages, work. Human bodies provide the basic content of the system here. But these bodies are ordered by certain physical, biological needs: for food and shelter, firstly, so that any human society must involve acquiring food in some way—by foraging, hunting, or cultivating land—and also forms of clothing, however simple. These needs can only be met if humans are part of a larger ecosystem, that is, parts of an assemblage alongside other kinds of things such as plants, animals and raw materials for making essential artefacts. Universal needs like these impose a fundamental limit on the kinds of variety which human societies can exhibit, if they are to be at all viable.

Basic needs are not just physical though. Living interdependently alongside others in society entails common restrictions and requirements on the otherwise arbitrary behaviour of individuals. For example, a certain measure of civility towards ac-

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<sup>1</sup> Deleuze and Guattari, *A Thousand Plateaus*, pp. 45-46. See also Brent Adkins, *Deleuze and Guattari's A Thousand Plateaus: A Critical Introduction and Guide* (Edinburgh: Edinburgh University Press, 2015); Mark Bonta and John Protevi, *Deleuze and Geophilosophy: A Guide and Glossary* (Edinburgh: Edinburgh University Press, 2006).

<sup>2</sup> An idiom coined by Stanley Salthe, *Evolving Hierarchical Systems* (New York: Columbia University Press, 1985).

quaintances is expected; you cannot just go around killing anyone you wish. General features like this make up a kind of generic proto-ethics ordering the content of human societies (people and artefacts).

But different cultures express this loosely ordered content in very different ways. It was at this point, in the join-the-dots analogy, that the numbers came in: in Deleuze and Guattari's jargon, they "transform the [...] assemblages of bodies without changing the bodies themselves".<sup>3</sup> Each culture embodies particular codes, sets of instructions which organise society in particular ways. These codes vary from informal conventions (when you meet a stranger you shake hands) to laws coercively applied (if a soldier sent to battle declines to pull the trigger he will get court-martialled).

Codes also vary from place to place and from time to time. Over there, they chop your hands off if you do that; over here, we just slap your wrist. The result in each case is an emergent social whole, a unique configuration arising from the basic requirements of embodied, social existence and 'overcoded' by the specific ethical and legal norms which make up each culture. As Mark Bonta and John Protevi put it, expressive codes represent "the takeover of content, putting it to work in a 'functional structure'".<sup>4</sup> Or, in Deleuze and Guattari's metaphor, forms of expression provide the warp around which the weft of content is woven.<sup>5</sup>

## 2.3 Assemblages, sacred and profane

Let us illustrate this with a couple of examples. First, church. On the one hand, church is a jumble of people who relate together in various ordered forms: a main weekly gathering, mid-week small groups, church councils and committees, small-scale friendships, and so on. So far, this does not hugely differ from other social clubs and groupings which order their content (people) in broadly similar ways. What makes church distinct is its form of expression, which puts its content to work

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<sup>3</sup> Adkins, *Deleuze and Guattari's A Thousand Plateaus*, p. 71.

<sup>4</sup> Bonta and Protevi, *Deleuze and Geophilosophy*, pp. 83-84.

<sup>5</sup> Deleuze and Guattari, *A Thousand Plateaus*, p. 95.

in a particular way: the proclamation of the Christian kerygma in worship, forming the community into a single emergent body—the Body of Christ—sent to share in God’s mission.

Admittedly this is an idealised scenario. In reality, other factors readily end up shaping how church is expressed—factors such as the maintenance of the building; inadequate flows of money; established local expectations; patterns of bitterness inscribed in the history of the local community. Church as it actually exists is very much an assemblage comprising heterogeneous parts, each instance with its own signature evolutionary history.

A second, contrasting example is provided by the virus-human assemblage I have already mentioned. Left to its own devices, SARS-CoV-2 would simply have acted on the content of societies, reordering bodies. Its direct effect would have been the damaging of lung tissue, eliciting a response from the human immune system. As a result, some people would have been off work for a few days; some would have been hospitalised for a while; some would have died. Some hospitals might have been temporarily overwhelmed and there would have been some economic impact. In terms of our join-the-dots analogy, the distribution of some of the dots would have changed, temporarily, and some dots would have been erased altogether.

But government responses expressed the virus-ordered content to produce a very different outcome. The results of this overcoding were manifold: on a physical level, human bodies in many countries were largely constrained to a form of house-arrest, and even when allowed out in public separated spatially by at least two metres. Increasingly, many bodies encountered each other chiefly via the mediation of data flows on the internet. Domestic violence increased. Education was disrupted, with life-changing consequences. Businesses went bust. Governments became astronomically indebted, and so on.

As we noticed in the Introduction, much of this followed from adopting a particular version of the virus-human story. This numbered the dots so as to produce a picture so scary that, in combination with other political and ethical factors, what emerged was lockdown—an unforeseen, non-linear development if ever there was one. Looking to the future, the continuing human story is likely to undergo quite a twist, not just because of the virus itself, but because of the expressive transformation by humans of the potential deforming of bodies by the virus.

This illustrates the irreplaceable role of narrative in understanding the evolution of complex systems. We can only understand path-dependent phenomena by piecing together the unique series of events and decisions that got us to where we are. By the same token storytelling is the mode by which we tackle the future. Sentient living beings operate by means of what's known as an internal model. This enables "lookahead" or anticipation: "[i]f an agent has a set of rules that simulates part of its world, then it can run this internal model to examine the outcomes of different action sequences before those actions are executed".<sup>6</sup> In other words, I operate on the basis of stories I tell myself about what may happen when I encounter a particular situation or if I do so-and-so (if I glimpse a group of hooded youths up ahead in the park on a dark evening I might well take a detour). An internal model comprises assimilated habitual responses to past experience, as well as an overarching view of what the world is like—what matters, what does not, what is good, what is bad.

So, in a social assemblage, for good or ill, the diverse stories people tell interact to (re-)organise some content, an incipiently ordered jumble of bodies, so as to express some emergent whole. And this whole is always on the verge of being disassembled into raw material for further processes of re-ordering and re-organisation. These formative stories are themselves emergent products of past processes of assembling, and subject to the same forces of co-evolution as the assemblages of which they are a part.

Ethics, as a story about bodies, is central to this expressive formation. It is both a product of material processes, and itself a means by which material processes, the intermingling of human and non-human bodies, get organised. The numbers in the puzzle are always constrained by the pre-existing distribution of dots; but they always add to that distribution; they can never be deduced from it. Again, the lower level proposes, the higher level disposes.

In other words, ethics is an emergent reality, a new creation which cannot be boiled down to the factors which gave it rise. The second stage of the double articulation is always supplementary, introducing an element of genuine novelty. You could even say that there is an arbitrary character to it, albeit the arbitrariness of a gift.

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<sup>6</sup> John H. Holland, *Complexity: A Very Short Introduction* (Oxford: Oxford University Press, 2014), p. 86.

This, after all, is how complex systems work. They are morphogenetic, spontaneously producing new, higher-order structures. All the time these new structures continue to bear the marks of their past becoming—they “carry their histories on their back”. But the range of morphogenetic options available also always depends on how much energy there is available, on the strength of the flows coursing through the system, as in the case of the slime mould.

What if the character of emerging ethical forms also depends on that? The next chapter will explore this question further.

# Chapter 3

## Complexity in action: on energy and equality

“Each age gets the inequality it needs”.<sup>1</sup> So argues anthropologist Ian Morris in his fascinating and provocative book, *Foragers, Farmers and Fossil Fuels: How Human Values Evolve*. His basic thesis is:

1. that human societies can be divided in a threefold manner according to the prevailing energy-capture regime—those of foragers (hunter-gatherers), farmers (“Agraria”) and fossil-fuel users (“Industria”);
2. that each of these regimes is also broadly characterised by a set of signature ethical values;
3. that (1) is the (indirect) cause of (2): “in each case, modes of energy capture determined population size and density, which in turn largely determined which forms of social organisation worked best, which went on to make certain sets of values more successful and attractive than others”.<sup>2</sup>

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<sup>1</sup> Ian Morris, *Each Age Gets the Inequality it Needs: 20,000 Years of Hierarchy* (Online, 2016). Available at: <https://www.lse.ac.uk/Events/2016/03/20160315t1830vOT/Each-Age-Gets-the-Inequality-it-Needs> [accessed 22 December 2020].

<sup>2</sup> Ian Morris, *Foragers, Farmers and Fossil Fuels: How Human Values Evolve* (Oxford: Princeton University Press, 2015), pp. 139-140.

While (1) is commonly accepted and (2) would not be unduly controversial, (3) is the really interesting claim. In this chapter I want to examine and expand on this claim by drawing on ideas from complexity theory and assemblage thinking. In this way my plan is to use Morris's schema as a way of illustrating the application of these ideas.<sup>3</sup>

To begin with, what are these signature value sets which Morris claims go with each energy-capture regime? This is how he summarises them, each value denoted as it is typically perceived within each regime.<sup>4</sup>

	Foragers (11 GJ/cap/yr)	Farmers (45-75 GJ/cap/yr)	Fossil-fuel users (280-400 GJ/cap/yr)
Political inequality	Bad	Good	Bad
Wealth inequality	Bad	Good	Middling
Gender inequality	Middling	Good	Bad

One issue needs to be tackled straight away. Complexity theory cannot be content with Morris's claim that there is just one-way traffic between energy-capture regimes at one end and value sets at the other. Recall that the basic effect of energy flows is to move systems away from equilibrium so that clustering occurs and new synergetic associations brought about. Strictly, it is these associations that generate bottom-up causation, not the energy flows themselves. Moreover, the resulting emergent values in turn act top-down: "the lower level proposes, the higher level disposes". Lower level processes generate a range of possible results, from which some are selected and produce higher level processes which in turn regulate the function of their lower level components. This is, therefore, very much a two-way street, the role of energy being to provide gradients which enable traffic flow in both directions.

Having got that basic but important caveat out of the way, what is most striking from a complexity viewpoint is how the clustering of values according to energy-capture regime is reminiscent of the non-linear behaviour of complex systems—specifically the existence of thresholds at which systemic form and behaviour suddenly change.

<sup>3</sup> Morris gamely includes some critical responses in the book itself.

<sup>4</sup> Based on Morris, *Foragers, Farmers and Fossil Fuels*, p. 134. GJ/cap/yr = gigajoules per capita per year. See Marina Fischer-Kowalski et al., 'A sociometabolic reading of the Anthropocene: modes of subsistence, population size and human impact on Earth' in *The Anthropocene Review*, 2014, Vol. 1 No. 1, pp. 8-33.

The slime mould provides a striking example of this, appearing superficially as three different types of organism, changing form and behaviour as food supplies decrease. Might the capture of energy by societies work in a similar way?

### 3.1 The “Old Deals”

In the signature values table above, notice that the fossil-fuel profile has more in common with that of foragers than that of farmers. This might seem counter-intuitive: we would expect our values to make more sense to Shakespeare’s contemporaries than to those who painted the walls of the Lascaux caves. What marks out farming cultures as distinct is the valuing of various kinds of inequality. Complexity theory can suggest why this might be. To see how, let us consider each regime in turn.

Foraging societies “live in small groups and move around a lot”.<sup>5</sup> Typically, food supply is limited and so groups constantly need to be on the move, searching out new resources. Foragers need to be light on their feet, opportunistically exploiting their immediate environment and then moving on once what it has to offer is exhausted. Their relationship to the rest of their environment inevitably remains inchoate: random associations flourish for a while (plenty of berries to pick here in the autumn), but there is little opportunity, or indeed need, for stable positive feedback loops to develop.

Similarly, there is little opportunity for hierarchies to emerge within a basic social unit of typically no more than eight extended family members. While these are very often male dominated, gender role differentiation is limited. Several such groupings make up networks and regular gatherings, but even here social structures are flat, with no established leaders. Socially and economically the ethos is consistently egalitarian and non-hierarchical—why should it be otherwise? In many ways, foraging societies display the loosely coordinated, fluid characteristics of ecosystems at early stages of development. Put differently, their content (people and simple artefacts) is only weakly channelled by particular forms of expression (codes of conduct).

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<sup>5</sup> Morris, *Foragers, Farmers and Fossil Fuels*, p. 30.

Farming societies by contrast more closely resemble highly developed ecosystems or organisms. The Neolithic revolution, some 10,000 years ago, which brought about the innovations which made farming possible—and permanent settlement necessary—led over time to a four-to-sevenfold increase in energy flows through societies. It also entailed far more organised forms of social life, increasingly characterised by sophisticated role-differentiation. More and more, the human content of societies came to be expressed in particular, well-defined ways. Rather than just being a mother, child or sister, I am now also a serf, or a member of the cooper’s guild, or a church warden, or a king’s subject, and so on. My life is richly interwoven with those of many others, including strangers; so the informal, small-scale, make-them-up-as-you-go-along conventions which suffice for foragers now need to be augmented and formalised into hard-and-fast protocols. Inchoate social forms give way to large, elaborately organised structures.

As with all emergent structures, these are necessarily hierarchical. Morris notes that serfdom and slavery were consistent features of classic farming societies: “neither kinship nor the market could generate the labour needed to build the ships, harbours, roads, temples and monuments without which their (relatively) huge populations could not have fed themselves or maintained their societies”.<sup>6</sup> Moral and legal compulsion was typically grounded in what Morris calls the “Old Deal”, a variant of a story legitimating an arrangement whereby some people exercise power as authority, and others know their place. This ordained cosmic order was variously underwritten by nature, or God, or the gods. If rulers ruled wisely and justly, and subjects were obedient and conscientious, all would be well.

Political hierarchy was mirrored in gender and economic relations. The demand for hard physical labour in the fields, best suited to men’s physique, along with the increased fertility of women compared to foraging societies led to pronounced gender role differentiation and a distinction between the home and the (economic) workplace. Likewise, economic inequalities tended to grow as the routine production of agricultural surplus made it possible to accumulate. The inheritance of such accumulated wealth led to the entrenchment of economic disparities, as well as to a novel preoccupation with female sexual purity.

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<sup>6</sup> Morris, *Foragers, Farmers and Fossil Fuels*, p. 64.

In this way, these signature values can be seen as emergent products of the Neolithic revolution, made possible by the crossing of an energy flow threshold. Once established, these exercised top-down control, defining individuals’ roles and identities. The low energy flows through foraging societies simply are not sufficient to stimulate the autocatalytic morphogenesis which gave rise to elaborate Agrarian social forms.

So, how do we explain the return to more egalitarian values following the shift to a fossil-fuel society? Naively, you might have expected the onset of an even more intensely hierarchical organisation. Instead, whereas “Agraria had worked by drawing lines [...] Fossil-fuel societies [...] work best by erasing lines”.<sup>7</sup> Perhaps the key to explaining this lies in appreciating certain economic developments which were already under way before the advent of Industria.

## 3.2 The “New Deal”

By the 16th century the goal of improved productivity, and so increased flows of money, was already leading to the enclosure of land.<sup>8</sup> This led to waves of dispossessed, itinerant workers destined for the anonymity of city life, so disrupting the classic agrarian pattern of settled accumulation. This tendency was reinforced by colonial “Discoveries” and the consequent growth in flows of people and goods around the globe. The content of human societies became increasingly disassembled. The opening of new trading horizons fostered the invention of new instruments designed to release greater financial flows, culminating in so-called Dutch finance and the national debt-taxation complex on which modern credit money is based.<sup>9</sup>

Set in this context, we can see how the arrival of an industrial, fossil-fuel economy in the 18th century simply served to further intensify tendencies which were already under way. The unprecedented energy flows released by fossil fuels further disrupted established Agrarian social codes, even if the latter’s inertia was only widely overcome in the 20th century. This final *coup de grâce* was delivered by the unleashing of widespread consumerism following World War Two. The content of societies having

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<sup>7</sup> Morris, *Foragers, Farmers and Fossil Fuels*, p. 106.

<sup>8</sup> Simon Fairlie, ‘A short history of Enclosure in Britain’ in *The Land*, 2009, Vol. 7, pp. 16-31.

<sup>9</sup> Geoffrey Ingham, *The Nature of Money* (Cambridge: Polity Press, 2004), pp. 107-133.

already been disassembled over the course of centuries, their expression was now decoded over just a few decades: nomadic workers now, additionally, became passionate consumers. So inherited virtues (notably frugality and temperance) had to be eliminated at all costs. This was necessary in order to fully release flows of desire so as to further release flows of money through the buying and selling of more and more stuff.

Flows of energy, money and desire: here we come to the basic reason for fossil-fuel users' signature value set.

As we have seen, order in complex systems arises in two stages: first bottom-up, as mutually beneficial autocatalytic connections between juxtaposed components establish a weak, rudimentary order; and secondly top-down, as these incipient structures become organised in more elaborate and durable ways. Agraria's relatively limited energy regime both allows a comparatively settled social order to develop, and also requires that order to maintain homeostatic stability. In fossil-fuel societies, by contrast, per capita energy consumption is not only several times larger, it has also kept on growing. Global per capita energy consumption is almost four times larger now than it was in 1800. Remarkably, it doubled in just the thirty years between 1945 and 1975.<sup>10</sup>

Consider a small lake fed by a newly rain-swollen river. As flows of water into the lake increase, each new day sees it getting bigger, with new species being imported. Existing ecological structures get disrupted and new, bottom-up associations are forever spontaneously appearing. While the lake continues to grow rapidly, the ecosystem never gets a chance to stabilise and mature: that is, it never gets beyond the first stage of the double articulation.

Industria is rather like an ecosystem locked into a permanent adolescence. Its ethical codes tend to be ephemeral structures because any provisional ordering does not last long enough to settle. Buffeted by strong and ever-growing flows, no structures can last long. Nor should they—they would only get in the way if they did. Established social codes tend to inhibit the dynamic reallocation of people and flows of desire. And these flows need to be released in order to fully exploit growing energy flows, and

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<sup>10</sup> Author's calculations based on data from <https://ourworldindata.org/>

their transmutation into growing torrents of money. Deleuze and Guattari describe this as the work of what they term the capitalist axiomatic, the only constant feature in the flux which is *Industria*.<sup>11</sup>

Consequently, ethics becomes largely surplus to requirements. While flows through the system continue to increase, the transient bottom-up forms briefly conjured (such as “market discipline”) can do duty instead: we get order for free. In *Agraria* economies were often living at the limits of what could be achieved, and so a strong, collective, top-down ethic was needed in order to hold things together. In *Industria*, thus far, there have been no limits, only an ever-expanding range of exciting possibilities. So, we have learned to get by with a proto-ethic of inclusive affirmation towards the other miscellaneous bodies into which we may bump as we ride the rapids.

Morris’s argument in *Foragers, Farmers and Fossil Fuels* is deliberately provocative and amenable to a range of objections, some of which he hospitably accommodates within the book itself. But read from the perspective of complexity theory it remains intriguing. In nature, forms can change drastically at energy flow thresholds, as we have seen. This should prompt us at least to reflect on our own energy-capture regime and the ways it may, or may not, be congruent with the values which have come to typify Western society during the 20th and 21st centuries. And what if that regime is drawing to a close? With these thoughts in mind we come, finally, to ponder the task of Christian ethics at this historical juncture.

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<sup>11</sup> Gilles Deleuze and Félix Guattari, *Anti-Oedipus*, trans. Robert Hurley, Mark Seem & Helen R. Lane (London: Continuum, 2004), pp. 242-284. Note however that Manuel DeLanda, taking his cue from Fernand Braudel, nuances this interpretation by distinguishing between the loose, bottom-up structures of the small-scale market and the established, top-down structures of the capitalist corporation proper. See Manuel DeLanda, *Assemblage Theory* (Edinburgh: Edinburgh University Press, 2016), pp. 9-50.

## Chapter 4

# A complex task: doing Christian ethics in the 21st century

Doing the right thing is often a complicated business. In this tract I have argued that, more fundamentally, it is a complex business. But what difference does this make to the way we understand Christian ethics? And what does complexity add to the Christian ethicist's toolbox as we take on the 21st century? In this chapter I will offer a couple of preliminary answers to those questions.

### 4.1 Not just love, actually

To begin with, the double articulation of complex systems offers an insightful framework for relating diverse ethical perspectives. The late 20th century gave rise to some pretty varied ways of seeing Christian ethics. For example, these decades gave us Joseph Fletcher's situation ethics, in which the right thing to do depends on what would lead to the most loving outcome. But the same era also gave us Paul Ramsey's Christian deontology: central though love is, rules retain an indispensable role in ethical decision-making.

Situation ethics well illustrate the tenor of the 1960s. Fletcher's work spoke powerfully to a generation already becoming predisposed to believing that "all you need is (*agape*) love".<sup>1</sup> Absolute rules were rejected in favour of contextual decisions based on the application of universal love towards the other. Or, rather, the only absolute is love of God and neighbour. In each situation what matters is the most fitting response; moral principles serve as rules of thumb at most.

Fletcher's approach brings to mind the first stage of the double articulation described above, the bringing-together of the content of an assemblage. Assorted heterogeneous parts get thrown together, begin to interact and so are drawn into relationship. There is no pre-ordained plan; everything is spontaneous and contextual. This resonates with ethical values of acting in the moment, of being attuned first and foremost to love as that which attracts and binds, with codes of conduct featuring only in an inchoate and secondary manner.

Ramsey provided a sophisticated critique of situation ethics, affirming *agape* but building a framework around it. For him, showing love in practice can sometimes entail following particular rules—"pure rule agapism", even if in other situations rules offer a general guide only—"summary rule agapism".<sup>2</sup> If Fletcher's approach parallels the first stage the double articulation, that of assembling content, this is all about the second stage, the expression of content. Rules overcode content by organising its parts in well-defined ways. Clear lines structure the ethical space, delineating right from wrong and supplementing the proto-ethical intuitions of the situationist. Hierarchy appears here too in Ramsey's taxonomy of different kinds of agapism, and in his account of ethical decision making as rational process.

However, no account of Christian ethics over recent decades would be complete without reference to the work of Stanley Hauerwas. For him, the goal of ethics is the formation of character through the acquisition of skills necessary for authentic Christian agency. Notice the centrality of morphogenesis: what are being formed here are the disciple herself along with the Church of which she is a part. What is doing the forming, the Church's form of expression, is the Christian story, rooted in the scriptures and unfolding down the centuries. This involves assimilation by the disciple of a particular inherited and collective internal model. As a result the

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<sup>1</sup> Joseph Fletcher, *Situation Ethics: The New Morality* (Louisville: Westminster Press, 1966).

<sup>2</sup> Paul Ramsey, *Deeds and Rules in Christian Ethics* (Edinburgh: Oliver & Boyd, 1965).

Christian can exercise a form of “lookahead” distilled from the wisdom of earlier generations of disciples.<sup>3</sup> Path-dependence is then an essential feature of Hauerwas’s approach, since the Church “carries its history on its back”: we always inevitably build on the precedents of Christian tradition as that has sought to repeat, non-identically and according to context, the story of Jesus.

## 4.2 Running out of steam

As the 20th century progressed and gave onto the new millennium, you might have been forgiven for thinking that ethics as such was becoming a thing of the past. In the last chapter I argued that this was because a globalising socio-economic system had been consuming massive and growing amounts of fossil-fuel energy. This is akin to an ecosystem which is both growing in size and subject to an increasing nutrient load: new opportunities for economic synergies were arriving all the time, so tending to destabilise existing cultural forms (ethical values included) and imposing instead a different kind of dynamic for ordering societies.

However, there are grounds for thinking that this happy arrangement breaks down when per capita energy consumption stalls or goes into reverse. Actuary Gail Tverberg notes that, since the start of the fossil-fuel era, times when per capita energy consumption has stalled have tended to coincide with bad things happening.<sup>4</sup> For example, following a steady increase up until around 1910, consumption largely stagnated until the 1940s. It is no coincidence, Tverberg claims, that during this period we experienced two world wars, the Great Depression and the rise of fascism. Then, between 1945 and 1975, consumption doubled: in many ways, this golden age remains our cultural benchmark still, unconsciously shaping our expectations. Since the mid-seventies the world has re-entered a period of relative stagnation, almost a half-century in which the average rate of increase has been only about one-sixth of that enjoyed during the post-war boom. Again, says Tverberg, it is no coincidence that this period has included the collapse of the Soviet empire and numerous financial crises, culminating in the 2008 global financial crash.

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<sup>3</sup> Stanley Hauerwas, *The Peaceable Kingdom* (London: SCM, 2003).

<sup>4</sup> Gail Tverberg, <https://ourfiniteworld.com/2018/05/30/our-energy-problem-is-a-quantity-problem/>

Where has this left secular ethics? From both the left and the right, top-down moral codes are making a come-back.<sup>5</sup> From the left, this deontological shift is traced by the rise of the language of rights. This language has been around a long time of course, but the idea that certain groups, and people in general, are unconditionally entitled to be treated in certain ways gained fresh traction after World War Two. In the West, the various liberation movements of the 50s, 60s and 70s channelled this idea to produce what became the idea of the moral as the politically correct.

The original aim of liberation movements was to challenge the (by then passé) hierarchical inequalities of Agraria. This bottom-up dismantling eventually developed into the top-down assertion of a new regime based on values such as inclusion and diversity, accompanied by mirror-image “vices” such as sexism, homophobia, racism, transphobia, and so on. Permissiveness gave birth to a new age of Thou Shalt/ Shalt Not, expressing the content of societies according to a story about bodies in which themes of cultural progress and individual autonomy were prominent and tightly interwoven.

Central to this story is the question of identity: who and what am I? As we have seen, strong flows tend to disassemble established identities and roles, and while flows remain strong and strengthening evanescent, new identities keep popping up: in such exciting times, experimentation is the watchword. But if flows begin to wane, then spontaneous bottom-up mechanisms of identity-formation do too. The ground beneath our feet does not seem so secure any more. We need to know who we are, and start to long for some solid, top-down stories which give us stable answers.

For some, one or more of the diverse cultural identities asserted since the 1960s will suffice, albeit now reified and publicly normalised in ways that brook no dissent. But for others, a story based around ideas of progress and individual autonomy will not wash. They need a stronger plot, one with a more substantial pedigree.

So, from the right, a different set of values has appeared on the scene. Behind this, in part at least, is economics. As the work of Thomas Piketty and Branco Milanović has shown, the economic benefits accruing to developed nations since the 1980s have left

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<sup>5</sup> See John Milbank and Adrian Pabst, *The Politics of Virtue* (London: Rowman & Littlefield, 2016).

behind large sections of their societies.<sup>6</sup> The narrative of progress, deeply ingrained during the post-war boom, no longer makes sense to those who have been left behind. What they want instead is another, older story—one that is less about me, the heroic individual, and much more about us, a people with a proud history.

The VE Day celebrations of 2020 were inevitably muted because of the COVID-19 restrictions, but it would be hard to overlook how important World War Two has become in providing an English, if not a British, sense of identity. From the sprouting of St George's crosses in suburban gardens, to Boris Johnson's rhetoric, to the impact of films like *Darkest Hour* and *Dunkirk*, here we have a story which communicates a set of values which, along with institutions such as the monarchy and the NHS, provide a definite sense of who "we" are.

It has become a commonplace to talk about the end of globalisation even if only a few, like Tverberg, make the link with stagnating per capita energy consumption. Following Ian Morris's lead, I want to go further and suggest that we are already experiencing a concomitant shift in values. Except that, at present at least, there are two shifts going on—one to the left, the other to the right. What they both share is a gut feeling that the underlying dynamical regime is becoming unstable. There is a growing desire for top-down order, the order which increasingly only a strong hand acting from above can supply.

It may well be, therefore, that the values of *Industria* are already on the wane. What will replace them? Short of wholesale societal collapse we are unlikely to find ourselves back in *Agraria* any time soon.<sup>7</sup> In any event complex systems like human societies are path-dependent: we never step into (exactly) the same river twice. But Christians, as characters in a particular, path-dependent story, approach the future from a unique angle.

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<sup>6</sup> Thomas Piketty, *Capital in the Twenty-First Century* (London: Belknap Press, 2017); Branco Milanović, *Global Inequality: A New Approach for the Age of Globalization* (London: Belknap Press, 2018).

<sup>7</sup> Though see e.g. Margaret Atwood, *The Handmaid's Tale* (London: Heinemann, 1993); Robert Harris, *The Second Sleep* (London: Hutchinson, 2019).

# Conclusion

Back in Jerusalem, a beggar is reflecting on an eventful day. He had started it blind, economically helpless, but socially integrated. He is ending it sighted, with a new world of possibilities open to him, but socially ostracised. All because of the very different stories told about his body.

It is worth noticing that the three stories, and so the three courses of action, all arose from the same Agrarian milieu. A given energy capture regime may arrange the puzzle's dots in a particular way, but numbering the dots is another matter. In other words, any milieu remains hospitable to a range of different stories. Depending on the story, the same interaction of bodies can issue in a passive fatalism ("who's to blame?") or in a rigid deontology ("no work on the Sabbath") or in acting as God's agent ("we must work the works of him who sent me"). Different stories with different consequences, both for the people telling the stories and for those about whom the stories are told.

As the fossil-fuel age with its vast and growing energy flows burns out around us, it is important to attend to the stories people are telling and the values they embody. The heyday of Industria held out the promise of equality and prosperity (for some at least), a place of no distinctions and freedom for endless self-reinvention. If that party is over, and distinctions and inequalities are already returning, then which stories we tell could make a big difference.

Happily, Jesus's stories are precisely concerned with such regime change. *Pace* Philip Pullman, the new regime is a kingdom, not a republic. That is to say it is inherently hierarchical, like all emergent systems, not an endless flat plain of indifference. But the hierarchy of this regime is no structure of top-down exploitation: according to this story's plot, the first become last, the greatest is the one who serves, and it is the humble who are exalted. Jesus's story offers redemption not just to his native Agraria, but to all regimes.

At the start of the 21st century, as the proto-ethics of high Industria wanes, different sets of values are already jostling for power. The dots on the page are shifting. How we join those dots will depend in part on where they end up. But it will also depend on where we place the numbers.

In Jerusalem that day, bodies interacted in a remarkable way: morphogenesis happened, and a once blind beggar began a new life, because of a particular story. In a complex world, at this complicated time, which new forms emerge will depend on which stories about bodies prevail. Seldom has telling Jesus's story mattered more.

# Questions for further consideration

## Doing ethics as Christians

The story told in this tract could plausibly be seen as an exercise in natural theology.

- Should secular accounts of how the human and non-human worlds operate influence the way Christians do ethics at all?
- And what should Christian theology more generally make of the idea of the spontaneous emergence of order in the world anyway?
- The latter idea is naturally attractive to atheistic writers like Deleuze and Guattari since it renders any “god of the gaps” surplus to requirements. What might a Trinitarian theology of emergence look like?

## “Is” and “ought”

Replying to Ian Morris, Christine M. Korsgaard claims that real moral values exist independently of particular cultural value systems. Evolution, she claims, has conferred on human beings not primarily the content of particular values (which she concedes can and do vary), but rather the capacity for making valuations. Once this is in place, “it is the correct exercise of that capacity that determines the content of real moral values, rather than evolution itself”.<sup>8</sup>

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<sup>8</sup> Christine M. Korsgaard, ‘Eternal values, evolving values and the value of the self’ in Morris, *Foragers, Farmers and Fossil Fuels*, pp. 184-201.

- Is Korsgaard right? Is there some single, absolute set of values to which all societies tend, however “developed” they may or may not be? Or will these values always wind up resembling the discursively dominant mores of the hegemonic (currently, fossil-fuel) culture?

## Ethics and the *missio Dei*

Missiologically this leads to key questions about how far Christians should seek to work with the grain of currently prevailing “universal” values (such as human rights) in order to promote desirable change; and how far, instead, they should look to adopt a distinctive stance.

- If Christians do have a distinctive and relevant story to tell today, what exactly is it? What constitutes good news for our contemporaries?
- At the start of the 21st century, what aspects of our shared Christendom tradition could be woven together into a narrative compelling enough to transform the embodied lives of individuals and societies?
- And, finally, how ready are Christians to join their Lord in paying the price for telling such a story?

# Glossary

**Assemblage:** A dynamic mixing of heterogeneous yet interacting components. This is a key concept in Gilles Deleuze and Félix Guattari’s *A Thousand Plateaus*, in which numerous different kinds of *agencement* (assemblage) occurring at various levels of being, are examined. The strength of the linkages between assemblage components can vary greatly. In this book, weakly structured assemblages are often called consistencies, while highly structured ones are often termed strata.

**Autocatalysis:** A process of internal positive feedback, whereby different components in a system promote each other’s functioning, typically issuing in growth and the development of structure. Examples are replete in nature and human society. They include the bladderwort – algae – water flea complex mentioned in chapter 1, and also, for example, the complex of factors comprising the human response to the 2020 COVID-19 pandemic: sensationalist media reporting; underlying popular anxiety; an existing professional culture of health and safety, and associated risk-aversion; uncertain government, eventually promoting “Project Fear” and media guidance to support unprecedented public restrictions; all of which feed back into reinforcing the originating dynamics and so to the consolidation of lockdown as social given.

**Complex system:** A heterogeneous “system of systems”, or assemblage, in which components typically interact in non-linear ways, that is, with outcomes which do not smoothly and predictably reflect causes. This can give rise to thresholds at which the behaviour of the system can suddenly change in pronounced ways, leading to qualitatively different regimes of operation.

**Content and expression:** The two moments in the double articulation of an assemblage.

**Double articulation:** The two-stage process by which the components of an assemblage interact to produce enduring structures. Random, dynamic flows act first to provisionally arrange the content, or raw material, of an assemblage in a non-

random manner, so setting up novel associations and possibilities. This arrangement may then become overcoded according to one of a range of potential forms, and so established as a particular, well-defined expression of the content. The content is thereby “put to work”, or expressed, as a functional whole.

**Emergence:** The arising of higher-order structures and behaviours on the basis of the bottom-up interaction of a range of lower-order components. Once established such structures can exert top-down control over their components via autocatalytic mechanisms.

**Internal model:** The assimilated narrative by means of which sentient beings, or agents, model the behaviour of elements of the external world according to relevance and logical association. These models are built up on the basis of experiential learning, and so condition future expectations regarding what will happen following an external event or a hypothetical action on the part of the agent.

**Morphogenesis:** The spontaneous arising of form in non-isolated systems far from thermodynamic equilibrium.

**Path-dependence:** A feature of complex systems characterised by the irreversibility of certain processes. A given outcome can never be exactly reproduced, but always reflects the non-linear processes constituting a unique sequence of contingent events—the particular path—which gave it rise.

**Thermodynamic equilibrium:** Static thermodynamic equilibrium is characterised by the complete absence of intensive gradients, and so also of any flows of matter or energy. Dynamic equilibrium is characterised by constant intensive gradients, issuing in steady flows of matter or energy. Complex systems can only arise in conditions far from static equilibrium.

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