The Creative Animal

How Every Animal Builds its Own Existence

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Contents

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CHAPTER 1

In Praise of Improvisation

Premise

Observing the adaptive behaviour of animals, it is difficult not to be fascinated by the complexity and aptness of their actions: they match their environment and their chosen lifestyle down to the smallest detail. The various species express their skills spontaneously, almost nonchalantly and yet precisely, without requiring any additional training. They show that they have built-in knowledge, something that does not require masters and apprenticeships and comes even before experience. The close correlation between morphology and behaviour as a whole, between an animal's appearance and the challenges it has to face, has always struck the human imagination. When Rudyard Kipling (1865–1936), in his *Just So Stories* (1912), imaginatively illustrated the origin of the morphological characteristics of various animals—the whale, the camel, the kangaroo—he provided us with the clearest example of how, since the earliest times, man has recognised functional predicates in the characters of the zoological universe, judging them to be extraordinary in their predisposition to the performance to which they were called.

Both shamanism (Eliade 1964) and natural theology (Paley 1836) are based on the recognition of an intrinsic virtuosity of living beings, whereby nature becomes the first teacher also for human beings. We marvel at the care with which a weaver builds its nest, a swallow prepares for migration

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or wasps build their hive, all with geometric and precise perfection. There are therefore countless testimonies, widespread in mythology and religion, of the feeling of *thaumazein*, which is equally admiration for animal wisdom, but also religious fervour and nostalgia for a spontaneous dimension that is irretrievably lost. The Hellenic founding myth of the two titans also shows us how animal qualities are based on somatic expressions—one might say intrinsic to the body—resulting from Epimetheus' bestowal, as opposed to humans, who have to call upon Prometheus in order to receive the technical equipment they need to survive. Animality shows off an embodied competence, which made Giacomo Leopardi (1887) say (1798–1837) "di natura è frutto ogni vostra *vaghezza*". And that word embodies admiration and longing for the inexplicable wisdom of nature, which is now precluded to man.

On the animal stage, the spectacle of nature's wisdom is on display: the techniques and performances, the precision and foresight, but above all the correlation is stupefying, stunning and sublime. Every challenge finds the right structure in the animal's body, every opportunity finds the right behaviour to take advantage of it, and the whole system runs like clockwork, dictating precious synchronies. We are thus led to think of the work of an omniscient architect, the only one who could have arranged such perfection (D'Aquino 1970). The wisdom of nature appears as much in the harmony of the whole, that is in the reciprocal dependence of living beings and in the organismic texture of the various ecosystems, as in the performative adequacy of the individual, which shows a manifest balance between needs and capacities, a functional specialisation to which we attribute precision and lucidity of judgement. Everything seems to be part of an organic design and the animal appears to be called upon to bear witness to the pervasive ingenuity of nature.

The manifold strategies of the living are not only masterfully tailored to the typical challenges of each habitat—that particular niche in which each species is embedded—but often display such precision and extravagance in their details and peculiarities as to leave naturalists speechless. The great competence deployed by animals in their activities is baffling and suggests minds capable of actively raising various problems and delving into them so as to find the best solution every time. Human beings find themselves in front of this set banquet and cannot help but be astonished by the order it displays, so they are led to seek the explanation of such perfection in the here and now, attributing it all to the work of a designer and assigning

expressive finalism to the individual whenever it manifests particular adherence between the action and the result achieved.

Human beings also exhibit innate behaviours, some of which are particularly evident in children, precisely because they have not yet been modified by first-hand experience of the world, the relationship with their parents and cultural conditioning. The presence of a substantial number of hereditary patterns contradicts, moreover, the humanistic assumption that considers our species different from other animals insofar as it lacks natural endowments (Gehlen 1988). On the contrary, ethologists, starting with Konrad Lorenz (1903–1989), have challenged this claim: the great researcher Irenäus Eibl-Eibesfeldt (1928–2018), by studying similar behaviour in populations of very different cultures, has been able to describe in detail a large number of innate human patterns (Eibl-Eibesfeldt 1989). The reason for such skills lies in the history of the species: phylogeny, in addition to providing morphological solutions that are strikingly suited to a species' adaptive challenges, is a process of information build-up through standardised patterns of expression. These patterns provide the subject with "operational tools" already designed to deal with the most common survival problems. It is clear that the organisation process of such displays takes much longer than an individual's ability to learn, but for this very reason these skills appear extremely refined.

Innate knowledge gives individuals an initial advantage in facing the challenges of life, and this will then be followed by the experiential processes that they will develop through the particular circumstances with which they will be confronted. This knowledge is a fundamental asset for all living things: it results from natural selection, the mechanism highlighted by Charles Darwin (1809–1882) that represents the cardinal explanatory principle in biology. If we consider each character as the result of a slow refinement process, lasting millions of years and carried out over many generations—going beyond the species dimension—then we can understand the origin of such skills. We fall into error, however, when we attribute relevance and performative effectiveness to the occasional and specific response of the individual's ingenuity. The reason for this distortion is easily explained: we are accustomed to believing that intelligence is manifested in performance responsiveness and success, and that every solution results from individual work.

There is no doubt, moreover, that the performative collection of the animal world is a veritable Guinness Book of Records: think of the surgical meticulousness of actions, the inflexible sequence of flow charts, the

precision with which time frames are respected, the convergence of organs, functions and practises. It is no surprise that we should feel wonder and tend to attribute these masterpieces either to an omniscient deity or to the skills of the individual. The Darwinian theory is counterintuitive in many respects, because man struggles to understand the idea of a knowledge built up over millions of years through competition in the reproductive process (Dawkins 1986). We find it hard to relate to biological timescales, so we look for a comprehensive explanation in the behavioural manifestation itself. In reality, the individual is nothing more than a drop of water in the great river of life and its qualities are the result of a process that transcends its brief passage through the world.

We are wrong because we persist in believing that knowledge can be attributed to individual experience and that, at birth, the subject is a kind of *tabula rasa*, to be filled from scratch (Locke 1690). In reality, every animal comes into the world with a wealth of knowledge. Its sensory organs are already predisposed to perceive those stimuli that are useful to it, organising them into meaningful *Gestalts*, and its cognitive system has expressive and orientational tendencies from the earliest moments of its existence—such as chasing a moving target for predators or gathering for omnivores. Puppies already have communicative and interactive patterns for parental request behaviour, for example. All this results from an accumulation of selection processes that bring together millennia of adaptive evidence in the individual. The great wealth of past generations, subjected to the grindstone of articulated selective pressures, brings forth existential geometries from below.

The human being is excited by the adaptive responses of animal behaviour and tends to attribute to individual ingenuity a wisdom which, conversely, results from a long build-up of successful attempts to overcome life's challenges. We delight in the thoughtfulness of parental tasks, we admire the foresight and orientation skills, and we are enraptured by the variety of hunting strategies we find in animals. On the other hand, we can see that these competences tend to recur almost unchanged in different individuals belonging to the same species, so it is evident that these behaviours cannot be assigned to the intellectual work of a single subject. There is a kind of experience that precedes the individual, a learning that does not develop in the instant of the subject's attempt at a solution, a functional adequacy that precedes it.

For naturalists, the animal world, where morphology and behaviour add up to a style that reflects the context, is a source of interest and

passion, precisely because of the large number of strategies involved. The great explorers of the eighteenth and nineteenth centuries, such as Alexander von Humboldt (1769–1859) and Alfred Russel Wallace (1823–1913), could not help being fascinated with the multiformity of the living universe and the adherence of morphological and behavioural strategies for survival adopted in different geographical areas. The ability of some snakes and scorpions to conserve water in arid areas, the deep trophic chain links in complex environments such as rainforests, the ability to avoid thermal dispersion in arctic or high-altitude areas—all these things inspired the creation of new intellectual figures who, alongside their profession as geographers in the service of different countries, inaugurated a growing interest in biodiversity.

It is easy, on the other hand, to fall into the trap of assigning to the species itself a title of cognitive individuality, personifying a process that, conversely, is simply one of accumulation. The apparently simple Darwinian explanation actually contradicts certain intuitive heuristics, so that we struggle to understand this process of adaptive adherence. This process takes place over a period of time that exceeds our comprehension, and if we already struggle to reckon with a millennium, let alone millions of years. Life may appear to us in an individual form, but we must not forget that it is more like a flow, a great river, where the various generations follow one another through small modifications which, in the long run, change the morphology and the overall rules of the corresponding ecosystems. Performative adherence is therefore only the result of a momentary balance between the different actors.

But this correlation between character and function, or between challenge and performance, is undoubtedly what most strikes our imagination, in the apparent cyclical stillness of a background world: the seasonal migrations of many birds, the springtime awakening of mating, the time of hibernation, the winter diapause of the insect world. Animal life seems to impart teachings concerning the appropriateness of actions, in the right ways, at the right times and in the right contexts. Human beings, in admiring the behaviour of each species within their own niche, assign to each individual a wisdom that is unique to them and deserves to be imitated. Thus, from the vast performative panorama of biodiversity, man has drawn inspiration for his instrumental translations, crediting birds with the role of auspices, incorporating the virtues of bears and wolves in shamanic rites, relying on animals as spirit guides and double identities (Marchesini 2017). There is a strong sense of enchantment that humans feel towards

animal mastery, because it is spontaneous and does not require any additional teaching, but for this very reason it is all the more amazing.

Praising animal skills therefore becomes a veritable narrative *topos* in human tradition, which often magnified the richness and properties of animal ingenuity. Each species has precise expressive habits together with a morphological profile that is consistent with them, so that form and behaviour make up a whole corresponding to an existential style. A species becomes a way of inhabiting the world and lends itself to taking on symbolic values or being used as a metaphor. Animal shrewdness was easily used as an analogy for vices and virtues, qualities incorporated into nature that can be accessed through liturgies, models to be imitated through techniques and tools, properties to be represented in avatars or heraldic representations. The form itself thus embodies a content, because anatomical features and expressiveness overlap: a structure becomes, therefore, fully manifest in the corresponding behaviour. It is said, then, that the animal is intelligent insofar as it is sensible in the execution of a task, admirable in the effectiveness and efficiency of the results achieved, and capable of correlating the body to the function.

Phylogenetic Knowledge

We cannot fail to be amazed at the precision with which a bird builds its nest or a mammal copes with the task of giving birth, at how a tiny wasp is able to create complex architectures or a whale feeds on plankton, how a cicada knows how to camouflage itself on the trunk of a tree or an ant is busy supplying its community with food for the winter. The knowledge that each animal deploys to achieve its objectives of survival, foraging and reproduction, in the multiplicity provided by biodiversity, leaves us astonished and fascinated, conveying the image of a foresighted intelligence filled with dexterity. And there is no doubt that the interplay of animal interactions, in the balances of ecological homeostasis as well as adaptive functions, is as close as it gets to what we consider perfect. How many times have I heard the virtues and expertise of different species listed as proof of their intelligence, their mastery of ordinary tasks as unequivocal evidence of their mental acuity! The carnival of animal performance cannot but leave us astonished, and it is understandable that we should try to explain it through the individual's ability to see into the problem and give a well-considered answer.

However, this is a big blunder, because it leads us to believe that there is an overlap between performative property and intelligent evaluation, whereby we focus on animal competence in order to obtain evidence of its subjectivity. The mistake lies in looking for an overlap between competence and the individual's ability to find a solution to the problems of everyday life. The skill with which birds build their nests and the diligence they show during hatching, the oxygenation of eggs that fish achieve by beating their fins, the early obstetrical care we observe in many mammals on the part of their mates, the precise and meticulous attention paid to the young, which we find even in insects—all these features cannot fail to amaze us and testify to the profound wisdom of animal instinct. Parental attention astounds us with its lyricism, a poem of parental love that on the one hand moves us, and on the other seems to suggest implicit intelligences projected towards the goal of reproduction. Similarly, survival skills, from mimetic capacities to various predation processes, speak to us of the wisdom of the subject, which seems to knowingly camouflage itself in order to escape or surprise its adversary.

Thus, the architecture of a termite mound is reminiscent of a homeothermic construction project devised by the master insect, while the use of a stone to break the shell of a mollusc seems to have been devised by the ingenuity of an otter. There are countless examples of animal expertise, such as beaver dams, parasite tricks, the cryptic disguise of an octopus or the Batesian camouflage of a hoverfly. The animal world is a kaleidoscope of qualities: from the reproductive rendezvous of fish, turtles and toads, excelling in synchronism, to the chemical battles of moths based on pheromones of engagement or repulsion. While sexual contests between the males of some species turn into exhibitions, in others courtship consists of psychedelic manipulations. Interspecies interactions are also extraordinary, such as the allelochemical phrasings and alliances between plants and insects—for example, when aphid-infested shrubs attract ladybirds—or the dissuasive stotting of gazelles towards cheetahs (Caro 1986). It is a world of multifaceted and precise messages: from the topographical dances of bees, hymns to collective harvesting, to the predatory mimicry of some fireflies, which turn love invitations into lures. This whole display of ingenuity cannot leave anyone indifferent.

But on closer inspection, these behaviours occur in all subjects of a given species, as choreographies whose individual units follow rigid and predetermined schemes, so that the final performance is accurate and exact precisely because the whole is detached from the variables of experience

and individual will. Our projective interpretation misleads us, attributing an intentional character to something that in reality derives its competence not from the individual's planning and decision-making, but rather from phylogenetic knowledge. We are misled by the anthropocentric perspective that tends to assign to every event a finalistic and subjective explanation, as also used to be the case with meteorological phenomena. On the other hand, the teleological explanation is the most intuitive way to account for what we see, so we say that fish have fins to swim and birds have wings to fly. And in this objective-based interpretation any behaviour that shows adherence to the goal, whatever the functional chapter it is supposed to serve, seems to support an operational judgement, that is the evidence of intelligence in action. But we have to think again.

Since I was a child, I have been fascinated with the plural articulation of insect life, which in a certain sense represents the youth seminar, one could say the propaedeutic apprenticeship, for anyone who wants to try their hand at the subtleties of ethology. In the phantasmagoria of entomology, in fact, one can find such a vast catalogue of life strategies as to go beyond any science fiction or horror movie, with correlations and appointments so precise in their space-time coordinates, despite every degree of improbability, as to leave one breathless. Consider Hymenoptera, these mind-bending miniature masters of cruelty, far removed from the harmonies of butterflies or beetles or the flying feats of flies and dragonflies: their refined homicidal skills cannot fail to astonish an enthusiast such as myself; their life strategies have something demonic, but also sublime, about them.

Ichneumonids, who anaesthetise a larva to enclose it in a cell together with their eggs, which once hatched will feed on their immobile host, seem to possess truly incredible foresight (Fabre 1879). On the other hand, the multiplicity of parental strategies of solitary wasps is no less impressive than the complex constructions of social wasps in the articulation of community life. We are thus faced with a large catalogue of examples of animal foresight. Ants are portrayed as the ultimate hard workers, an example that seems to need no further commentary to show that animals can think about the future. And yet, I ask, is this really the case? Is the ant busy filling the chambers of the anthill because it is thinking about the future? Undoubtedly, when one compares its never-ending toil with the cicada's presence in the festive *hic et nunc*, one finds it hard to argue otherwise. We see it scurrying for food, cooperating with its sisters for the good of the community: it is inevitable to explain this with the yardstick of intentionality.

We are led to believe that an ant's behaviour reflects clarity about the need to forage, insight into the problem of supply and projection into the future, as if to say "the fate of the community" depends on this. The ant therefore becomes a counterpoint to the bacchic lightness of the cicada. The latter, however, with its hymn to carelessness, *chi vuol esser lieto, sia* (De' Medici 1991), certainly does not seem to lack wisdom, given the short number of days left to the insect once it has left its exuvia. Each behaviour is coherently embedded in an overall style, without smears or contradictions. It is no coincidence that the classical tradition of Phaedrus and Aesop handed down wonderful fables based precisely on the qualities of animals, where each species is an embodied idea, a predicate that can be extracted in its essential and translatable qualities. Animals seem to be directly responsible for the ingenuity they display, the latter being the result of their single, active presence at the interface with the world. Nevertheless, we must not be misled by this project-based epistemology, by this eagerness for finalism.

The aerial image of nature offered by natural theology claimed to extract proof of the divine creator from the harmony of the whole, where every correlation took on the title of perfection, mirroring the omniscience of its designer. The metaphor of the watchmaker, formulated by William Paley (1743–1805), was intended to justify the presence of a divine design. This would later give way to the counterargument by Thomas H. Huxley (1825–1895) who, by entering into the details of life, in the ruthlessness of the struggle for survival, could find, on the contrary, evidence that there was no beneficent author. For Darwin's Bulldog, it was not permissible to attribute the deadly harmonies of living things to a benevolent deity, but rather to the lack of one, so the dictates of natural theology could even be reversed (Huxley 1893). Once again, an attempt was made to identify a universal through a personifying projection: the harmonic design was contrasted with the struggle for existence.

Darwinian evolutionism has provided us with a key to explain how animal traits respond to the challenges of the world: the principle of adaptation, that is the gradual emergence of the most advantageous traits (fitness) within an animal population. Once we understand the evolutionary mechanism by which a better performing character is more represented in subsequent generations, the slow process of adaptive correlation becomes clear. What is so extraordinary about living things? The answer is simple: they reproduce. But not everyone succeeds in doing so during their lifetime, so that over time a kind of accumulation of advantageous traits is

created in a species, depending on the lifestyle and environment it adopted. The reproductive differential strongly depends on several factors that affect the population of a species, inducing a selective pressure, which can be more or less powerful depending on the available resources and which includes different selection levers according to the characteristics of the species. The behavioural wisdom of animals can be treated in the same way as the information that chisels the adapted body of different species, regulates cascades of physiological functions and keeps the system in a state of metabolic homeostasis.

The risk, however, is to fall back into the error of finalism, attributing to natural selection the same teleological matrix previously assigned to the omniscient designer. On the contrary, taking Darwinian thought to its extreme consequences—a task which, in my opinion, was carried out by the palaeontologist Stephen J. Gould (1941–2002)—angels and demons no longer have space in the world of the living, because life on Earth neither followed an a-priori design nor can be compressed into the selective algorithm (Gould 1989). Phylogeny has generated events, rehearsing its morphopoiesis in a chaotic manner within the constraints of necessity. Only a generous flowering of forms from below, subjected to the grinding of fitness along the score of time, that is of its incompressible historical dimension, could have achieved such an admirable concert of adaptive adherence. Every form of finalism and predetermination fails, and with them fails the essentialist claim of an idea embodied in the morpho-function of a species. At the same time, thanks to evolutionary dynamics, it is easier to understand the process of information build-up in animal predicates, producing skills that do not require individual dexterity, because they are the fruit of phylogenetic wisdom.

Without this clarification we would risk confusing intelligence with performative competence: but this is precisely the mistake I want to avoid. In order to search for intellectual subjectivity, it is necessary not to be misled by the carnival of adaptive respondence of multiform species-specific performances. However much we may continue to be amazed at these competences, once we understand the morphopoietic guidelines of evolutionism, we no longer need to invoke individual wisdom to explain precision and adherence. We could say that the performative marvels we observe, even when they act with perfect adequacy to the problematic context they have to address, should be read in the light of innate information, built from below by accumulation. In other words, these are standardised abilities, the result of pre-established schemes and sequences,

which in reality have very little to do with the process of *intus legere*, that is looking inside a problem and formulating a relevant answer *ex-novo*.

This knowledge diluted in time, a knowledge that belongs neither to the individual nor even to the species—since there are countless skills acquired from ancestors common to other animals—should make us reflect, if anything, on the relative importance of the individual in the great river of life, placing a sort of *epoché* on the narcissism that elevates individual experience to the sole engine of knowledge. We could say, then, that the biosphere learns through the generational repetition of its creatures, bringing out morphological and expressive features calibrated to the needs of the lifestyle and environment of each species. On the other hand, these forms, constantly tested and changing due to the transformation of surrounding conditions, do not pre-exist the great palette of possibilities, but are simply enabled by it. Life itself is a process of knowledge: this can be seen in its colonisation of the Earth, in the priority given to development and reproduction, in its resistance to thermodynamic decay, in its capacity to accumulate information within the aperiodic crystal of DNA, in its modification of the environment and thus the matrix of selective pressures.

It is marvellous to study these plural variations on the theme of replication, to discover how one law, that of mutation with differential reproduction, has created a multitude of strategies and relationships that exceed our capacity for understanding. This process transforms the individual into a small portion, an infinitesimal fraction of a magmatic whole that travels through time and brings back its traces as resonances: the individual is a fossil of a lost world. The parable of the individual is always fascinating in its budding, opening up to the world and building an existential singularity. And I continue to be amazed by the memory of the experiences that came before me and that still live inside me. We think of ourselves as corpuscles, totally disjointed monads, thrown into the world in a state transitory Being-there, yet we have already been in the world. We are an organic part of a flow that transcends us, and the innate memory that each of us has received from phylogeny speaks of this "having-been-there-before". It brings back fragments of non-human ancestors who preceded us, so that even our presumed identity as a species has blurred boundaries: we resonate with ancient worlds that, though past, have never really come to an end.

The individual is the fruit of a process that is metamorphic and sedimentary at the same time, a sort of epistemology of the living that, in the

body, bears the stigmata of the useful cognitions that have evolved and been maintained in the species. The river of life changes over time, collecting, albeit partially, the succession of remote experiences, since, as Konrad Lorenz suggested, the a-prioris are nothing more than phylogenetic a-posterioris (Lorenz 1973). Traces of distant memories cross the species threshold so that, in spite of the essentialist view, the individual carries within itself endowments that evolved in its progenitors, so that even in the behavioural sphere we can speak of homologies, that is of traits of trans-specific similarity through common inheritance. Each species develops its own competences because the complex dialogue between population and environment leads to the emergence of a niche and a rank, acting as a chisel on useful traits. But at the same time each species does not evolve *ex nihilo*, so it retains other skills that evolved in its ancestors: each vertebrate tetrapod retains in some remote corner of itself echoes of a liquid world in which it swam in its distant past as a fish (Shubin 2008).

Today we know that different geological periods have followed one another on the face of the Earth, with equally different players, creating ecological balances that cannot be superposed on the one that finally took place in the Tertiary era, which saw the emergence of mammals and birds. On the one hand, evolution is constantly producing new forms, and on the other hand it is just as voraciously dissipating them, following the biological timeline, so that what we are seeing today is not an Eden prepared by an omniscient mind, but just a point in time of life on our planet. This, however, is an important stage, whose biodiversity has been achieved over millions of years. Incidentally, this awareness should make us reflect on the absurd way in which human beings are destroying it at a rapid pace, having known no more than an infinitesimal fraction of it. The innate reminds us of our participation as individuals in something greater that develops over time and has its most important expression in this diachronic dimension. We cannot, in fact, understand the individual, in its orientations and impulses, if we try to detach it from the generational flow.

Expressive Singularity

It is not my intention to belittle the innate dimension, that performative articulation of living beings which does not descend from the creativity of the individual, but from the legacy received from phylogeny. I do not wish to downplay the elegance and complexity of instinctive strategies, but, on the contrary, to place them in the dimension they deserve. What I am

proposing is to distinguish this form of creativity of the living—which is diachronic and diluted in the succession of generations through processes of natural selection—from the creativity of the individual. In fact, I would like to point out that it is not precision or competence that should be called upon to bear witness to animal cognition, because in very many cases—obviously not all—this performance does not belong to the individual, but to an entity dispersed over time and transversal to the various forms of life. Phylogenetic wisdom has always fascinated me, precisely because of its transformation of the individual into a drop in the great sea of life, so that its presence is far from being annihilated or alienated, but on the contrary finds comfort in the fact that it participates in a realm of knowledge that goes beyond its temporal presence. Each living being emits a resonance that lingers in the great flow of life, associating itself with all the others. However, each can leave an imprint on this flow, in which the individual is both moved and moving. And that is what I intend to talk about in what follows.

The subject of this book, therefore, is not the innate wisdom of animals (although this is fundamental to understanding the identity of the various species), but their creative capacity and therefore also their ability to improvise in the great lottery of life. The fact that an individual does not start from scratch when entering the world but can make use of skills developed by natural selection over generations is certainly an important argument that should not be underestimated by assigning every expression of the individual to the manifestation of its ingenuity. On the other hand, this heritage should raise at least a second question, namely: what is the relationship between this heritage and the individual? We can believe that the individual is nothing more than the passive executor of innate neurobiological algorithms, thus adhering to the model of the "animal machine" professed by René Descartes (1596–1650), or we can consider this heritage as a set of endowments that the individual actively uses. Choosing this second option would certainly lead us to a different order of ideas, one that values and focuses on the individual in the expression of its existence, because we would assign the role of protagonist to it.

This perspective is precisely what I am going to develop, trying to show how the model of simple repetition and passivity in the exercise of phylogenetic endowments cannot stand and how, on the contrary, the singularity of individual action is the only way to enliven phylogenetic memory. What I am trying to suggest is that innate competence should be distinguished from the use the subject makes of it, adapting it to several

situations and often adjusting it where necessary. Without being a passive executor or even a puppet moved by the strings of the innate, in reality the individual most often uses its innate competences in a rather flexible way, but sometimes even in an innovative way if not as a solution to unexpected problems. In other words, what I am proposing is not to question the innate, but rather the interpretative model usually adopted to outline phylogenetic competence: that concept of automatism which claims to be the only key to explain animal behaviour.

If phylogenetic information is thought of as the constitutive basis of automatisms, it is evident that there is no room to speak of expressive subjectivity. If, on the other hand, we consider the innate as a set of endowments available to the individual, a totally opposite explanatory question appears: the protagonism of the individual becomes, then, an inescapable explanatory factor. In this case, it is true that the individual does not start from scratch—we could say that the competence it manifests is not all its own making. However, the innate does not give rise to automatisms that passively drive the subject, but to endowments that the individual uses: (1) to build tools that are even more adherent to the specific situation in which it finds itself; (2) in a fairly free manner, like any other tool. When it comes to animal subjectivity, the alternative between these two models is the real issue, not the appeal to consciousness or the appeal to the astonishing abilities of the animal world. In fact, the problem does not concern performative extraordinariness or awareness, but ordinary behaviour—the very foundations of animality.

The question brings us to a central issue, namely whether we can speak of animal subjectivity or whether we must recognise that the animal is nothing more than a puppet moved by its own innate strings (Marchesini 2016). Tradition seems to continue to prefer the deterministic model based on automatisms, where it is the innate pattern that drives the individual. This explanation merely refers to the trigger, whether a drive or a stimulus, maintaining the direct and analytical relationship between input and output, that is reading behaviour as the expression of an automatism. It is clear that as long as we continue to explain animality in this way, there is no point in talking about subjectivity. I have referred to abilities, because any performance, even the most complex or extraordinary, can be carried out by a machine on the basis of adequate information. We have seen this with the development of extraordinary software capable of acting as an expert system, of neural networks capable of learning and modifying their

functions, of robots that have become increasingly interactive in the environment (Hutter 2004).

Similarly, I questioned the appeal to consciousness because any intentional gradient is a reference to something, an illumination of a certain event or process, which must therefore precede the reference or explication. If the individual is an empty room, it is not enough to turn on the light to furnish it, since it is its automatisms that animate it. I believe that the study of animal consciousness is very important and should be developed more fully, and yet it cannot be consciousness that sustains subjectivity. Consciousness can only make subjectivity explicit—in the human being, it can make it declarable. In other words, it can only shed light on subjectivity, but not create it from scratch. If endowments were automatisms, subjectivity would be mere appearance; it would then make no sense to attach consciousness to something that does not exist. To appeal to consciousness is to avoid the issue of subjectivity, that is to use it as a kind of deus ex machina.

The automatism model is based on the direct relationship between trigger and performance (in the behaviourist view, the stimulus-response nexus), which therefore can only repeat the performance or place it within pre-established cascade chains, domino style. Being a subject means having a certain freedom of action in relation to the world, having agency over one's own endowments and not being a slave to them. The individual never repeats, even when implementing similar behaviours: rather, it is reminiscent of a craftsman who uses his own tools, with competence of course, but with the power to use them as he wishes. Subjectivity calls us to give meaning to the individual, a meaning that, if it were merely to repeat itself, would certainly be negligible. Indeed, this meaning is given by the singularity of individual action, which is first and foremost presence and not simply the echo of a past that imposes a certain behaviour. The singularity lies in the individual act, in its emergence from the here and now to impose an orientation and thus give rise to something that did not exist before its action. Reading heritage as automatism denies any space to subjectivity, because it deprives the individual of ownership of its endowments.

The automatic and repetitive conception of animal behaviour, associated with random expression in the attempt to find a solution, has been the prevailing view in twentieth-century epistemology, even if, in my opinion, this explanation has more than one flaw. The most macroscopic error is the pretence of directly and exhaustively linking behaviour to

endowment when, on the contrary, it is evident that the individual would not be able to manage the multifaceted everyday situations it encounters if it had no free use for its endowments. Being able to use them freely means: i) being able to make them more and more adherent to the specificity of one's life context, by producing new endowments; ii) being able to use them in a flexible way when faced with situations that do not require the simple repetition of a competence, but a careful work of adaptation. The innate, then, rather than a repetitive automatism, is more like a "tool" available to the individual, which can evolve, generate new endowments and be used flexibly. Subjectivity, therefore, is realised through the biographical singularity with which it arranges its tools and thanks to the possibility of using its tools in a flexible and creative manner.

In this model, innate competence alone is no exhaustive explanation for a given behaviour, at least no more than a helm can account for the steering of a boat. The subject is therefore the helmsman, to keep this metaphor, who uses and supervises the equipment. Phylogeny sets up patterns of expression that are in some ways very much in tune with the particular challenges that the species faces, based on the given lifestyle-environment. However, the world is not a stable stage, not even in the short time span of an individual's life, so it is necessary to adapt one's heritage through new acquisitions. Innate endowments are therefore essential, but not sufficient to enable the individual to rise to the challenges of the world. At the same time, the individual must be able to use these endowments in a flexible manner, so that they are more like tools than automatisms: the individual uses them, it is not they who drive it.

In adaptation, the innate represents the starting material through which individuals construct their adaptive biography to match the specific conditions in which they find themselves. The innate provides the individual with an initial syllabary of behaviours that have already been experienced by previous generations, displays that realise the fundamentals of the species and support the individual in its first steps into the world. But the innate does not only have this "tutorial" function towards the young individual without first-hand experience of the world. It also represents the developmental substratum for the construction of new endowments, those which we define as individual. The innate is an interpretative tool, one could say a theory, or an operational tool, a heuristic, which allows the individual to construct new theories and new operants, as in the genetic epistemology developed by Jean Piaget (1896–1980). The subject,

therefore, always represents a singularity on the stage of life, both because it modifies its endowments and because it uses them freely.

What, then, of the particular kind of competence that appears to us as a kind of species uniformity, whereby we detect a kind of species-specific repertoire? Undoubtedly, different animals exhibit behavioural recognisability, an identity of expressive traits, as well as a certain morphological structure and a well-defined physiological regime. When we observe the behaviour of individual members of a species, we find uniformity of expression, so that individuality seems to disappear, to be nothing more than background noise. Yet that noise should be taken into account far more than we do. It is one thing to detect common traits among individuals of a given species, quite another to claim that the innate is manifested through automatisms and that individuality must be considered background noise. This tendency to homologate is the result of an interpretative bias, the perspective distortion which leads to zeroing out the differences between various entities when we place them at a certain perspective distance. It is the same effect that, for the ancient Greeks, turned all non-Hellenic peoples into barbarians, and it is the same effect that makes us speak of animals as opposed to human beings. It is how we observe the population that generates our standard of reference.

If, on the other hand, we deal with the individual, and therefore use a different lens of observation, we realise two things. The first is that the species dimension, rather than a precise standard of behavioural patterns correlated with different situations, appears as a range of possible variations within the same theme. In other words, the innate generates a field of virtuality of development, within which we find the singularity, that is, the protagonism of the subject, which achieves a unique and unrepeatable identity. This field of virtuality of development and singular expression paves the way for significant differences between one individual and another and between one moment and another in the life of the same individual. This highlights the importance of subjective experience, which is capable of transforming the innate not into a mere echo of the past, but into a resource that the individual brings to life and evolves through its interaction with the world in the course of its existence. The innate therefore becomes available as a useful resource for the subject and not as a source of determinism.

In fact, the individual receives its phylogenetic endowments or what I have called innate memory, but then, through its individual experiences, adapts this heritage, developing an expressive identity that distinguishes it

from all other subjects. On the other hand, the phylogenetic endowments, precisely because they constitute the "building" material of the learned, define constraints and possibilities, giving rise to the range of variations on the theme that characterises individuality. The animal, therefore, incorporates two different experiential matrices: the phylogenetic one, relating to the experiences of previous generations, and the ontogenetic or biographical one, relating to the experiences of the individual. However, these are not two juxtaposed worlds because, as we have said, the innate is the basis of learning, so that the two identities actually form a single dimension. This means that, precisely by remaining within the canon of the species, the individual manifests a distinctive expressive personality.

The second interesting thing is that when the same individual faces similar situations, we would often expect a certain behaviour to manifest itself in the same form, yet we observe, on the contrary, a further variation on the same theme. In other words, the individual never automatically repeats the same pattern, even when in situations that present overlapping problems. There is always a small difference: it is as if we were always making a slight diversion when returning home from the same place. In this sense, we can say that, while learning produces individual competence, giving rise to a well-defined personality, in this case the use of the endowment does not resemble the triggering of an automatism. Rather, it is a singular expression that inevitably produces a variation on the theme of the acquired competence. To simplify, we can say that while learning also produces competence, the individual never simply repeats what it has learned in a standardised way, but always adapts it to the specific circumstances.

This second aspect of singularity sits alongside the biographical composition of the individual, whereby singularity is a matter of the utmost importance. Just as the speciation event represents an emergence of singularity within its starting taxon, so the individual is singular within its species, and its here and now defines a subsequent moment of singularity. Singularity indicates that there is always a creative protagonism in the living that can never be dismissed (Bergson 1907). Standardisation is therefore a deliberate result, the outcome of filtering out individual differences and expressive singularities. In reality, an animal cannot simply repeat itself if it is to deal with the singularity of reality because, in adhering to a particular situation, it must always manage a degree of novelty, however small it may be. In fact, situations present themselves in terms of similarity, but

never complete identity, so competence is not enough: one also needs creativity, that is the free and particular use of one's endowments.

Creativity, in fact, is a far cry from competence; more often than not, it is opposed to it, resulting in sketchy works, functionally clumsy DIY, a misplaced use of tools and juxtapositions bordering on the paradoxical. Creativity is often uncertainty, contradiction, it appears as a lightning and unrepeatable flash showing the solution or as a long reflection often lost in suspension or failure. Creativity increases when the degree of novelty to be managed is considerable; it manifests itself most clearly in challenging situations. This is where a mind in action is revealed: in a moment of difficulty, when competence alone fails to grasp the opportunity or the danger of the situation, in a situation which shows a gap between the stimulus and the response. Yet even when the degree of novelty is small, there is still something unforeseen to handle, that is, there is a need for the helmsman to use its resources in an innovative way. Not blind repetition, but the animal's ability to attend to its here and now: that is what can lead to adaptive adherence. This adaptive intervention, even in failure, reveals the intellectual work of going beyond the appearance of habit and the repetition of the acquired. The package of information possessed by the individual is necessary, but not sufficient to explain the expression.

But then, what is the relationship between competence and creativity? It is not easy to answer this question, because any behaviour expressed by an individual is always a mix between these two components. We can say that in certain situations the contribution of creativity is very modest, limited to adapting competence to the singularity of the situation being experienced at the time, managing a narrow margin of novelty. The level of creativity in these cases is not even remotely comparable to those situations in which the animal lacks endowments predisposed to that type of problem: then creativity peaks and manifests itself in hesitation, partiality and improvisation, which often lead to a failed attempt to find a solution. An intermediate situation can be identified in the process of assimilation-accommodation exposed by Jean Piaget, where it is possible to find a bridging endowment that allows the development of a new competence (Piaget 1971). However, even when the degree of creativity is small and limited to modifying the expressive volume of the response or generalising its scope, even in these cases it is not possible for the animal to simply repeat a pattern: a touch of creativity is always necessary.

We could summarise this statement by saying that "it is not possible for an animal not to be creative". In fact, even innate competence requires

reapplication, a touch of creativity, because when faced with the fluctuations of the world, repetition is of no help. What, then, of species-specific competence? As I said, it is difficult to deny that there are traits of behavioural identity within a species and that some expressions of competence are not directly acquired by the individual. There is no doubt that: (1) it is possible to find general patterns in the behaviour of species, repetitive patterns that individuals of a certain taxon have in common; (2) there are innate behavioural patterns that adhere very closely to the adaptive problems faced by that species, what I have called "phylogenetic knowledge". It is necessary, however, to place the apparent uniformity and repetition of patterns within a particular observational perspective: one needs to be aware of using the lens to find patterns, not the lens to capture fluctuation. The skills we detect in the animal world are far from being as precise and standardised as they appear at first sight, and far from being mere repetitions.

There are species-specific patterns of expression: these are configured through hereditary contributions but also through social learning and interactions with the niche to which they belong. So, if we focus on these patterns, the behaviour of various individuals seems standardised. In reality, each pattern is nothing more than a basic script that the individual interprets with a range of expressive freedom, which may be greater or lesser depending on the situation. But looking at what generically appears to be uniform—identical among individuals of a particular species—the more we go into the details, the more it exhibits marked differences. In reality, species behaviour is not a standardised canon of expression, but a range that allows each individual to position itself in a singular way within experience. And it is not simply a matter of admitting individuality in the declination of a pattern, but of accepting that there is situational freedom in the expression of a pattern.

The homologated reading of phylogenetic competence stems from the model called upon to explain its application, a model based on the desubjectification of the non-human animal, such that competence itself—understood as automatism—could be exhaustive in the explication of the behavioural phenomenon. The model was designed precisely to do without a subject as the helmsman of its own competences. In accordance with the Cartesian paradigm of the automaton-animal, it was essential to transform the innate and learned endowments into automatisms capable of explaining behaviour, without involving any entity delegated to supervising the individual's expression in the here and now of the situation. This

meant constructing a full overlap between accumulated competence and compliance of the implemented behaviour. Automatism, in fact, does not require presence, because it is free from control and not subject to calibrated application. But if this were the case, we could not speak in any way of animal subjectivity, because once the ownership of use of the endowments is lost, the presence and, with it, any attribution of inherence in the animal also necessarily vanish. We can, therefore, speak of animal subjectivity only if we admit a present individual that is capable of applying its innate and learned endowments freely in every situation.

The Art of Improvising

Competence can be discussed in various ways. At times one can note the correspondence between the structure of the body and the animal's expression—the stick insect, for example, not only has the shape of a twig, but also sways as if moved by the wind, just as the cat, in addition to its plantar pads and retractable claws, also exhibits stealthy behaviour. At other times one can stress the adherence of innate behaviour to the adaptive challenges of the species. There is one aspect, however, that is before the eyes of any observer: the here-and-now aspect of animal behaviour, the fact that it can never be assigned to the domain of mere repetition of prior skills.

The animal is present in the moment it is living, it is not directed towards a past of automatisms to be triggered, but is always alone in front of what is happening to it. Animal expression is always a work in progress, a phenomenon that takes shape at the very moment it takes place, according to the situational here and now in which the subject finds itself. The animal has to invent its behaviour whenever an opportunity presents itself, gathering everything at its disposal and trying to produce the best possible response. Most of the time it fails, but it does not have the easy option of simply reiterating the skills it has acquired: every time an animal expresses a certain behaviour, it has to apply a little creativity.

More often than not, competence, whether innate or acquired through experience, provides the individual with endowments that are sufficiently suited to the challenge it faces, sticking to an adjustment-based approach, that is a partially innovative use of the instrument. In these cases, it is sufficient to find new operational paths or try other ways of using the endowment itself. At other times one has to rely on the art of improvising, like a trickster capable of shaking up the cards in order to find an entirely new or

unusual solution; the individual must try and make attempts, after having understood the problem. The term "improvising" may seem far-fetched, and it is obviously necessary to clarify very well what is meant by this definition. Indeed, although it may seem unproblematic and intuitive, in reality it requires explanations that are anything but simple. When we say that an animal is also called upon to improvise when going about its ordinary business, we are primarily saying that competence is never sufficient in the difficult task of adapting to the specific nature of the situation.

Of course, gaps can always be filled through the acquisition of new information or by modifying or adapting innate endowments. This is often what happens. Yet even learning is not sufficient to explain the development of behaviour, which is never a linear or algorithmic sequence of sedimented information, but rather a composition that takes place in a singular way in the here and now of the subject's expression. In other words, behaviour is more like a dialogue between the individual and the world than a linear sequence of already structured expressive units. When I say that a behaviour is never a repetition of a pattern, but is always an interpretation, that is, a singular way of using an endowment, I mean to say that the individual always has to put in place a creative surplus to manage a margin of situational novelty. The particular condition experienced by the subject is singular, and the ability to respond in tone is always urgent and immediate.

In order to do this, it is not enough to make use of previous responses, be they innate or learned: it is necessary to accept the challenge of the ad hoc responsive predisposition. This of course may have different degrees of complexity, but is always an emerging product in the animal's interactive here and now. In other words, the individual must use its own previous endowments as useful material for developing responses that adhere to the particular nature of the situation. This means that the model of the innate endowment, however related and schematic in its structure, as mentioned above, cannot be thought of as ready-made, so that it only needs to be applied. On the contrary, it must be viewed as an instrument that presents a multiplicity of functional outcomes and is also endowed with internal plasticity such as to allow an immediate reconfiguration when necessary.

Admitting a certain amount of creativity in all animal behaviour—that is believing that the expression occurs at the very moment the animal manifests it and is not a simple repetition of a previous pattern—means questioning the model with which we are used to explaining animal

behaviour. Let me be clear: the problem of subjectivity lies primarily in this, that is whether we think of behaviour as a product freshly made by a mind in action or whether we consider it the expression of a preset mechanism. In arguing for this inevitable "expressive improvisation" of animal behaviour and this poietic role of the mind, which does not limit itself to repetition but continually produces content, I do not want to diminish the importance of the past, whether innate or learned. In fact, it is one thing to consider this background in the form of fixed schemes, which are activated when stimulated by triggering factors, and quite another to think of these endowments as construction material, which allows the mind to produce the expressive result in a specific way, that is in the moment.

In the mechanistic paradigm the animal is a puppet not because it possesses endowments of competence—I do not wish to question this in any way—but because it simply has to obey them, it does not own them. This means that, in fact, it lacks presence in the here and now (it cannot attend the event), because its actions are nothing more than the repetition of something already set. In this model, the individual is absent, so that animal behaviour does not require the work of a helmsman called upon to adapt the instrument to the situation. In this model, the endowment, in its trigger-sensitivity and productive automatism, is considered exhaustive in explaining behaviour. If, on the other hand, behaviour is the instantaneous fruit of a mind-in-relation with the event, however corroborated by all the endowments of competence it possesses, it is evident that expression always requires a touch of improvisation and never arises from mere repetition. The subdued and local nature of behaviour, its being improvised—*in provisus*, that is, not fully predictable—means that it is impossible to explain animal experience through a static model, which defrauds the individual of creative capacities and of ownership over its resources.

Clearly, the explanatory model needs to be modified in order to understand animal creativity, and it is not enough to appeal to superior cognitive faculties—perhaps it is not even necessary. It is not a question, therefore, of carrying out a simple operation of retouching, adjusting or fixing up the traditional model, perhaps by adding this or that cognitive endowment, as was attempted in the last decades of the twentieth century. In so doing, due to the multiplication of falsifications and exceptions that escape every single model, we have gone so far as to produce an explanatory tripartition of animal behaviour. We use (1) the psycho-energetic model for the innate, through the drive motive; (2) the associative model for learning processes, by virtue of the concept of conditioning; (3) the elaborative model for all