Systemic Relativism
A philosophical exploration of chaos and creation, evolution and intelligence.

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Illustration on the front page: 'Raven's Nest' by Dave Smith (Kwakwaka'wakw, Canada).

For Anne

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Introduction

This book is an invitation to an exploration, an exploration of life. Life has many aspects and can be viewed in many ways, but the exploration I propose will be of the philosophical type. Biology, known as the science of life (that is what the term says), studies how life originated, how it is constituted, how it evolves, how organisms function, how they relate to each other and much more. Philosophy, on the other hand, takes life for granted and wonders how we, humans, can deal with what we experience as our life, how we relate to each other and our environment, how we function as communities, even how we evolve and what we may consider our future. All questions that have to do with the position of humans in life, their relation to life, to the world and to nature in general.

We humans are definitely peculiar participants in the realm of life, and life as a phenomenon in nature. As biological organisms, we are endowed with a most intricate organ, our brain, which we perceive as the seat of our mind. We call that experience 'consciousness'. This consciousness makes our exploration of life possible, just as it makes biology and any other type of science possible as well. As a species, we are able to study life as a phenomenon, including how *our* lives are constituted and develop, but we can also view our lives as what we call 'ourselves'. To explore our position as humans in the big system of nature is what I am inviting my readers to do with me. The territory we shall have to cover will undoubtedly be rugged and perhaps unaccessible, and we have only our minds to hold onto. It makes one think of the vertical rock climber who has to attach the rope he needs to pull himself up.

To marvel at life and the place humans have in it, is of course as old as philosophy. What makes the present day situation different are the enormous advances science and technology have made in the 20th century, and in particular biology with the discovery of how our brains are constituted and how they function. I shall argue, agreeing in this with many philosophers, that philosophy is a science in itself, because it uses scientific methods, namely the development of theory and the verification of the proposed contentions by experimentation. As a result, philosophy is dependent on other sciences and vice versa. This dependence will be central to our exploration. Since science has changed so much, philosophy has to as well. We are on new territory here.

This is why I wrote this book. As a scientist and engineer who has been interested my whole life in philosophical issues, I have been confronted with the many and fundamental changes in scientific thinking that occurred in the 20th century. Many of them are spectacular, but not all of them are directly relevant to philosophy. In the first chapters of this book I shall account for those that I consider indeed very relevant to our quest, and thereby lay the basis for our exploration. They are: new fundaments for logic due to Gödel; 'chaos' as a pervasive phenomenon in all non-linear dynamical systems; the related 'emergent behavior' that makes creativity in many new directions possible; and 'evolution' and the emergence of 'intelligence' as its present main driving force. All the terms used so far shall need careful definitions. This will be an important part of their exploration.

The new insights in logic, in the wake of Gödel's incompleteness theory, now a central tenet of logic, will force a relativistic approach on us. This will be perhaps the most contentious part of our endeavor. Relativism has been decried as a major philosophical mistake and the basis for licentiousness and lack of ethics. However, the brand of relativism that I shall follow does not allow for such things, quite on the contrary. I have called it 'systemic relativism'. There shall be no relativism *within* a carefully defined system of thought, but the precise definitions, premisses and methods of that system, what we shall call its context, will always remain subject to criticism, say from 'outside'. This process of criticizing a given system necessarily requires the definition and development of a new system of thought outside the original, with its own premisses and methods. Following that insight, we shall need to reconsider such age old notions like 'semantics' (or the meaning of utterances), 'truth', 'freedom' and 'epistemology' (or the theory of knowledge), none of which will have an 'intrinsic' or absolute meaning. We shall have to clarify these notions in the new context of systemic relativism, devoting several chapters to them.

However, the main issue this book aims at, is the development of ethics in the context of systemic relativism. We shall discover that the incidence of chaos and emergent behavior makes unfettered creativity possible, only limited by controlling power structures, which are mostly emergent as well, that is, largely unpredictable. Although 'survival of the fittest' (within a specific environmental context) is the natural biological controlling principle, the evolution of life has gradually developed intelligence as another, very successful, steering agent. Ethics will be seen as an intelligent layer that supervises the quality of the systems humans and their societies try to develop, much like design engineers do, who use the knowledge of their art and the goals of their designs to implement their quality ambitions. Ethics so becomes an evolutionary driving force in its own right, defining novel teleologies based on intelligent quality assessments. These may be well conceived or not, but without ethics, any new development would lack direction, but, as there is no absolute 'good' in systemic relativism, there is no absolute ethics either. All actual ethics will hence need control on its quality as well. Such an escalating process of evaluations necessarily makes all ethics evolutionary. How this works out is an important part of our treatment of ethics.

Our exploration then ends with a critical analysis of the common notions 'principles' and 'religion', and a comparison of the likeness or differences with some other systems of thought. Given the wealth of topics to be considered and their intricacies, our exploration will only be a beginning, and an invitation for ever deepening further forays. But this is not any different than any other scientific exploration. The more we get to know, the more questions emerge, or, as the old Chinese poet-philosopher puts it,

> From wonder into wonder existence opens.

Acknowledgements

I am indebted to many people who have kindled my interest in philosophy, starting with incomparable teachers in my high school, Sint Pieterscollege, Leuven, Belgium, where the spirit both of scientific enquiry and respect for civilization was very much alive and enthusiastically communicated. At the Catholic University of Leuven I followed the courses of, in particular, Dondeyne, Ladrière, De Smale and D'Hondt on various philosophical topics. Over the years, I participated actively in a philosophical reading group (the 'Circle'—*Kring* in Dutch) and am very much indebted to several of its members for both providing reading motivation to sometimes difficult texts and critical analysis. Thank-you, Christine van Ham-de Vries, Klaus Reinhartz, Jan de Haan, Koosje de Neef and Hans Blok for continuing this effort, participating in many hours of discussion and providing invaluable interpretative inputs. I am equally grateful to all the former members of our Circle, too many to mention by name. Nonetheless, let me single out two of my colleagues and former members of our Circle to whom I am especially grateful for so many fruitful interactions in the past, Aad de Hoop and Jacob Fokkema.

The discipline that preoccupied me professionally most of my life was dynamical system theory. When one starts thinking about what makes systems tick, one very quickly discovers the enormous incidence of (mathematical) chaos, a central concept in dynamical system theory. *Linear*, time invariant dynamical systems are important because they can be engineered

and controlled very precisely, but most systems in this world, especially biological systems, are highly non-linear and hence most often than not subjected to chaos. Chaos is at the roots of emergent behavior, a concept pioneered among others by the Belgian Nobel Prize winner Prigogine, and hence also at the roots of the emergence of intelligence. From there, the step to continuous creativity and emergent teleology is not that big. Many scientists and colleagues contributed to my thinking on dynamical systems, let me just single out three with whom I had the most intense contacts in this area, the late Rudy Kalman, Tom Kailath and Leon Chua, of course not to talk about my many students, with whom I had so many direct and illuminating interactions.

All this means that I am very much indebted to lots of past and present writers, philosophers, scientists, colleagues, friends, family members and discussion partners, so many that I do not feel capable of making a list that would do right to all the people who deserve it. I mention a few of them in the text, but I do feel very much indebted to so many more. I do want to mention my dear, wise, generous and loving wife Anne, my charming children Sabine, Benjamin and Muriel, and my equally charming children-in-law Bart, Elisenda and Jan, because of the way they enriched my life and in particular the many discussions I had with them over so many years and the many ways they have influenced my thinking. A special note of thanks goes to my son Benjamin, who went through the text in its early stages and contributed many suggestions for improvement. In about every chapter I got the feeling that the list of people I am indebted to is even longer than the text itself!

In a different direction, I feel very much indebted to my grandchildren as well, who not only provided me with a charming laboratory of chaos, allowing me to watch the wonderful emergence of unique capacities in each of them close by, but also succeeded in keeping my two feet on the ground when my mind was drifting off in too theoretical endeavors. I wish them, Noémi, Keiner, Nathan, Yuleidis, Lucas, Joel, Aurik and Alejandro, and all our young people wherever, a new world of sustainability, intelligence, creativity and humanity, but I am also conscious of the fact that the world my generation leaves to them needs major improvements to meet even the most elementary quality standards. May this book be a small contribution towards that goal.

Concerning the final redaction of the book I got substantial help from a professional editor, Ms. Melitta Konradi, who not only extensively corrected my Dutch-tainted English writing, but also contributed structural elements in aesthetics and neural science, based on her extensive experience with those topics both as an artist and as an editor of scientific papers in these areas. Thank-you, Melitta, you have been of great help in improving

both the content and the form of this book.

For the illustrations, I am very much indebted to Martha Waijop, a famous Dutch sculptor with a very original and characteristic style, who succeeds in representing complex ideas in a direct and almost natural way. Thank-you Martha for allowing me to use your work to enliven an otherwise dry text.

In the course of writing the book I got material support from the TUM Institute of Advanced Study, which offered me very nice office space and accommodation so that I could develop my ideas and do the writing in comfort and peace. I am very grateful to the staff of the Institute for making all that possible. In the same period I was also a formal guest of Delft University of Technology, which allowed me to make effective use of library and computer facilities there, for which I am also very grateful.

Typography

To conclude this introduction, a word on typography and usage. I use single quotes, as in 'good', for words that acquire their meaning in the text (or to put it differently: that are used in a specific way); double quotes for quotations as in Teilhard de Chardin's famous "voir ou périr"; and a capitalization for proper nouns (as in Truth, indicating the chapter on the topic, while truth is just the noun.). Indeterminate gender of a human actor creates a problem. Recently, the use of the plural for reference to a single person of indetermined gender has been accepted by some scholarly groups (for example the American Psychological Association). In the course of writing, I have started to adopt this last convention.

Each chapter is preceded by a short italicized summary of its main line of thought. This is mainly for easy content reference between chapters, as many are highly dependent on each other.

Illustrations

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Page 242: Andreas Vesalius dissecting a corpse. From *De humani corporis fabrica.*

Martha Waijop, *Lady of the Night*

Chapter 1

Socrates

Socrates defined ethics as "how to live a good life" and this book starts out fittingly with discussing this point, since its main concern is the development of a philosophy that closely adheres to the objectives of one of its main founders. In starting with Socrates' view, it follows the work of the late Bernard Williams, who makes a case for a broad definition of ethics as how a person or a society envisage their life process. Williams distinguishes ethics from morals in terms of what is obligatory behavior, mostly in critical situations, whereby the assessment of a critical situation or whether obligatory behavior is called for is dictated by the chosen ethics. Socrates can be seen to adopt a relativistic view from the start although it may seem that he compromises relativism in his dialogue with Protagoras, but a careful consideration of his position shows his extreme skepticism towards any formal claim of truth, making him de facto a 'systemic relativist'. The opposition between unfeathered relativism on the one hand and an uncompromising acceptance of at least some absolute truths makes an intermediate position necessary, which is also the position Socrates seems to take. Socrates' question can be interpreted as 'how to design one's life' or 'how to design society', which brings up the question of how to judge the quality of one design with respect to another. Evolution and the role of intelligence in it are bound to play a role in the treatment of Socrates' question.

In the market place of ancient Athens, the Agora, people met not only to exchange goods, but also to discuss politics, gossip, comment on events, communicate ideas, and even make decisions (later the impressively arcaded Stoa was erected for such purposes, testifying to the power of ancient Athens). In contrast to the Acropolis, which was the religious center of Athens entirely devoted to worship, the Agora on its Eastern slope was a place where freedom of speech was at least possible, and critical thought on conceptual matters made a by hindsight wonderful appearance. A new type of characters emerged, sophists or philosophers, and their non-conformal thinking appealed to the local youth. So Socrates. Although there were quite a few philosophers in ancient Greece before him and thanks to the recordings of Plato, Socrates may be considered the patriarch or founding father of Western critical philosophical thought, and in particular may be credited for creating the discipline of *how to think philosophically* rather than proposing a closed system of presumed truths. One of his main concerns was the question of ethics, the question of "what it means to lead a good life". I am indebted to the great former professor of philosophy in Oxford, Bernard Williams, for a pertinent analysis of Socrates' ethical thought in his landmark book *Ethics and the Limits of Philosophy* [61], which has been a great source of inspiration for me and Williams' many admirers.

In discussing Socrates' question in the first chapter of his book, Williams advises against interpreting the term 'a good life' in a moral sense, namely 'good' as the antithesis to 'morally bad' interpreted as "what *cannot or should not* be allowed". In Plato's *Republic* the discussion between Socrates and Trasymache in section 352 centers on whether one can judge a person's choice for a good life or a bad life and how one would go about evaluating a person's actual choice. Socrates insists on considering the issue carefully (352(d) (my free translation inspired by [53])

> Whether the existence of people who lead a good life is more valuable than that of those who do not, and whether their happiness is greater (...) we must carefully consider, because it is not at all a trivial question, since it deals with the issue of how one should live.

He then goes on discussing the issue at length (worth the reading!), trying to ascertain whether a person who acts justly should be happy and one who acts unjustly unhappy (354(e)). He concludes the discussion with

> ... the impression presently produced in me as a result of our conversation, is that I know nothing! Suppose indeed that I would have no idea what justice is, then it would be hard for me to know whether it is an excellent thing or, just as well, not so, and whether anybody who possesses justice is happy or just as well not.

The issue Socrates struggles with in the conversation is the view that each organism (or piece of it such as the eyes or the ears) is made in such a way as to produce its own excellence, which is equivalent to its functioning properly. If that is the case, one cannot do it justice classifying its actions as good or bad. Hence, without further analysis of 'justice', its occurrence cannot be deduced from the state of happiness or unhappiness of its bearers or whether they interpret it as good or bad (my own interpretation of course)[1].

According to Williams and classicists versed in ancient Greek texts, the term 'good' as used by Socrates does not have an imperative charge. It is best circumscribed as 'excellently satisfying its purpose' or even just 'functioning properly'. Also the term 'should' has to be dealt with carefully, because the ancient Greeks employed it differently than we do, conditioned as we are by so many ages of moral rule setting. The central ethical question can then be circumscribed as "how can one make the best with one's life given one's circumstances". The ethical issue is the development of one's character (what the Greek word 'èthos' actually means), in particular, the personal governance of one's life in private and public. This has little to do with 'should' or 'should not', notions that came up only later[2], mainly in the wake of Christianity and its insistence on behavior according to "God's law".

How we conduct our life in actuality, consciously or not, may then be considered our true ethics. How does our ethics arise in the course of our lives? We receive many influences from a young age, and, depending on our possibilities and abilities, we sort them out, we select those that we find valuable, that please us, or that are simply impressed on us by parents, siblings, teachers, friends, and colleagues. When we fail to pay enough attention to what our environment considers important, it will forcefully impose its values on us, and often we will have no other choice than to act accordingly even when our tendencies or intelligence tell us otherwise. But at other times, we do seem to have some choices, e.g., as in crucial moments when we change schools, look for a partner or for a job. The question whether at any time we are indeed able to make a 'free' decision, one that is not forced on us either by our environment or by our unconscious preferences, namely the question of the 'existence' of 'freedom', is a complex one that I do not want to consider further in this chapter. Instead, I am devoting chapters on both notions. For the time being let us accept that our lives are not fully pre-ordained and that room for free choice is not an illusion[3].

In the wake of Plato's texts and descriptions, Socrates has often been

[1]The same issue is also prominent in the thoughts of Marcus Aurelius [2].

[2]In the case of ancient Greece: decency, courage and the avoidance of shame were the key values [62].

[3]The question of the relation between freedom and determinism is very convincingly treated by Daniel Dennett in his book *Evolving Freedom* [17]. Although I refer to Dennett's views on this, I do have a somewhat different take on the issue, which I consider in the chapter on Freedom.

depicted as an idealist who believed in unequivocal values for truth, beauty and justice. However, according to him, these values are hidden to the majority of mortals living in the dark grotto of daily life and common opinions[4]. From such an idealistic perspective, a piece of music or the architecture of a temple is beautiful in as much as it participates in the ideal of beauty, much like the worth of a jewel increases with its setting of gold. The absurdity of such a conception was beautifully brought to extremes by Kirkegaard in his book *Enten-Eller* [37], where he shows that for the ideal of eroticism there can only be one opera that perfectly conveys it, that opera being Mozart's Don Giovanni—all other attempts at achieving ultimate perfection in eroticism should be considered miserable failures.

Nonetheless, the view of Socrates as a philosophical totalitarian is misguided, and it is Socrates himself who most clearly expresses his complete distrust of any absolutist interpretation of his or anyone else's statements (from Plato, *Letters VII*, 344cd):

> All modes of knowledge express the properties and the existence of each thing using the imperfect instrument of language. Therefore no wise individual will take the risk of confiding his ideas to language, and certainly not in the form of stone characters.

Still, one might object that "yes, Socrates distrusts words and interpretations, but he also believes that there is an underlying absolute truth. The problem is that it belongs to the deeper spheres of understanding and cannot be adequately expressed or communicated". This way of viewing Socrates' philosophical outlook may be correct, the point I want to make is that Socrates called awareness of the relativity of words.

I shall argue one level deeper, namely, that the existence of a unifying human understanding is an illusion one can dispense with, but this position will need a much more complex discussion than the relativity of language and communication, which is much easier to demonstrate. A thorough discussion of what can be meant by 'existence' and by 'semantics' (the theory of meaning) is thereby unavoidable. Interestingly enough, this discussion will lead us to why the duality between 'matter' and 'mind' cannot be avoided, although both are defined by and within the biology of our human brains.

Some of us may feel anxious from the lack of stability implied by Socrates' distrust of any statement or reasoning. Worse, any attempt at producing stability appears guaranteed to fail when carefully considered (as we shall do in the following chapters), leading to exactly the opposite of

[4] Plato, *Republic*, 514a.

what is intended. I am sure Socrates saw this gaping precipice in our human consciousness. Maybe he did believe that there exists a realm of certainty but that the majority of us are unable to access it, rather than an infinite abyss. Meanwhile we have grown accustomed to dealing with infinities and infinite regressions, and, although we may not be comfortable with them, we certainly are not as terrified of them as the ancient Greeks were[5]. The precipice we are gaping into has no bottom. We are just hanging above it grasping the tiny roots of our intelligence, like the Zen monk grasping the roots of a strawberry bush that is sticking out from the rock along which he hangs after his fall in the precipice. Like him, we have to live with the delicious strawberries in the environment that happens to be ours while also glimpsing the gaping tiger muzzle below us and little mice nibbling at our roots above. (With an infinite abyss there shall be no gaping tiger!)

Remarkably, the ancient Chinese poet philosopher, Lao Tzu, saw the precipice of infinity as well and writes (nr. 14 in the beautiful translation of Witter Bynner [8])

> What we look for beyond seeing
> And call the unseen,
> Listen for beyond hearing
> And call the unheard,
> Grasp for beyond reaching
> And call the withheld,
> Merge beyond understanding
> In a oneness
> Which does not merely rise and give light,
> Does not merely set and leave darkness,
> But forever sends forth a succession of living things as mysterious
> As the unbegotten existence to which they return.

Socrates's question is about "designing one's life", or, if you prefer, "engineering one's life". This is not a solitary exercise. He investigated not only how to develop one's views and insights, but also how to share them with others, given the uncertainty inherent in human communication, in particular, language. Such considerations do not have to be restricted to the personal sphere, but may be lifted to the level of human society as well, another exercise Socrates engaged in.

In the remainder of this chapter, I want to make a few introductory considerations on Socrates' ethical question, just to introduce the reader to

[5] We more or less overcame the Pythagorean horror of non-rational numbers, thanks to the "axiom of choice", but not without a lot of still ongoing debate [38]. Later we even got imaginary numbers and quaternions!

how I propose to approach the issue further in the book. Many elements will contribute to the overall picture, fairly well represented by the titles of the subsequent chapters, but here I wish to give a quick foretaste of the buffet that will be ours.

What can be considered a "well designed life" or a "well-designed society"? In our twenty-first century, having adopted the theory of evolution and obtained much more extensive collateral insights in biology, we would be tempted to state, "one that insures the best possible prospects for natural selection", by which we might understand, the 'best' design will win out in competition with other designs.

However—and this is a very important point that we shall have to deal with extensively—from a mere principle (an abstraction, regardless of its scientific foundation) one cannot deduce concrete action, for that would require at the very least additional knowledge of the environment in which the action takes place and, in particular, how the principle functions in that environment. The principle may set constraints or define a desirable property, but it does not tell us what a precise design would look like. To give a quick illustrative example, in the period in which I am writing this chapter, my wife Anne and I are busy making a photographic potpourri with photos from our trips to India, to adorn a wall of our guest room. We had no problems formulating the principles of arrangement. Make colors fit, select themes that match and devise geometries that provide a sense of order. It took us many days of trial and error to arrive at a result that somewhat satisfied our aesthetic tastes, but none of our principles could be fully accommodated.

Natural selection, unknown to Socrates (as far as I know), is a most delicate notion to handle because it hinges on highly uncertain anticipation (who would have predicted that such a clumsy organism like a human would be so successful in the selection game?), but it plays an important, if not determining, role in what might be considered a 'good' design of one's life. Surely, designs have to be robust (so that they survive usage), be of at least adequate functional quality (so that they are competitive in a critical environment), and satisfy the genetic requirements for durable selection across generations. But natural selection is an *a posteriori* criterion. Other factors that generate properties or quality play a driving role.

One such factor is intelligence. However you understand it, intelligence is a powerful, if not the most powerful, agent in steering natural selection, but it is already very effective in normal societal commerce. The notion of intelligence may seem vague at this point, and I shall discuss it intensively, but, to grossly summarize, it can be defined as "the faculty to develop scenarios, evaluate their outcome and make decisions based on knowledge and past experience". It is the faculty that makes humans capable of "designing their lives", at least to a certain extent, depending on their other abilities and the means at their disposal. We can imagine what the effects are of actions we undertake, evaluate them in terms of various types of (real or imagined) benefits and then take action on these if we can (mostly using proxies which our intelligence is capable to activate). It will depend on the scope and validity of such 'evaluations' whether the outcome makes evolutionary sense. Viewed in this way, ethics becomes a central human endeavor on whose quality even the future of humanity may depend.

It may seem strange that a chapter on Socrates ends mentioning biological evolution. Intelligence plays a central role in the evolution of humanity *and* conditions our behavior through anticipation and evaluation. The first time I realized this was while reading the introduction to Teilhard de Chardin's *Le Phénomène Humain* [13]. Here is what he says, paraphrasing Shakespeare (abbreviated and translated by me):

> The history of the living world reduces itself to the elaboration of eyes that get ever better in the midst of a Cosmos in which it is possible to distinguish ever more... To seek to see more and better is not a phantasy, a curiosity or a luxury. *To see or to perish* (my italics).

Socrates' simple question "what it means to lead a good life?" introduces the philosophical discussion. Exploring it, following the path Socrates has set out, one discovers that a direct and conclusive answer to the question is not possible due in the first place to the limitations of language, but leads to a deeper understanding of ourselves, our position in the world and nature, including an understanding of the thinking process itself. The exploration can therefore only be based on the best insights humanity has acquired so far from scientific enquiries (logic, dynamics) and in particular biology (evolution), including an understanding of the thinking process (intelligence and consciousness). This exploration will be our first concern, leading subsequently to a closer look at how Socrates' question impacts on the conduct of our lives and on our interaction with each other in the context of our societies. Could it be that the process of life itself continuously generates an ever evolving answer, making the practice of ethics a novel driving force of evolution?

Chapter 2

Kurt Gödel and relativism

This chapter introduces 'systemic relativism' as our main mode of philosophical thinking. The central idea behind 'systemic relativism' is to replace absolute relativism by relative absolutism. This may be seen as the most important insight contributed by logicians in the midst of the previous century, in particular by Gödel. Although Gödel's theory is technical and not presented here in detail, its basic insights and conclusions are formulated, in particular in what is called "Gödel's incompleteness theorem". A consequence of Gödel's incompleteness is that a comprehensive theory of 'truths' necessarily leads to contradictions and hence cannot 'exist'. The classical charge of inconsistency of the contention "there is no absolute system of truth" is therefore necessarily incorrect. This may seem mysterious, and the chapter then goes on showing how the mystery can be lifted by a good understanding of what would be an 'absolute' truth and what would not. So is the negation of absolute truth not an absolute truth itself when proof is contained within the running context (this point is explained in detail). We make a distinction between 'positive propositions', which are propositions that are added to a system but might be inconsistent, and 'negative propositions', which only claim inconsistencies. To assert a negative proposition, one only has to show a contradiction, while proving the consistency of a positive proposition appears to be impossible in most cases.

Relativism has a bad reputation. It is often decried as generating ethical nihilism, the attitude of people who have no firm beliefs or direction for their lives, and who therefore tolerate or even advocate all sorts of dubious practices that threaten societal order (Epicurists from Epicuros to Onfray have been decried as destroyers of civilized society). It makes, however, no sense to base societal order on misguided principles (whether it should be based on principles at all and, if so how, will be the topic of a chapter on 'principles'). Philosophy is not a freewheeling discipline. Its practice can have very dramatic consequences. I do not want to go into the horrors that some systems of absolutist thinking have inflicted on humanity in this chapter, but wish to focus first on what could be termed the "basic theory of systemic relativism", which aims at a healthy balance between the need for direction and skepticism. My goal is to offer several strong motivational arguments, and to develop a methodology for philosophical thinking that provides a sensible relativistic perspective on ethics in the Socratic sense.

The thought behind 'systemic relativism' is to replace absolute relativism with relative absolutism. It is a discipline that consists of making explicit whatever considerations, assumptions or methods are taken for granted and enforcing rigorous derivation of conclusions from these primaries, while at the same token acknowledging their potential relativity within a broader context. Systemic relativism does not allow any relativism with respect to what derives from the basic assumptions, but leaves the latter open for separate criticism and critical appraisal. It is motivated by the observation or belief that all thinking is necessarily based on prior assumptions which cannot be questioned within the system itself (except for consistency), while these prior assumptions must be left open for questioning at a 'higher' level of assessment of the system proposed.

One should realize that, in most thinking processes, new and unproven assumptions are continuously and often surreptitiously added to the existing system. The straightforward way of dealing with this continuous expansion of accepted assumptions is: (1) to make sure that they do not contradict previous assumptions; and (2) to always keep them open for critical review outside the given paradigm. Thus, we arrive at the term 'systemic relativism', i.e., relativism at the level of the definition of the system but not within the system.

The very first argument in favor of systemic relativism flows right out of Gödel's theory in mathematical logic, and will clarify the notion from the start. This may be surprising, because one would not expect mathematical logic to be tainted by relativism. However, it has become the cleanest environment in which systemic relativist thought is presently practiced, thanks to the pioneering work of Gödel, who contributed the present golden standard in mathematical logic. Let us therefore look at Gödel's new and unexpected contribution.

When one restricts one's field of discourse drastically to a strictly logical context called 'second order logic[1], as Gödel does, and assuming in addition the ability of counting[2], then Gödel's Incompleteness Theorems show that already in that restricted context the number of correctly formed proposi-

[1]It is the logic of propositions and predicates, to be made more explicit later on.

[2]Second order logic does not imply the ability of counting. One has to add some elementary set theory in the style of Zermelo and Frankel [29] for that. See further chapters for a more detailed discussion

tions that can be derived from any set of basic axioms is essentially limited in the following way: there is an uncountable number of well-formed propositions that cannot be proven or disproven from any set of basic assumptions [27]. It then follows that any one of these new propositions can be added to the system as either true or untrue, without impairing the consistency of the system, one at a time of course. Thus, at each step, two competing and contradictory systems based on the same primary axioms are created that each have equal claims to logical validity. Such constructions can be continued stepwise ad infinitum, creating an uncountably infinite number of valid systems that contradict each other (valid in the sense that they do not contradict the primary principles).

It has been argued (almost universally) that Gödel's theory is not relevant for philosophy, not even for basic science. I shall now argue that such a contention is structurally mistaken. The feat that Gödel's theorems and their proof accomplishes for philosophy, is that it refutes the intrinsic inconsistency of the statement 'there is no absolute system of truth'. Gödel actually shows that the opposite assumption of a full (absolute) *system* of truth, formulated by logical propositions (under the already very weak structural assumptions of what is termed "second order logic" plus counting) itself leads to contradiction. The Gödelian contention turns out to be an absolute statement about the impossibility of an absolute system of truth—yes indeed—but then only 'absolute' in a very restricted logical sense (i.e., relative to the logical rules used), yet fully applicable in any system of thought in which the most elementary logical assumptions hold[3].

The relativity of a logical theory is based on the fact that it always and necessarily posits an agreed upon prior axiom system whose claim for truth cannot be subject to proof within the given system, except for consistency. A very nice example is the common axiom system for mathematical set theory (the basis of almost all practical mathematics, neatly described by Halmos in *Naive Set Theory* [29]), namely the Zermelo-Frankel system, whose first six axioms are not proven themselves, but can be proven consistent[4], i.e., not contradictory. Once the basic axioms are defined, the mathematical theory evolves further, not only deriving truths from the agreed upon axioms, but adding new ones to cover new fields (such as Euclidean geometry, or in the case of modern physics, the more general Riemanian geometry). Other endeavors, e.g., physics or many fields of engineering, can then be further developed by adding specific new assumptions, while agreeing on the basic mathematical framework.

[3]We shall see later that the rigidity of the second order logical system does not necessarily qualify it as a valid model for nature. In fact it does not, as most models for natural evolution need a timing dimension that interferes with logical deduction.

[4]For a proof, see e.g., Paul Cohen, *Set Theory and the Continuum Hypothesis* [10].

However, this beautiful and effective method of generating (relative) truth encounters some difficulty with the seventh axiom of the classical Zermelo-Frankel set theory, the “axiom of choice” on which most mathematics and in particular Hilbert space theory is based. Hilbert space theory provides, in turn, the basis of quantum mechanics and its several further developments. The axiom of choice on which all this is based appears to be very innocuous at first sight. It only states that, given a collection of sets of objects, one can always construct a new set defined by the (seemingly anodyne) property that it contains at least one object from each member of the collection. The axiom is instrumental in defining non-rational numbers such as $\sqrt{2}$ or π. These are numbers that induced terror in the ancient Greek mathematicians[5]! The axiom of choice runs into problems as is e.g., well described by the mathematician and historian Morris Kline in his book *Mathematics: the Loss of Certainty* [38]. Kline shows even much more, namely that there does not exist one presently known mathematical theory that does not eventually encounter logical problems. This should provide food for thought to people who think that they can ever know anything for sure!

Human language does not so obviously run into such difficulties, but only because of its inherent imprecision. The more you strengthen logical thinking, the more you get into problems [6]. This does not mean that the difficulties even the most elementary logic system encounters, would not be relevant to the more relaxed human reasoning processes. As soon as one starts restricting one’s thought one runs into them, and sloppiness is not what we would like to nurture in ‘systemic relativism’ (although it may have some merits keeping human communication manageable).

The next point I want to make here is that the logical analysis of such (logic) systems requires quite a different kind of theory, namely, a logical basis for logic itself, what would amount to a ‘super-logic’ or, better, a ‘meta-logic’. A statement like “there is no comprehensive axiom system for all mathematical truth” (based on Gödel’s Incompleteness Theorem), is a statement that has to be made within such a ‘fundamental’ axiom

[5]Pythagoras discovered that the hypotenuse of a rectangular triangle with sides equal one was a number he could not express as a ratio of integers and hence did not exist in his system of thought.

[6]Here is a nice classical example: you can use language to describe numbers, e.g., you can say that ”the number π is the ratio of the circumference of the circle to its diameter”, or you can write a computer program that will generate it, etc... In the first definition just given, I used 78 characters to describe π. Now consider the set of numbers that cannot be described in less than a thousand characters (i.e., in about one page). Now take the smallest of those. Can this be?—I just described that number with less than a thousand characters in the previous sentence (just 21)! The problem is the formal imprecision of the description, not its logical meaning.

system for logic. One would think, given the requirement, that such a system should be exceedingly complex. The surprise is that it is actually very simple, at least in normal practice. The only ingredients one needs for meta-logic are: (1) the possibility of stating correct propositions (the propositional syntax); and (2) the mechanics of deriving new propositions correctly from them, i.e., derivations. In the history of philosophical logic, a number of such derivation systems have been proposed (see, e.g., [5]). It turns out that only one derivation rule (besides, of course, the syntactical rules to construct propositions) is actually needed, and the rule called "modus ponendo ponens" is what does the trick (as will be described in the next paragraphs).

Here is a quick summary of how this rule works. Propositional logic, as a theory of logical derivations, is not interested in the precise content of a proposition, only in the 'truth value' it may have, which is defined as either 'true' or 'not true', depending on the context, this value being the only property of a proposition that plays a role in further derivations[7]. Logicians therefore represent a proposition with an abstract symbol such as $p, q, r, \ldots$, which may acquire the value 'true' or 'untrue' depending on the precise context. This precise context is subsequently of no interest for the logical derivation, as logic is only concerned with which effect a proposition being true or untrue will have in (syntactically allowed) combinations with other propositions. Given this basic property of a singular proposition to be true or untrue in a specific context, propositional logic then allows one to make further assertions by combining propositions in a precise way, e.g., as in "q follows from p ($p \rightarrow q$)", "q and p are jointly true ($p \wedge q$)" etc... (this is the 'syntax' of well-formed propositions.). "Modus ponendo ponens" as the operational principle of our meta-logic then asserts the following: "If the proposition 'q follows from p' is true, and p is true, then the truth of q follows" as in the famous "All men are mortal, Socrates is a man, hence Socrates is mortal". Whether all men are indeed mortal, or even what the term 'man' means, is not at issue here, only the mechanics of the derivation belongs to logic. In propositional logic one actually shows that all other rules of derivation considered in traditional (mediaeval) logic can be written as combinations of modus ponendo ponens.

It is in such a framework that Gödel proves the logical non-existence of an absolute system of axioms, i.e., a system in which *any* correctly formulated proposition can be shown to be true or untrue. As already mentioned, Gödel adds a requirement, namely, that in the framework counting is possible. His proof depends essentially on the ability to assign unique numbers to

[7]For example, the truth of the proposition "the color of my hat is green" depends on who is making the statement.

individual propositions, actually a sneaky, but hardly controversial, way to introduce infinity. He shows that when one assumes the existence of such an absolute system of axioms, one necessarily runs into contradictions (Gödel's proof is constructive, which is much stronger than just an existential proof.). The assumption of absolutism leads, already in this very restricted purely logical environment, to unavoidable auto-destruction by contradiction. It is then not difficult to argue that any more sophisticated system of truth values should at least contain the extremely simple, immediate and straight logical framework just described, since the latter is only based on the most elementary rules of truth derivation (modus ponendo ponens), a rule that one cannot avoid accepting without dire consequences (and where counting is concerned, most people can count as well—the other necessary assumption). It also shows, perhaps more importantly, that Gödel's so called absolute statement "there is no absolute logic system", makes eminent sense because the opposite assertion is self-destructive.

How can that be? Does Gödel's presumed absolute statement not contradict itself? The solution of the paradox is, of course, that Gödel's theorem is only absolute within the very restrictive context of straight and basic logical thinking (the modus ponendo ponens logic), and, moreover, it is absolute only in a negative sense, it only negates absolutism, while the opposite statement (e.g., that there is a universal logic[8]) largely extends beyond the restricted context of second-order logic—that is the essence of Gödel's incompleteness theorems. It is not hard to validate so-called absolute statements that negate claims of absolutely valid properties. One only has to provide one specific instance in which the absolute claim fails[9], and that surely invalidates a universal statement *within a given system*. However, the claim of 'absolute truth' reaches (far) beyond the system of thought used, perhaps sureptitiously. Modern physics does claim some absolutes, but those are very sturdy laws of nature that need careful proof and extreme verification. For example, physics claims that there exists an absolute zero of temperature[10] (0 degree Kelvin = -273.15 degrees Celsius), that the speed of light in vacuo is maximal but limited to 299 792 458 m/s in any inertial frame of reference, and that some complicated natural constants exist such as the basic quantum mechanical constant h, which, by the way, can be put equal to 1 (or 2π) when an adequate choice of fundamental units is made. These absolute statements do not exceed the boundaries of

[8] As seemingly Hilbert thought.

[9] The second order logic rule applies: $\sim \forall = \exists \sim$—'not valid for all' is the same as 'there is one that fails'.

[10] Even this 'absolute' is dependent on the basic assumptions made in thermodynamics, in particular what can be understood by 'complete statistical rest'. A difficult notion in a universe where everything is moving!

the framework in which they are asserted, but they are dependent on that framework anyway (for example, on the definition of temperature, distance or time).

One could posit the rule "the more limited the context, the stronger the claimed truths can be". Once I had a discussion with a philosopher who fully disagreed with my relativism and asked me, "Would you even doubt that two plus two is four?" Well, of course I do, for various reasons, which I briefly explain (please skip this paragraph if you are not interested in this issue). There is nothing universal about that statement. It is totally context dependent. For one thing, one has to give meaning to the words 'two', 'four' and 'plus', and just what these sounds conjure in somebody's mind is already dependent on the person's particulars. Once that is settled, the number system used may come into play, but that may be thought to be implicit in the definition of the numbers. In the Zermelo-Frankel system, one actually proves that 2+2=4. After having disposed of all the definitions of numbers and the fundamental counting rules, the proof uses the axioms to move the brackets: 2+2=2+(1+1)=(2+1)+1=3+1=4, using the recursive definition of subsequent numbers as well (the sixth axiom in the system). This whole construct sits already deep in the carefully constructed Zermelo-Frankel theory. There is nothing 'natural' about it!

The relativity of the situation is even more clear in geometry. Pythagoras' theorem for a right angle triangle ($c^2 = a^2 + b^2$) was thought to be a "law of nature" until the end of the nineteenth century, when Riemann discovered that it is just a characteristic of a type of space that is "uniformly flat" (the illusion of uniformity or "symmetries" permeates thinking and mathematics). The theorem does not hold in a curved space, even one that is uniform, such as on a sphere (easy to see, just take two different polar great circles and the piece of equator between them and Pythagoras breaks down). The philosopher I was talking about, when presented with such a case, told me, "So you see, even mathematics changes with time. What was true until the end of the 19th century is not true anymore[11]". Nowadays economists tell us that two plus two is more than four, e.g., joining efforts achieves more than what individuals can do on their own (this assessment actually goes back to Aristotle, I am told). The statement "$2 + 2 = 4$" also runs into problems with semantics, or, if you prefer, the context. If I say that two jackets plus two jackets are four jackets, then that might be true for the accounting department taking the shop's inventory. But for a customer, one jacket may fit and another not, so how can they be added together and then split again to produce the same result? Even the

[11]Sorry, but that beats my understanding! Although I believe in things changing, logic does not change that quickly!

symbols 2 and 2 consist of different blots of ink. Sorry for this diversion, but I wanted to make the point evidently clear. Numbers, circles, spheres, propositions etc. are constructs of the mind.

So, and as Socrates rightfully feared, language allows us to produce absolutes that do not actually 'exist'. I shall go extensively into this issue when we talk about abstraction. For now, having accepted that there are no such things as absolute truths except for a few negative results that are absolutely certain in their extremely limited context, let us move on to a more constructive approach and show, on the positive side, that a relativistic approach opens up a wide area of novel thought and possibilities.

When a religious authority states "these are the ten commandments God has ordained", then that seems to stop any potential discussion on ethics at that point. God has ordained the ethics and no mortal can dispute it. But, as we all know, even religious discussions do not stop with the formulation of commandments. They just move to another level, namely their interpretation. No wonder much religious literature is filled with interpretative considerations, rule setting by authority etc. Some especially dogmatic religions, such as Catholicism, even claim a monopoly of interpretation as though God is immanent in their leadership, which then has received from Him the sole authority to translate His commandments to daily practice. Such a claim actually degrades the commandments to just a delegation or even usurpation of authority.

At this point 'reality' makes a glorious entrance. There is a great discrepancy between any abstraction (such as a commandment, a law of physics, or a number) and the reality it is supposed to cover. Words, sentences, thoughts, laws are all in our brains and nowhere else, even how we connect their content with what we think of 'reality'. For many people the connection is immediate. It makes daily life possible. But that does not mean it covers reality correctly or even adequately. Even as we saw with just the elementary numbers, we as humans have created them. One does not need to be a dualist in the traditional sense, thinking that human thought in some way does not belong to nature (the terms 'reality' and 'nature' need clarification, but at this point I use them in their normal or naive sense: reality as how nature manifests itself to me in my present space and time), but it is pretty clear that the human capacity for thought is a specific process necessary to produce those abstractions (we shall discuss the biological emergence of this process later in the chapter on evolution). Nature reveals itself through our observations, but that does not mean that the results of human based abstraction processes are faithful representations of nature.

Even when we just sense, we abstract. We connect similar sensations to a notion, e.g., the tactile sensation of warmth or hardness. In the opposite direction, one could say that warmth is the abstraction connected to a certain type of tactile sensation. Abstracting further, we develop theories about warmth, we order the sensations around our "understanding", and then start assuming that this construct 'is' actually reality. In daily life this process works well, and allows us to obtain a definite control over at least part of our environment. We connect "making fire" with "producing warmth", and when we feel cold we know what to do. The problem is that the value of abstraction only goes as far as it survives the test with reality. From our understanding of the structure of human brains (or brains in general), we know that more than 90% of one brain's neural connections are of the "feedback" nature, permanently testing whether abstractions pan out according to some way of experiencing (and interpreting the experience), and suppressing them when they do not. *That* is the daily working practice. Our brains 'know' unconsciously that they do not know, therefore they must test permanently.

Even so, the abstraction process often goes astray, none of the biological mechanisms that it uses is perfect, and the higher the abstraction, the more difficult is the testing of its compliance with perceived reality. The reason for this is simply statistical. Higher abstractions are supposed to cover much larger sets of phenomena. To validate them, a much larger testing field is needed and the chance that the test will fail increases. On simple experiences we perform simple testing, such as, "I just thought I saw a horse but now I realize it was a donkey" (because I tested the hypothesis 'horse' and figured out that the ears of the animal were longer than expected). Similarly, we may have restricted the set of possibilities too much. When I believe 'trees have leaves' and I encounter one without, it will not shake my belief, but I shall look for another cause of the phenomenon. Any abstraction needs continuous testing, hence it needs a field against which it can be tested. One could say, "it needs a context", but that is just a weak way of stating it. What it actually needs is access to the whole reality of its claims, *which it does not actually have except partially and sporadically.*

Abstraction generalizes by omission. Details disappear. But that is exactly where the danger lies. There are many ways in which generalizations are possible and they are not necessarily compatible with each other. Modern physics had to learn to live with such a situation. A particle can be interpreted as a wave and conversely waves can be viewed as particles. The viewpoints are not quite compatible. Physicists call them "complementary". They allow themselves to change interpretation whenever the results of experiments require. They say, "electron interference phenomena are explained by the wave-like nature of the electron", while its mass is "explained by its particle-like nature". In modern quantum physics these points of view can be made coherent with some sophisticated mathematical work, a few more hypotheses, and a new definition of what a 'particle' is.

Certain religions are very good at complex explanations as well: "Jesus Christ is at the same time human and divine." An acute question then arises immediately, "What is the meaning of such statements?" I shall devote a chapter to the hugely important and often neglected or even despised question of meaning or semantics, but it should be clear at this point that it is the confrontation with reality that provides the need for a shift in premisses. The subsequent experiments, as with the electron, make the shift of background framework necessary to explain the phenomenon.

The 'reality' offered by nature provides for the context against which any abstraction has to be tested, but that experimental process requires human intervention as well. The abstraction itself also belongs to nature, as it sits in our brains, but compared to all the other things that 'exist', it is a very tiny type of existence and very well hidden from the rest of nature. An assertion one would be tempted to make is, "Nature provides itself for the absolute framework!", the only problem being to discover it. But this would be a mistake. We have the tendency to view nature as "the all", but from our previous discussion we know that there cannot be a description *that can grasp the whole.* The situation is somewhat comparable to infinity in mathematics. We can set up rules to go beyond where we are, but we cannot 'grasp the whole' except as an abstraction, for which only non-comprehensive constructive statements are possible. There will always be an ungraspable "beyond". Once well understood, this situation, common in mathematics, becomes nonproblematic. Actually, and as we saw already, the problems arise when we do not accept it. There is no such being as Atlas bearing the whole world on his shoulders, certainly not a concrete one and not even an abstract one.

Although all this may seem mysterious, it is only mysterious for those who think in absolute terms. The way out of the dilemma, if there is any dilemma, is to keep the connection to reality in mind, and force oneself to always double check against the contextual assumptions one has made. One might call such an approach 'phenomenology', although there are differences with the classical term as used by Heidegger. Moving towards ethics, one could also say that the approach becomes a kind of 'consequentialism'. At each step of the reasoning one has to keep track of the consequences the recipes, rules or conclusions have. This then goes in the direction of "the results justify the means", but I shall show in the chapters on ethics, that this is not the case when one approaches the issue correctly, i.e., by not succumbing to the temptation of hidden absolutism (or fundamentalism).

The way to proceed is then very much as what one does when one builds a theory in mathematical physics. One starts out with a basis consisting of what is meant by an acceptable derivation and by a consistent set of basic axioms (unproven but plausible assumptions), and then moves into deriving consequences, some of which are testable against what is deemed the reality context for which they are applicable. The original axioms have to be rejected or adapted when the tests prove negative, and the construction has to be redone. When everything keeps checking out, then that does not mean that the axioms or basic assumptions are actually 'true'. The only notion of truth that applies here is whether the theory (and any abstraction is a theory) leads to testable results that prove correct in 'reality' (often, if not always, what is meant by reality has to be specified in the theory as the field of its validity). More cannot be claimed, certainly not absolute truth.

Philosophers have distinguished a number of types of relativism. Let me just mention a few, to contrast them from what I call 'systemic relativism'. We already encountered Protagoras as a prototype sophist, for whom there are no truths, just opinions, or to put it differently, truth is in the eye of the observer. This would be an early case of "interpretative skepticism", or the theory that the truth-value of any statement depends on its interpretation by a specific person. In these cases, relativism is seen as relative to a person. In the previous, I hinted at another kind of relativism, namely relativism with respect to a linguistic context (although my actual point of view is more involved). This then could be interpreted as underwriting the so-called "Sapir-Whorf hypothesis", which claims that language shapes the views people have on the world. Language certainly plays a role in describing properties of nature, but as humans we keep a certain distance to it, concentrating rather on the confrontation of our views with nature or 'reality'. I would rather state that language is fundamentally limited and cannot achieve comprehensive truth. This position is then also different from 'epistemological relativism', which would make our ability to know dependent on our linguistic abilities. It is, rather, our ability to formulate comprehensive truth that is limited, in the Gödelian sense. Relativism and skepticism have many sects, let me add a new one: 'systemic relativism'! It also has a host of opponents, to which I devote several chapters in this book.

What then is 'systemic relativism'? It *is not* the claim that any proposition is doubtful. It *is* the claim that: (1) any system of thought can never be complete, there is always a beyond which cannot be covered by the system itself; and (2) the validity (truth) of any proposition within the system does not guarantee its more global validity when viewed in a larger context. While point (1) may be pretty obvious given the state of modern science, point (2) is much more controversial. It says that since we cannot know the whole truth, we also cannot know that the system within which we are asserting the validity of a proposition remains valid in any larger context than the one offered within the system, and hence the validity of the given proposition is only *relative* to that given system. Hence the term *systemic* relativism.

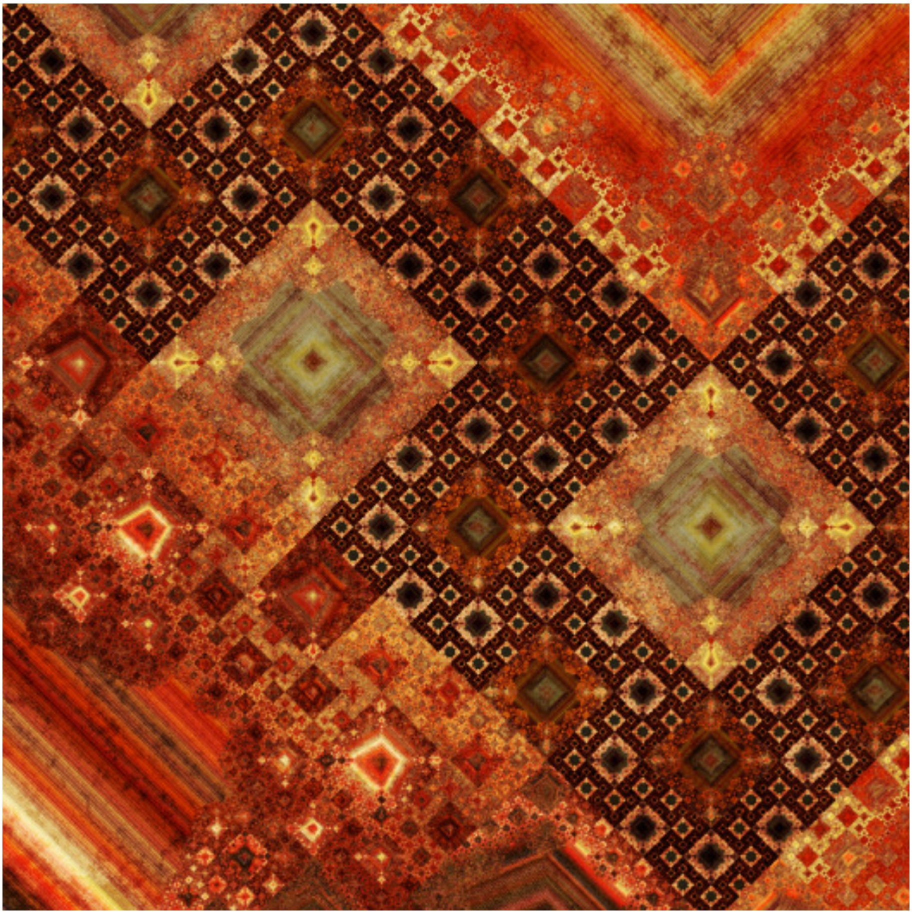
This admittedly preliminary definition should clarify a number of things. First, why I use the term 'systemic' and not 'systematic'. I accept the validity of a great number of propositions *within an accepted system of thought*, but I do believe that they can never be absolutely true, e.g., considering that our system of knowledge may increase, deepen or in other ways change. Second, the definition clarifies in my view the relation between relativism and skepticism. Systemic relativism is based on skepticism concerning the validity of a system within larger contexts. There is also an issue of precision here. We are often perfectly happy using an approximate or heuristic system of thought, knowing very well that it is inaccurate and that there exists a more accurate but more comprehensive model (we call this approach using "fist rules" or "calculations on the back of an envelope".). Some heavy skeptics would even say "truth is unimportant". I disagree. I believe that the notion of truth has an important role to play *but only within a given system of consideration.* I shall present my views on the notion of truth extensively in a further chapter. And fourth, I think that systemic relativism has the potential to unify the extreme relativists (epistemological, ethical or linguistic), skeptics and naturalists (those who believe that Darwin's evolution theory is absolutely true). They all have a point, but not the whole point[12].

Does the definition take care of the presumed intrinsic contradiction of asserting as true the non-existence of truth: the truth is that there is no truth? Aside from the word play, I believe that I have given sufficient documentation on the systemic imprecision of that statement. The objection would actually hold against Gödel as well, and we know that Gödel's theorem is absolutely true *within the system of second order logic with counting.* We also know that even second order logic has its limits of validity, not only because of its handling of various notions (such as the notion of truth), which have only a very tenuous connection with 'reality', but more importantly, because it merely provides a simplified model of deductive reasoning. However, it does that very well. The latter can be arbitrarily refined, but only at the cost of introduction of further axioms, which, although they would not change the validity of 'modus ponendo ponens', might change the validity of conclusions derived by it. Be that as it may (to be extensively discussed further on), reasoning is and remains a very specific human faculty, a very important one no doubt, but hardly a faculty that can grasp nature in its entirety.

To know the limits of human thinking is the first step towards wisdom!

[12]See the discussion on Gorgias and Leontinoi in [5].

I shall argue that systemic relativism provides a mode of thinking that is not only practical (we shall discuss a number of interesting cases), but also has a strong flavor of aesthetics. It progresses like art evolves and is just as imaginative and versatile.



Samuel Monnier, detail of *Fractals*.

Chapter 3

Chaos

From a completely different direction than strict logic thinking, modern scientific insights in the behavior of systems forces us to take the general incidence of chaos in nature as another foundation of our philosophical thinking. Nature owes its ubiquitous creativity to chaos. This will be a tenet the book adopts from modern analysis of most biological, sociological, and even physical phenomena. Chaos is a central concept in Dynamical System Theory (the author's main field of research). The term as used in this book has to be understood in a precise (mathematical) sense. This chapter takes pain to position the notion carefully both with examples and as a formal concept. Examples of essentially chaotic systems are: gravity (in physics), the transmission of neural signals (in cell biology), meiosis (in genetics), natural selection (in biology), capitalism (in economics). The occurrence of chaos in almost any real life process makes firewood out of any theory of "necessary causality" and allows the view of creation as a permanently on-going process of evolutionary development that refines itself the more it progresses. Creation happens permanently in chaotic ways but is controlled by a phenomenon called 'emergent behavior', which takes place at a different 'level' than the original system and follows different evolutionary laws (dynamics) not contained in the original system. A related question is that of 'system determinism' whose occurrence is accepted or claimed by a not-so-small community of philosophers and scientists (including many neuroscientists). The issue of determinism requires a careful analysis of both the evolution of continuous time systems and the functioning of intelligence as a biological property of brains. A central argument is made for the thesis that immediate determinism (as accepted by neurophysiologists) does not *imply longer term determinism.*

How many potential worlds are there?

Some 800 years ago, say, somewhere in Europe, a boy—I do not know his name, let us call him "AB"—meets the girl we call "AG". They make a date, build a relationship, have children and so contribute to our present world by supplying a tiny bit of offspring. Let us call our present world "OurWorld". Suppose, in a different scenario, AB misses the appointment with AG (because he has a toothache, or she misses the horse tram), they do not meet and have no offspring. This results in a slightly different world, let us call it "AlternativeWorld". How would AlternativeWorld be different from our OurWorld today? Well... the chances are very, very high that none of us would be around. Also there would be no Hitler or Einstein, no World War I or II etc...(of course other horrible things we do not want to consider would have happened.) A tiny difference around 1200 AD creates a totally different world. This is captured by the (strict or mathematical) notion of 'chaos'. There are good arguments that in any adequate attempt at mathematical modeling[1], chaos pervades all natural phenomena, in particular all biology, with millions and millions of chaotic events happening within each of us every second.

Would you really believe that AlternativeWorld would be *totally* different from OurWorld today? Actually, it is not too hard to trace genealogies up or down, at least in principle. I tried it for my family, with a three generation span, and the result is shown in fig. 3.1. It shows that in three generations already 16 women would not exist (and about the same number of males). In eight hundred years, we count about (conservatively) $4 \times 8 = 32$ generations, and tallying a disappearance of at least 2 per generation, we find a total number of $2^{32} \sim 10000$ million differences in today's female population, about twice the size of the whole world population. Just assuming Europe to be more or less isolated over long periods of history but internally connected, this produces many times the whole population of Europe. It can safely be said that any two Europeans have a common relative if you regress a few generations. If that person for some reason is not there, then the two considered are not there either, and the multiplicative effect (as shown in the picture) does the rest.

Chaos in its precise mathematical and system-theoretical meaning will play an important role in the philosophy we are going to develop. It provides for a major principle in nature causing action and evolution in all

[1] Mathematical modeling consists in representing phenomena with mathematical equations. This involves understanding the physical and chemical processes, defining the most representative variables, expressing their dynamics as differential equations and detailing how the various systems so defined are connected with each other by transmission of relevant data. In the case of the Hodgkin-Huxley model, the variables involved are flows of ions in Sodium, Potassium and Calcium channels, resulting electrical potentials and connections between the various channels. All these can conveniently be represented by equivalent electrical circuits. The neural transmission is then modeled by putting a number of Hodgkin-Huxley cells in series. Every modeling requires massive simplifications to be mathematically treatable and hence must concentrate on essentials.

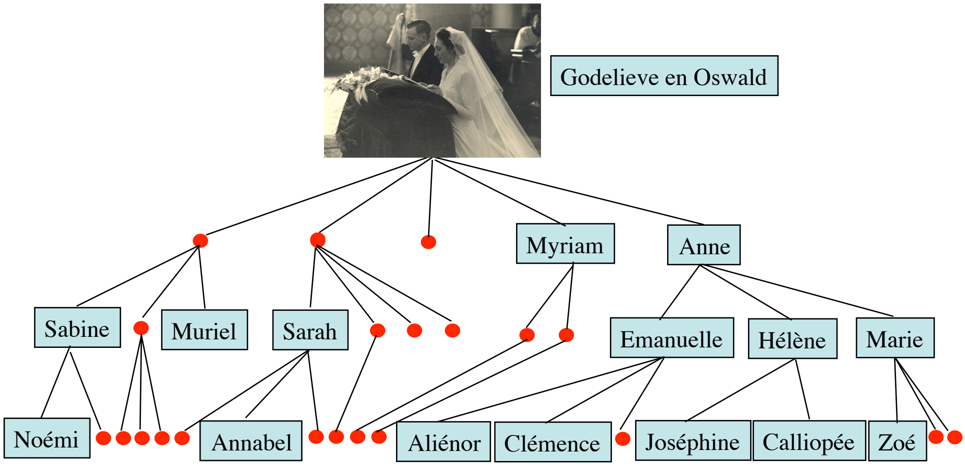


Figure 3.1: The picture shows all the women that would not be there in 2008, if my parents had not met. Of course, the males (red dots) would not be there either, but the females provide a more reliable gauge for the transmission of life.

sorts of unexpected directions. It makes prediction of the future a hazardous exercise and disclaims any presumed necessary causality. How it conditions everything that happens from the most detailed physical and biological phenomena up to the astrophysics of the massive galaxies, including our psychology and societies, cannot but strongly influence how we view ourselves, our world and hence how we develop our philosophy. That nature is chaotic in the systemic sense is not a choice, it is a property of our best scientific knowledge and cannot be discounted lightly.

Let us therefore dwell a moment on the systemic (mathematical) definition of chaos. It is a special property many *non-linear*, and even linear, time-variant systems have. This is in contrast to a linear *time-invariant* system. Such a system not only remains the same over all time (or can be assumed to), but its evolution from any point in time depends also linearly on both the actual state at that point and the future inputs it experiences.

Linearity means that everything evolves in direct proportion both of the state reached so far and of the inputs at any point in time. If the state at a given instant is twice as large, then the response induced by that state will also be twice as big. Zero inputs will have no effect. Sums of inputs result in sums of outputs. It is indeed a very special type of system, but one that has been studied very intensively because it is mathematically treatable and many technical systems are built in this way (predictability of the evolution is often a very useful property of a technical system). In addition, a number of important physical effects also follow such laws, namely the propagation of light and other electro-magnetic waves. A linear time-invariant system can be either stable or unstable. It will be *stable*, when, after any short disturbance, the system goes back to rest (i.e., the state returns to zero all by itself), or it can be *unstable* when the disturbance gets amplified (proportionally) over time. The famous mathematician Euler showed that linear, time-invariant systems mostly follow *exponential* laws, whereby the exponents either force the disturbances to die out or to amplify exponentially. In the latter case the magnitude of the state keeps increasing ad infinitum, and each further increase is proportional to the state already reached due to linearity, which de facto causes the exponential growth. System designers will almost always try to avoid instabilities because most real world systems cannot increase indefinitely in size. A linear time-invariant system is either stable, returns to its rest state zero after a disturbance, or it is unstable and blows up.

In contrast, a non-linear but otherwise deterministic system (and some linear time-variant systems as well) can be unpredictable in very different ways. After an initial state of relative rest and under the influence of a small disturbance, it may start spinning around, first behaving like an unstable linear system but soon reaching a saturation, then coming back, seemingly searching for a new equilibrium point, not finding it, increasing and decreasing again without ever coming back to its initial state nor blowing up. This is what mathematicians call making 'limit cycles', which may be very irregular, changing shapes while they proceed and sometimes even turning into a different mode altogether (as exhibited by the famous "Lorenz attractor" [45]). Sometimes, such a system encounters what is called a 'bifurcation', in which case it reaches a meta-stable point, but then moves on unpredictably in one or another direction. You may think of a marble in a trough, or how a spinning top moves erratically. Such complex behavior happens even in very simple non-linear systems, but the main characteristic of it is that the specific behavior, although deterministically dependent on the initial conditions, follows an erratic and unpredictable course due to the influence of small disturbances or imprecisions that get amplified because of the chaotic nature of the system's dynamics. More precisely, an innocuous tiny change occurs and the future behavior ends up completely different. It is a form of instability that does not blow up the system but makes the behavior unpredictable.

Most systems in nature and in particular biology are seen to behave in this way. But then there appears a new effect which is fully unexpected. Small initial perturbations may bring the system in different modes, which then may become globally predictable although they look completely random locally. Local disorder leading to global order at a more "abstract" level of consideration (Ilya Prigogine received the Nobel Prize for this discovery, for more information see his 1984 book *Order out of Chaos* [49]). This phenomenon is also observed, not to say ubiquitous, in most biological systems. Trees grow branches and leaves with very orderly functions but very disorderly, unpredictable arrangements. The same can be said about organs developing within an embryo. Where a specific atom in an embryo ends up in the organism a few months later is completely unpredictable, perhaps in the brain, the intestines, the toes, or even discarded all together, although all the various body parts have developed orderly functions. In this case, and many others, no law of physics is capable of making an accurate prediction, the situation is purely chaotic at the detailed level of the constituent atoms, yet functionally orderly. The phenomenon has been called *emergent behavior*, because the orderly function cannot be predicted from the chaotic movement of its constituent particles.

A similar case can be made for the growth of the brain. Let us first focus on the transport of electrical current in the axon of a neuron (a nerve cell) in a brain, because the mechanism there is well understood. The propagation of a signal in the axon can be mathematically modeled by what is known as a 'Hodgkin-Huxley cell', which is a two-port electrical circuit[2] that exhibits the exchange between the input and output electrical currents and the ions that are involved in the transmission, and that are stored in internal memories of the cell. Huxley and Hodgkin received the Nobel prize in 1954 for their research in these basic transmission mechanisms. They introduced the notion of 'ion channels', which open or close depending on the reigning electrical potentials, set up the (non-linear) mathematical equations that govern these processes, and could prove that their model generates the propagating electrical spikes that are observed in the transmission of a neural impulse (the so called propagating 'action potential'). A detailed analysis of how an individual Hodgkin-Huxley cell operates mathematically finds that such a cell has a normal stable equilibrium when not subjected to input stimuli. It is a stable circuit in its normal state [9]. However, when connected to its neighbors even in the slightest way, then suddenly the connected system shows instabilities and is capable of generating and propagating impulses when activated[3].

[2] A 'port' is a pair of electrical terminals that connect to the external circuits like a plug. Each port has a potential and carries a current. Ordinary plugs carry a potential of, in Europe, 220 Volts AC and a current measured in Amperes.

[3] In our present understanding, neural transmission at the level of signal transmission is nothing more than what the Hodgkin-Huxley equations say (they model the main chemical processes in the process of neural transmission.). The chemical processes produce electrical currents and potentials that are propagated along the neural channel, which is modelled by decomposing it in a series of elementary circuits connected output port to input port. Granted, this is a simplified model, which can be refined further,

The remarkable thing about this is that the passive interconnection of stable subsystems suddenly appears to be capable of unstable behavior. This phenomenon has been called ‘edge of chaos’, and has recently been investigated with increased precision by a celebrated specialist of the applications of chaos theory, Leon Chua of Berkeley (for a comprehensive presentation of the concept and its many ramifications, see the book of Klaus Mainzer and Leon Chua [39], here we suffice with a few considerations needed for our main arguments.). What happens is that the equilibrium of a neuron only needs a small disturbance to unleash the chemical energy the cell contains. The neuron has a large collection of dendrites sensing its environment (in the order or 1000 to 10000) and when a number of these get input stimuli from neighboring neurons or other sensing sources (like cells that detect light or sound) then suddenly the flood gates open and the cell ‘fires’ its stored energy, changing its quiescent mode into the release of a bullet of electrical charge into its axon represented by the so-called ‘action potential’.

Soon after firing the cell has to cool down and return to its quiescent state. Let us consider what chaos has wrought in this process and how versatile its incidence can be. The quiescent cell sits on the ‘edge of chaos’, meaning that just a little effort is needed to change its mode of operation from quiescent to firing. A non-linear system is capable of ‘mode changing’ (physicists call it a ‘regime change’) and this effect is already known as chaotic, because it involves pushing the system over an edge, which may or may not happen depending on small disturbances or fluctuations. This type of behavior may be considered predictable, if the input stimuli are strong enough. Moreover, after the firing the neuron is capable of what I have called ‘cooling down’ and hence recovering its original quiescent state, which is not a typical chaotic behavior. A system governed by non-linear equations may exhibit stable behavior in different modes of its operational repertoire, much like a gun recovering itself after firing a bullet.

Given the fact that the firing of a neuron and the propagation of the action potential along an axon is to a large extent a well organized and predictable effect, one might wonder “where is the actually effective chaos

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but in physical modeling one always deals with a simplified situation. However, further increases in complexity do not change the basic picture. To give an analogy, when we speak to each other we use sound propagation as the transmission mechanism. There are simplified acoustic models for this, which are never 100% accurate but pretty well capture how sound propagates, which in this example is not chaotic because the propagation equations are linear. In contrast, neural propagation is even at that very basic level chaotic. The chaotic aspect is used to generate the propagating spikes, called ‘action potentials’. Maybe hard to understand, and, indeed, many scientists and philosophers have difficulties with such an absolutely basic but also tricky mathematical property of non-linear systems.

then?". I already mentioned that the firing of the cell is conditioned on outside stimuli which are picked up by the great many dendrites the cell has and which are activated by axons to which it connects. The cell performs a kind of arithmetic on its input signals. When a sufficient number of connected input cells produce more or less coincident signals with sufficient strength, enough input energy is assembled to push the cell over the firing edge. This is dependent on a number of factors that involve the axon-dendrite interconnect, but most important is the more or less simultaneity of the various pick-ups. Simultaneity and arrival times are in principle extremely chaotic as we already discovered in the first example of this chapter: 'boy meets girls in the Middle Ages'. In the neural cell world it would be 'axon A's firing' meets 'axon B's firing' when both are connected to a third cell via the latter's dendrites. There are many more chaotic processes involved in the cell-to-cell interface. In particular and depending on the chemicals present in the interface, cells may be conditioned to fire more or less happily, and this may even happen in a differentiated way, not all parts of the brain being equally conditioned. Although all these effects are extremely interesting to study, we have to leave the topic to neurobiology and only remember here that at the very basic level of brain architecture chaos is what makes our brains function.

Hence, the neural system of each of us is busy with a billion instances of chaotic decision making every second, and still, our overall neural system shows an impressive measure of stability (with exceptions!), although it operates in each of us in a unique way. Globally and functionally it looks more or less the same in each biological kind, but the detailed arrangements are different just like two trees of the same kind and with the same age are similar in general morphology but different in detail.

But then, how can our overall mental state be stable at any moment? Other mechanisms must be at work that cannot be explained from the detailed behavior of neurons. As I already mentioned, one has to move to a higher system level or even several higher levels of 'emergent behavior' to find at least the beginning of an explanation. The unfortunate thing is that present day neuroscience does not fully comprehend how it all works (although there are partly successful attempts at moving to the 'systems level', in particular in the realm of so called 'Hopfield networks' that try to model neural functioning at the system level), but it is fair to say that, as far as the overall neural system is concerned, we are sticking with our feet in the concrete laws of elementary neural biology, seemingly without being able to lift ourselves to the 'laws' that would govern the higher levels, except in some very schematic sense [30]. So, bye-bye physics, bye-bye cell biology, hello psychology? In other chapters, I discuss the notion of abstraction. Let me suffice here to state that the higher we move into abstractions the more questionable the proposed characterizing laws become. The abstractions we construct are bound to be poor reflections of what 'really' happens in 'nature', and in great need of caution and validation, if not humility because of our low level of understanding.

Yet, giving up at this point would be a capitulation and not something our minds would normally do. Let us dig deeper. Even though we do not have a comprehensive model of the brain, there is a lot of structural information available nowadays, described e.g., in Jeff Hawkins book *On Intelligence* [30] just mentioned and in the huge literature on neural biology as can be found in general textbooks [33]. Bundles of neurons form a kind of cylinder which contains several thousands of them. Fig. 3.2 reproduces their basic structure very schematically. What strikes the ob-

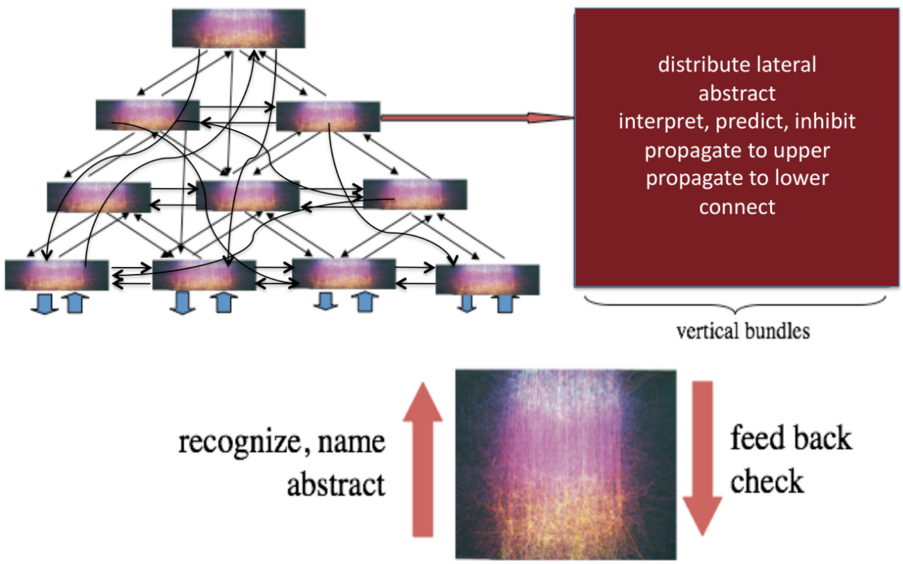


Figure 3.2: The generic structure of a neural bundle or cylinder. Each bundle consists of thousands of neurons, organized in six layers with specific functions. Especially important is the massive occurrence of feedbacks vertically and horizontally [30].

server of the brain's neural connections most is the pervasive occurrence of feedthroughs and feedbacks, in all directions. Lateral, between similar neurons, "upwards" towards higher levels of abstraction, and "downwards" towards more basic layers. We build two-dimensional layers of awareness, e.g., visual and auditive, mapping what our senses experience in zones that memorize the experience (what I call ‘awareness’). We have a clear sense of many parts of our body, what is known as proprioception. And then these internal levels of neurons are connected to other neurons that detect coherences and similarities, which are then coded into abstractive classes (e.g., ‘chairs’, ‘person’, ‘sound of a doorbell’) and this in many further ‘layers’, or, with a better term, ‘networked entities’ since the whole construct consists of all sorts of interconnected localities with different structures, but all basically consisting of ‘cylinders’ composed of layers of neurons. Another important element of the interconnection dynamics, already emphasized in the simplifying Hopfield model, is the incidence of ‘attenuation’. In this model, when a neuron gets excited, it forces itself and its immediate environment back to rest thereafter, thereby contributing to the stability of the network. Because of this effect, propagating waves of information arise, which, after having passed by, make room for further activity. The conjunction of massive interconnections with stabilizing dynamics takes care, on the one hand, of immediate information propagation and, on the other, of overall stability.

How is the relation between the basic chaos of the neuronal operations and the resulting, obviously impressively stable massive brain, consisting of billions of these chaotically operating cells? Although it would be very hard to trace the exact path that nature follows in building the brain of a person starting from the very first embryonal cell, a path that is totally different in detail from one person to another but in which control by subsequent neural cell entities is built up in more or less similar global structures, we can make some general remarks that would help understanding, or at least acceptance.

A key observation is that *nature bypasses causality* of the underlying system! The causality active in each and every neural transition, which is short lived, capable of changing the total system but ephemeral, has no determining effect on the global functioning of the overall system although it contributes a tiny bit. A rabid determinist might say, “Okay, at that level nothing can be predicted with certainty, but at the higher level, everything is causally determined nonetheless.” Unfortunately that does not make sense. At higher levels, similar chaotic mechanisms are at work, partly contributing to stability and partly generating their own chaos that then will need control at still a more global level. Much of nature can be said to be ‘fractal’, i.e., following patterns that repeat themselves at increasingly larger scales. Fractality is closely related to chaos. I do not wish to dwell on these in themselves very interesting notions any longer here, let it just be said that when the lower level chaotic behavior gets ‘abstracted’, a new chaotic structure appears at a coarser level, which again allows the generation of higher structures. This is a kind of order out of chaos and there is nowhere causality to be seen, except from the fact that nature will select those systems that are capable of producing the emergent behavior necessary for their overall stability and sustainability. It just happens that way thanks to the creative action of chaos and the controlling consolidation of the higher level.

All this makes firewood out of traditional notions of 'laws of nature' being causally deterministic. An exception are laws that do not make concrete predictions, but only establish *a posteriori* causal relations, such as Darwin's laws of evolution. These are not laws in the traditional sense. They are unable to determine what will happen out of the present state or situation (like most laws of physics or chemistry), they only claim that specific conditions have to be satisfied for something to happen, leaving open whether it actually happens or not (e.g., depending on other conditions or eventualities). A quite common situation! For example, for a baby to be born, a woman and a man must meet and have intercourse. That does not say which babies will be born from which parents. This is very different from Newton's law of gravity that states precisely how stellar bodies move from their present state to the next (although even Newton's law when applied to more than two bodies results in chaotic motion, i.e., motion that in the long run depends extremely sensitively on initial conditions.). To be a bit more precise, when a man and a woman meet, we cannot state that they will have intercourse. When they have intercourse, we cannot state whether that will lead to a baby. The only thing we can state is an *a posteriori* justification: a baby was born because a specific woman had intercourse with a specific man. That intercourse is then seen as the 'cause' of the baby's birth. This works backward in time, not predictively and causally forward! With neural chaos the situation is much, much worse. Unpredictable events happen at all levels of the neural network (and there are many), and this million times a second (although backwards justifiable).

Nonetheless, it makes sense to state that some predictive causality *is* active in nature but it is a limited phenomenon, restricted to precise circumstances. There is, as already observed, reason for much more backward causality than forward predictive causality, but even that type of causality, although very helpful in a preventive way, is altogether fairly limited in the face of the massive chaotic dynamics that imbues the world (and is by definition un-predictive). When we know that intercourse produces babies, we can limit the number of babies by prohibiting intercourse or try to limit its effects (as the Chinese government has been doing), and when we know that a bacteria produces measles, we can develop a vaccine etc... Our control on the world will be based on what we can make out from causality, but to say that the world is ruled by causality is definitely erroneous. It is being driven by chaos (and mostly controlled by well understood natural selection).

However, the heavy emphasis I put on chaos in this chapter may be misleading. At this point of the discussion, its role has to be put more in perspective. Its effects are indeed overwhelming when one focuses on them, just because it is such an unexpected and only recently discovered basic component of most, if not all, real life systems, be they biological or social. However, other, equally important mechanisms are at work as well. I already mentioned Darwin's natural selection law. The latter has lead to great misunderstandings, especially in communities who believe in a "by God" ordained world. Their criticism against Darwin's position is that the extremely high complexity of organisms like humans cannot possibly have arisen from pure accident. Of course not. That is *not* how evolution and natural selection work. Natural selection will immediately start emphasizing any 'good' mutation when it occurs, i.e., one that in the environment of the organism proves profitable, and will smother any unfavorable one (these statements assume, of course, that the mutation is able to propagate itself, so that an exponential amplification, or decline, occurs). This works with organisms, but it also works with ideas, as so beautifully described by Dawkins in his book *The Selfish Gene*. In this case it would be about "memes", i.e., ideas that propagate from person to person [12].

There is a lot of competition between memes, and natural selection is heavily at work in this realm (ideas form a great laboratory for chaos and natural selection.). Many 'good' memes have been around for thousands of years (think about the use of a hammer or Pythagoras' theorem), and 'bad' ones have been discarded. 'Natural' meme selection determines *de facto* what will turn out to be good or bad, but what makes the process 'natural'? In theory, and in the very long run, the effectiveness of a meme in the full social, organic and environmental context will determine its goodness, but there is not such a thing as 'the full context'. Some memes might be good in a local context and very bad in a more global one. Those may have a very long life and even threaten our planet, but will eventually loose out. The whole mechanism of meme competition is far removed from the basic chaotic neural transmission discussed earlier, but it is chaotic as well, albeit in a very different way. The fun thing about it is that we can easily observe it *in situ*. We only have to look at our own thinking.

An important point in chaotic system behavior is the seeming contradiction between initial determinism and unpredictable evolution. We shall define intelligence as the ability of the brain to envisage scenarios, evaluate them and draw actions and conclusions from them, thereby utilizing the results to condition future behavior. The issue then arises whether the propagation of memes in the human community has a deterministic character. Could it be stated that "you get influences from various directions, but you are conditioned in what you do with them", so that, ultimately, which meme will succeed in your brain could be claimed to be a deterministic process?

But, alas, such a consideration, even if marginally correct, does not catch the main point, and we have to explore further. Local, short term determinism is just one ingredient in the selection process. Given several memes that impinge on the brain, we may have been conditioned to choose the meme that has the highest plausibility value, so that the choice for the most likely explanation would be deterministic after all, giving knowledge of our conditioning (whatever that is at that point). The net effect is that the brain has, in the end, made a definite, not a random choice, well motivated by a previously established bias or conditioning, which, in turn, has arisen in a similar way, using the evaluation and anticipatory mechanisms the brain is capable of (and that are the result of millions of years of evolution). Our decision-making is not at all random. There is no free choice in the sense that what we choose ultimately would be totally arbitrary. That would lead to total randomness, a phenomenon that we can often observe, but not one that the brain or other organs that have grown out of chaotic transformations and evolutionary selection are subjected to.

The determinism just described is illusory in the chaotic situation of the brain at all its various levels of functioning. The best way to grasp this is to mentally allow for emergent behavior, whereby the myriad of tiny interactions leads to unpredictable but somehow orderly results (which may again be considered chaotic at a higher level). These effects are neither random nor deterministic, they have ingredients of both, and, above all, they lead to structures that cannot be derived nor explained from the underlying basic mechanisms. Think of a football (soccer) game. You know the rules of the game and how it is played, but what a specific game will become *as a game* you do not know. It depends on totally unrelated interactions between players.

Chaos is a central ingredient of our present day understanding of most physical, biological and social systems. It permeates everything that exists, evolves and lives, and hence must be of great philosophical and ethical significance. It is bound to have a great impact on how we understand existence, and the various modalities that condition its evolution. The gradual emergence of intelligence is the prime example of emergent behavior connected to the brains of humans (and mammals). Therefore we have to discuss its various effects in depth, and, in particular, the role it plays in evolution and its functioning as what we shall understand to be a (partially) free agent. Intelligence, evolution, creation and freedom are tightly connected with each other and are thus bound to have great influence on our development of ethics, resulting in positions that the reader may experience as very unexpected. But before engaging in an in-depth somewhat formal discussion of these various notions, I wish to set the tune by proposing an appealing metaphor first in which all the elements play a natural, determining and hopefully convincing role: aesthetics.

Martha Waijop, *Windharp*

Chapter 4

Aesthetics

To guide us further in the development of our philosophical outlook, it appears attractive to introduce an analogical field in which the notions described so far play a central role and that can serve as a well-defined and well-developed model environment: aesthetics. We may view aesthetics as a micro-cosmos for ethics: aesthetics as the ethics of art. It provides more than a metaphor because aesthetics has given many people a good foundation for their life projects (their ethics) as well. One great example is the composer Johann Sebastian Bach who invested his Lutheran way of life fully in the development of his music, and what a torrent of musical creation it is! But what is of most interest philosophically is the process: how aesthetics provides a 'theory' for artistic intentions and their connection to actual behavior. Abstract notions like 'beauty' play a role in the process, but have a substantial distance to the 'reality' they attempt to cover. For further analysis throughout subsequent chapters, a number of crucial concepts are highlighted and placed in the relativistic context: abstraction, emotion, style, quality, and last but not least, reality and existence.

Aesthetics is the Ethics of Art.

Ton Huijsman, my guitar teacher, considered himself more a teacher of style than of technique. The very first principle of interpretation he would convey to his students was that they should try to understand how aesthetics functioned in the period and the mind of the composer and what the resulting stylistic ideas were as a result. There is nothing so ugly as Bach played romantically. Bach's compositions have to flow subtly and evenly to produce the total melodic and contrapuntal exploration the composer had so cleverly designed. Its attraction is in the progression of the melody, the variety of contrapuntal combinations and the inventiveness of the resulting harmonic constructs.

According to my teacher, music composition has gradually evolved in five main directions: melody, harmony, counterpoint, rhythm and color. Each period in musical history seems to emphasize one or the other of these, often creating new possibilities thanks to the parallel development of ever more powerful instruments[1].

In many cultures, musical ideas are based on the capabilities of the human voice and would naturally emphasize melody and harmony. The original Gregorian chant is purely melodic. One could say that it pioneered Western melody in the 9th century AD. It is almost impossible to interpret Gregorian chant in a romantic way (a much later addition). It does not tolerate emotional emphasis on individual notes, *retardandos* and heavy accentuations. The essence of Gregorian melody is in its tonal sequencing, often achieved with subtle changes in pitch. In the Renaissance, harmony made a massive entrance, culminating in the perfect balance of melody and harmony in Monteverdi's compositions. The Baroque period then brought counterpoint with its own culmination in the music of Bach. So far no romanticism there, although Bach's music often has a strong expressionist flavor, like what the romantic composers try to achieve, but with different means (variations in key, use of instrumental coloring, melody as text enhancement).

Certainly, Monteverdi used counterpoint in his compositions, especially the juxtaposition of a straight chant (a so called "cantus firmus") and a totally different and shifting highly melodic instrumental commentary [41], but the Baroque period brought an emphasis on intricate constructions based on independent and ever evolving melodic lines that at times clash with each other and at other times merge into harmony in a paroxysm of musical constructs coming together. In these, every note receives a double role, as part of a melodic line (a kind of flowing horizontal structure) and as part of a harmonic conjunction (the vertical structure). The interpreter has to carefully observe these structures and understand the role of each note and position both melodically and harmonically. My guitar teacher used to say, "Each note is there for a purpose". Interpretations where this is done with skill and clarity stand out and convey the aesthetic message the composer has put into the music. It has been said that Bach's music is "mathematical", and the term certainly applies to a number of his compositions. But who has not been deeply moved by the expression of desolation, anxiety, sorrow, contrition and love in his Passions?

[1] Sometimes a better instrument produces results that are too perfect for the intentions of the composer. Consider the use of the simple trumpet horn in Bach's cantatas. Sometimes Bach wanted them to sound clumsy, depicting the human condition. But what a wonderful sound gifted players can produce out of an unadorned copper tube, just using their lips, for example in BWV 75, nr. 12!

Not everybody would be moved by this. And actually, things are not that simple. For many people, Bach's musical idiom is hard to fathom, his longwinded melodies boring, his use of the "well tempered" scales slightly false sounding, his massive harmonic progressions bombastic and his religious themes old fashioned or downright unappetizing. It takes serious effort to connect the form to its intended meaning. To understand Bach's music (and the same is true for other great composers) is like learning a new language, not only technically but emotionally. Bach's aesthetics is by no means obvious. It is the result of a long evolution in musical experimentation, exploration, evaluation and elaboration into a complex coherent system in which a correspondence between acoustic form and emotional experience has been fully developed.

My contention is therefore that there is no such thing as intrinsic or absolute beauty. The notion of 'beauty' has a different role to play, namely as a regulator that realizes, or even forces such a correspondence. (I am not claiming any authorship of this widespread and age old insight, but I need to make the point.) To put it differently, there are many ways of generating beauty, even contradictory ones. What is beautiful in one system becomes horrible in another. I hinted at romantic interpretations of Bach's music, but there are much stronger examples. When one compares Indian classical music (sorry for generalizing, there are lots of different types of classical Indian music) with Western music (again, sorry for the generalization), one is immediately struck by the incompatible tonal systems. The definition of beauty in one must be totally different from that in the other. The underlying structural concepts regarding intervals, pitch, scales and harmony simply make the two aesthetic orientations incompatible. One could still find an abstract notion like melody in Indian music as a coherent time progression of related tones, but such an abstraction would not even allow an Indian melody to transform into a Western one, so poor is the grip an abstract notion like melody has on the tonal reality. The abstraction does not define the means nor the means the abstraction.

The notion of 'beauty' is then at even further abstractive distance from reality[2]. Aesthetics is often understood as the "art of achieving beauty", but that is certainly not what Bach's aesthetics is about in the first place. My guitar teacher would say, "Oh, you interpreted this piece beautifully!". But he would mean by this that I (perhaps unconsciously) succeeded in interpreting it by conforming to the aesthetic principles set out or (often implicitly) agreed upon by the composer as a child of their time or as a purveyor of musical sensibility. We use the word 'beautiful' often, just

[2]If one considers abstractions as "layers", whereby the first layer consists of sensing elements, and then further layers contain relationships between elements of the layer below. For more explanations, see the chapter on abstractions.

to mean something like "conforming to a stated or assumed ideal", an ideal that can modify with changes of environment. The horror of Christ's crucifixion is beautifully rendered in Bach's Johannes Passion, but nobody will argue that the crucifixion is a beautiful affair.

The fact is, beauty is a very relative notion. How do we make sense of this type of relativism? The reason why I wanted to talk about musical aesthetics as a metaphor for ethics is because our composers, music teachers and interpreters give such natural examples of evidently relativistic thinking. The essence of music is the association of feeling (emotion if you want) with sound. This is an eminently human ability but it takes effort to achieve it to any degree of fulfillment. Artistic sound can be very complex, as any type of evolved music testifies to, and feelings can also be very deep and delicate. The aesthetic issue is the connection between these two complex entities and whether the complexity of a given sound evokes or provokes the complexity of a specific feeling. This is what is meant by a 'homomorphism' or, for short, a 'morphism'.

At this point I want to discuss the incidence of 'good' and 'bad' taste, which I think is a very difficult but also interesting topic because it connects the idea of 'beauty' with the idea of 'goodness' and hence is exemplary for a much deeper discussion on good vs. bad ethics. The Baroque period is notorious for questionable taste in architecture, in contrast to the Romanesque period that produced some of the most exquisite buildings in Western Europe (at least, so we think nowadays). Yet, when one talks about music, perhaps the opposite is true. There the Baroque period really stands out. Good taste in one field does not guarantee good taste in another. Our forefathers tore down their intimate, half dark and sparsely ornamented Romanesque sites of meditation to construct flashy and overloaded basilicas where the eye has no place to rest and the mind no chance to focus. Was their taste bad or did we change? Beauty seems to be a variable thing, if not exactly personal. It changes through time and space, its relativity being the most striking aspect of it.

While this observation may confirm the general contention of the necessity of relativity, I do not think that we have cornered the subject fully yet. I want to argue now that we are still lacking one important element: the dynamics, or, if you allow, evolution. As with most things human, the situation is never fully clear nor stable. An important element of aesthetics is the progression of style. Every new step is a modification of previous practice. A modification does not necessarily destroy the existing aesthetic principles, but it adjusts them further and adds a new, often delicate, element to it, except in rare instances of a complete break with the past, but even then a more careful analysis often reveals more continuity than the protagonists admit. Romantic music took the strictly neutral melodic, even dancelike, progression of the previous Renaissance and Baroque styles and added to it slight, emotionally motivated variations. These had to be slight because they were very disruptive of the original form. Too much lingering on individual notes certainly destroys the melodic line and changes the emotional idiom fundamentally. The emotion in Bach's music is entirely based on the use of chromatics and well chosen themes, not on whimsical variations of tempi. In the period following the Baroque, the music starts lingering on organ points, passages are being dragged out, tones are emphasized and everything that prevents the straight logical progression of tone and harmony is (almost) destroyed (I am exaggerating of course). Evidently, a new theory, new rules and new connections between emotions and sound had to be developed. Left alone without a new structural theory, the existing idiom might have disintegrated. Luckily it did not and produced new generations of composers who succeeded in keeping the old gains and combining them with the new idiom. Mozart and Beethoven are prime examples of this integration, followed by many later composers. A new morphism was put in place with a new notion of beauty.

Style can become dictatorial. Wars on style are fought between artists, who sometimes form unholy alliances with political establishments. For a time, some forge ahead and others, who may be more talented but do not follow the trends, are left behind. The game becomes dominated by power structures. Art has to be sold and the gain of one can be the loss of another. Competition can be fierce. Even though economic or political gains may be the source of rivalry between artists, style wars can also be fought from purely artistic motives. Either change is resisted or change is imposed. The worst treatment is perhaps total oblivion. Bach's sons, who are considered among the first generation of romanticists, called their father "the old peruke". It took about a hundred years until Bach's great art was rediscovered by Mendelssohn and Schumann and became a major influence on modern classical music. Bach's resurrection may seem strange, but it is a tribute to his manifold contributions to music. He was not only a composer of an immense array of new melodies, the discoverer of a highly emotional paradigm of chromatic variations and a mathematical genius in exploiting melodic inventions, all extremely creative elements of style, but he was also an architectural genius in the spirit of the best modern novelists. His art testifies to one of the most elaborate aesthetic constructions in Western history, rooted in the long past evolution of musical forms but exploiting the rich possibilities of the Baroque musical idiom.

Bach's work demonstrates how the connection of art to emotion can be realized. He produced an elaborate framework of musical principles that elevates music from mere sound to an expression of deep human feeling, at least for whom is willing to immerse themselves into the idiom. However, often the opposite connection is in effect. This is mostly the case in art that catches on easily. The common person—all of us!—has no problem in voicing their feelings without much sophistication. This emotional directness translates into raw sounds and ends up with simple melodic lines or even barely a melodic line on the background of a strong beat. The melody or the beat may catch on and ravish millions and at the same time be unbearably ugly to others. While this demonstrates the connection between emotion and sound, it also shows that a great theory of aesthetics is not needed to achieve strong results. Many human emotions are basic and so are many systems of sound production. This seems like an uncanny homomorphism between them: brains and basic rithms resonating with each other!

However critical one may be about this relationship, from these basic emotional expressions through sounds new sprigs of invention may sprout, very often inspired by musical elements that go back centuries. Harmonic sing-song reappears, elements of counterpoint, syncopes, chromatic variations, often without plan or purpose, just as curiosities or emphasis. The whole existing musical dictionary can be used to benefit. But not all such variations catch on. A lot has to do with the expressive talent of composers/interpreters (often the same persons). In some cases, a true new idiom arises defined as a comprehensive set of aesthetic principles used in a sophisticated way. This was the case with the Beatles or German Schlager music, but even then, the level of sophistication obtained cannot in any way compare to that achieved by the great classical composers. It is like the difference between using about 2000 words of English in daily parlance and a work of Dickens that uses 20,000 or more in a highly creative way.

There is a great distinction between a framework and the creative use made of it. Every language provides a framework: grammar, dictionaries of interpretation and semantics. The stability of a framework is needed to allow for communication and further evolution. Stones make the building, but the building is more than an orderly agglomeration of stones. The construction rules are necessary to achieve new elements that transcend them: rooms, stairs, roofs, pillars.... Language moves seamlessly from structure to purpose, but each of these exist independently, they cannot be derived from each other. The 'duality' between structure and meaning is inescapable (this is a theme that shall occupy us much in the following chapters.).

In the case of music the situation is no different. A given emotion can find expression through various sounds and, conversely, the same system of sound can be used to express varying emotions. All this is determined by contextual elements connecting composer, interpreter and listener. These parties do not even have to know each other. The connection is made through semantic creativity at both sides. The interpreter may be aware of the purposes of the composer (or can even imagine them if the information is lacking), and the listeners may possess a frame of musical inference based on actual practice, fashion, conventions, or imagination that they either share with the interpreter or generate all by themselves. All these abstract structures do not even have to be completely precise. There is plenty of room for individual interpretation. None of the aesthetic constructs is deterministic with variations being possible at any juncture.

All this still leads us further into the issue of taste. When does a piece of art, or in general, any creation be it a house, clothing, or food, testify to good taste? I find many ancient Hindu temples magnificent, but their modern versions often tasteless and kitschy. My country, Belgium, offends by the tastelessness of its modern landscaping (or lack of it), while the beauty of its medieval cities stands out. Whatever happened there? Some people would say, "Good taste is for specialists", and there is certainly something true about the statement, although amateurs are often very good observers. The notion of taste is closely related to that of beauty and we already hinted at the role 'beauty' plays in aesthetics. Let's try to make it more explicit.

There is no such thing as 'absolute' beauty. Beauty is a notion that derives from a more or less arbitrarily conceived aesthetic system. A valid description would perhaps be "more than adequate use of the possibilities the system offers". "More than adequate" can go in many directions. It can point to an especially well done realization, an unexpected creative development, a deepening understanding or a better correlation with emotions, but it has to elicit admiration, especially in experts versed in the aesthetic system, assuming their assessment is based on a constructive attitude, which is sometimes lacking among specialists. A thing of beauty need not be pleasing. It may even make one very uncomfortable if it conveys its aesthetic intentions in an especially effective way. While a piece of music can be termed beautiful by some, others may find it insipid. Modern Indian pilgrims find their temples exceedingly beautiful, while to me they look awfully kitschy, and many art lovers might agree with me, although others might find the kitschiness in itself great. But then again, that assessment would be made from the position of a different aesthetic attitude. Another approach would be how well a piece of art is capable of eliciting the intended emotions, but that would require a common interpretative framework as well, and the artistic intention may be different than the generation of specific emotions (e.g., transmission of information or effective presentation of knowledge).

For a viable notion of 'beauty', we have to walk a ridge between the dictatorship of experts and popular rule. As with other such notions (truth, justice, courage, even eroticism), their use is dependent on the value system of the user. For a specialist, beauty has a fairly precise meaning of appreciation with respect to their aesthetic system, while for a lay-person, it relates more to their inner system of appreciation. Most people may have a standard (partly inborn, partly nurtured) practice of aesthetic appreciation that orients to one or the other existing system in each field of art they might be exposed to. There is a lot of learning in the process. We learn in a variety of ways. One is through examples and experience, and we are conditioned in certain directions through education and regional influence. The other way is by the development of theory, enforced through examples and practice. There are many aesthetic theories around in a variety of fields and each of us picks up elements of this and that, and then amalgamates them into a kind of personal aesthetic “gestalt”. We may be artists in minor and major ways, and our respective aesthetic sophistication will vary dependent on our interests.

Even when a person is educated in a very advanced aesthetic theory in one given field, say music, they may be totally ignorant of a competing system (most Western musicians know hardly anything of Indian music). It takes practice and experience to adopt a given system of aesthetic values, nothing very deterministic there. The landscape of tastes is as diverse as the variety of languages with great similarities and major differences. Aesthetic idioms are seemingly more variable than, say, languages and can be recomposed more easily; for example, classical music adopts jazz rhythms and pop music counterpoint. The problem for further joint evolution arises when the basic frames are incompatible, as is the case with the well-tempered dodecaphonic Western system and the Indian quarter tone system. Although they can sometimes be played on the same instrument, they cannot be played together. Likewise, they cannot both be played on an instrument in which the tonal framework is fixed, such as the piano. Some composers may nonetheless try a synthesis, but the result may fail to be satisfying, satisfaction being a primitive but important principle of evaluation. The recombination of possibilities makes one think of recombination of genes. The results can be prodigious, but more often than not, the effort ends in failure.

Beauty is not a question of ideals, it just refers to positive evaluation within an aesthetic system. Each system comes with an evaluation method, implicit at first and then gradually more explicit as the system evolves towards higher levels of maturity. The evaluation method may be environmental—e.g., general appreciation, or the survival of the fittest—or it may be intrinsic—e.g., the strengthening of the system, or enhanced consistency—or anything in between, and it evolves as the system evolves. Inevitably, at some point, there will be a clash of values, new ideas and developments may disappear as ‘unfit’, or else will be fought by conservative forces that want to preserve gains made so far, while the new generation will vehemently depreciate the old values in favor of the new fashion: "was die Mode streng geteilt", according to Schiller. Much later, the old values can come back at a higher turn of the sophistication spiral. Just like life, art keeps renewing itself, "down come the strong and rigid, up comes the tender sprig" (from Lao Tzu, The Way ol Life, nr. 2 in the Witter Bynner translation [8].):

> People through finding something beautiful
> Think something else unbeautiful,
> Through finding one man fit
> Judge another unfit.
> Life and death, though stemming from each other,
> Seem to conflict as stages of change,
> Difficult and easy as phases of achievement,
> Long and short as measures of contrast,
> High and low as degrees of relation;
> But, since the varying of tones gives music to a voice
> And what is the was of what shall be,
> The sanest man
> Sets up no deed,
> Lays down no law,
> Takes everything that happens as it comes,
> As something to animate, not to appropriate,
> To earn, not to own,
> To accept naturally without self-importance:
> If you never assume importance
> You never lose it.

The history of art and its ethics as aesthetics offers the prime example of how creativity, evolution, emergent behavior and freedom interact. Chaos and controlling selection work at loggerheads and create an evolution in unexpected and unpredictable directions. But this is only half the story. In the other half, many new avenues will be tried but most will disappear and even the successful ones will be discarded at some point in time with no one except a select collection of specialists or historians still caring about them. Looking backwards in the history of music, who would ever have imagined that a highly stylized and rigidly melodic system of composition like Gregorian chant would ever emerge out of the chaos created by the collapse of the Roman empire and the invasions of hordes of Germanic tribes? Crucial to the emergence of new forms of art and their consolidation is the development of a parallel evaluation system. What we summarily call beauty boils down to a relative consensus on what is good art and good taste in that developing context. This is how we experience artistic existence to arise and move ahead, a process to be examined more closely in the next chapter.

And another important (and final) point I want to make is that the evolution and deepening of art forms is not necessarily cumulative. In every new cycle, old and well-developed forms may either be used again of be discarded. The new style does not necessarily integrate the old ones, but picks elements from them, producing a new environment of artistic practice that obeys its own structural laws and becomes essentially different. We should then not be surprised that similar evolutionary mechanisms are at work in the development of ethics and any other human endeavor as well.

A Kwakwaka'wakw totempole scultpure from the village of Gitanyow

Chapter 5

Reality and existence

A few basic philosophical issues present themselves now for treatment in the light of systemic relativism and the incidence of chaos. The first is the 'ontological question': what 'really exists'? As a relativist, does one have to doubt the 'existence' of 'reality'?—or, anyway, what do these notions cover? The relation between the 'mind' and 'reality' is a tricky affair. Is the mind creating what it understands as reality? Many physicists would believe that what they do is to discover the reality of nature. This is vividly exemplified by the general 'principle of Maupertuis' (or, for the Anglo-Saxons, the 'Hamilton principle'), which states that any natural physical evolution of a closed system minimizes the system's 'action'. The temptation is then to consider the principle of least action an unmovable law of nature. We analyze this point of view and reach the conclusion that even within the principle's region of applicability, interpretative variability is endemic. Physicists (and scientists in general) typically (have to) limit their scope of vision to what they are able to understand and, next, able to observe given the methods they have been able to develop. The situation may be even more dramatic. 'Reality' is to be seen as a concept or entity in scientist's brains, which describes how what they view as 'nature' reacts on their theories, including the experimental set-up designed to verify the contentions the theory produces. The remainder of the chapter develops that proposition in more detail, first using gravity as an example (do masses attract each other?) with Einstein's general relativity theory as the guide, and then proceeds to analyze the dichotomy between 'mind' and 'world' or 'reality', concluding with an assessment of how one can understand 'existence' relativistically.

The notion of 'reality' is claimed first and foremost by science, in particular by physics. A scientific theory is considered proven or disproven by what happens "in reality". Or is it perhaps the opposite, with physics defining what it considers reality? Most physicists believe that the first is true, while (in reality!) it may be more the second they actually practice surreptitiously. The question is certainly legitimate, but requires a deeper analysis of how physics relates to what physicists call 'nature'.

Let us explore the contention between "reality as physics" or "physics as reality" by the example of Lagrangian mechanics, possibly the most comprehensive principle pervading modern physics. It states simply that any evolving physical system minimizes what is defined as its 'action', and this actually determines precisely how it moves (its trajectory, speed and other characteristics called its 'state'[1]). For those who are not familiar with it, here is how it works. Take any reasonably constrained physical environment (a billiard ball on a smooth flat surface, planets around their sun or electrons in a transistor), and the movements of its components are governed by a "principle of least action" (sometimes called the "d'Alembert principle", the "principle of Maupertuis" or "Hamilton's principle" depending on regional affiliation). The 'action' of the system is defined as "how the system at each point in its evolution converts the external forces it is subjected to into its internal energy (kinetic and potential)". This is expressed mathematically by its so-called Lagrangian, a mathematical function of its state which accounts for the gain of internal energy at the expense of external energy[2].

The main difference between mechanics as practiced by the ancient Greeks and the mechanical laws proposed by Newton is the choice of state variables. Newton recognized that force changes velocity rather than position (it only changes position indirectly), so that velocity has to be declared a state variable, whose evolution (time differential according to Newton) is determined by force. More precisely, acceleration is proportional to force. It was later discovered that this effect can be equally well described as a principle of least action. It turns out that this latter principle generalizes to any physical system known so far, including elementary particles, waves and galaxies, the catch being that an adequate expression for the Lagrangian has to be found in each case. Modern quantum mechanics, special and general relativity theory all minimize action, based on some adequate representation of the Lagrangian. A good example of the adaption of the principle is given in quantum mechanics where a further fundamental step is taken. Probabilities are attached to all possible action paths, proportional to the value of the Lagrangian along each, so that the path of least action only has the highest probability of being taken by the system. This is exploited in the famous "Feynman method [22]", used in modern

[1] The 'state of the system' is formally defined as the collection of all the internal data needed to uniquely determine the immediate evolution of the system.

[2] By minimizing the Lagrangian, the system tries to gain as much as possible internal energy at the expense of the external sources. My physics teacher in high school used to say, 'Nature is fundamentally lazy, greedy and chaotic'.

quantum field theory to compute quantum probabilities.

The temptation is then great to believe that the principle of least action is an immovable “fundamental law of nature”: it is fully ingrained in nature, or equivalently, that is how nature “behaves”. Every experiment done so far confirms the principle, provided the correct Lagrangian is used. Physical experimentation consists in a continuous confrontation of the stated physical principles with the reality of nature and the theory gets reaffirmed every time an experiment pans out. It seems that somewhere there is a super reality, more real than reality itself, in which true physical theories live. The principle of least action is its main demiurge, its Kronos.

I claim that this view is a *fata morgana*. The principle of least action exists very precisely in our brains and nowhere else, not even in the internet, which is just a repository for things our brains have created and can understand (except for our brains and robots built by us, nature does not consult the internet!). We consider a theory “valid” when it turns out to be the best model our brains are able to generate to explain what we experience in our confrontation with what we understand to be nature. Somewhere we are fooled by successful experimentation to think that the ‘laws of nature’ actually ‘exist’ in nature, while the situation is actually the opposite as I shall argue: *our brains create laws to account for regularities in the structure and behavior of that piece of nature on which we are able to experiment.*

Our experimentations are selective and limited by the development of ‘knowledge’ (we shall spend more time on that notion in the chapter on Epistemology). In the beginning of the history of science, nature watchers were driven by their senses. What they heard, saw and felt, that was reality. At any stage of the development of our thoughtful confrontation with nature we try to make sense of our many experiences, wittingly or not. “Making sense” means pleonastically “developing a coherent theory”. The coherence between what we think and what we sense is what our brains feel as understanding. Coherence takes place in various ’dimensions’, in the time dimension as causal relations, and in space as cooperative structures that build systems and for which we can eventually define structural laws such as a Lagrangian. Nature is hugely diverse, and very soon our brains will focus unwittingly on what we are actually able to understand, i.e., whose coherence we are able to experience, leaving out the many phenomena we do not have a grasp on—the history of science is ample proof for these statements! The best we can do with seemingly incomprehensible phenomena, is classify them (taxonomy), as we did with astronomy in ancient times or with botany even up to modern times.

Taxonomy is a beginning of order, even when superficial. At some further point in time, connections between seemingly unrelated events find wonderful explanations, a new mystery of existence is resolved and the going classification has to be thrown out in favor of a new coherence. It happened most spectacularly with star constellations. Originally, stars in a constellation like Orion were thought to belong together (and to be emanations of gods). It was only when astronomy could start gauging their distances that people understood that they mostly have no relation to each other, except that they are seen more or less in the same direction from the earth (an extreme case of "truth is in the eye of the beholder"). Nowadays we term such insights as trivial, forgetting that we are continuously doing exactly the same thing, in many cases not yet knowing the presumably true relations. The understanding of plant genetics threw existing botanic classifications into disarray. Societal order can also be a casualty of faulty explanations. Here is my short history of gender relations. A baby comes out of the womb of a mother, hence the primitive matriarchal societies since she is seen as the procreation agent. Later, people understood that there was a fairly fixed time span between insemination and birth, a direct causal relation was inferred and patriarchal society was born. The mother was thought to be a mere receptacle for the seed introduced by the father. When on purely statistical grounds Mendel discovered genetics, which was later confirmed by the deepening understanding of cell biology, suddenly gender equality made its appearance and is now the dominant mode of societal progression. Males and females contribute equally to their offspring's genes, the female contribution more critically than that of the male, the supply of egg cells being more limited than that of sperm. So I wonder what might happen next? Back to the matriarchal society?

So we believe in the existence of gravity as bodies attracting each other, but the geometric viewpoint of general relativity is demonstrably[3] more precise. The simpler model is not equivalent to the more complex one. For one, it assumes a flat universe in which propagation of force is instantaneous, while with Einstein we know that this is not the case. Within our usual context the difference is infinitesimal, but as soon as you move into interstellar space and astrophysical time the situation changes completely. So then, what actually "exists"? Force? Geometry? There is a model in our heads and there is nature as we experience it. One must keep them separate.

If I may permit myself an analogy, a human brain is comparable to an extremely powerful camera, able to see and to analyze very complex scenes that evolve in what it calls time. It is also capable of organizing its findings and experiences in an openly accessible repository, comparable to a very advanced and well-organized picture album. These manifold pictures and

[3] It gives different values for the apogee of Mercurius, a.o.

their relations show us a universe that we interpret, whose properties we analyze and for which we derive constitutive rules, which we then consider to be insights in how the universe 'is'. However, the ultimate picture we obtain and share among our peers is not the universe or nature itself, it is the best possible picture we can make given our present day imaging aptitudes (in particular mathematical and experimental aptitudes). *The picture will never be the thing itself.*

We might think that the progress of science and the discovery of nature's processes are linear in the sense that the most urgent questions are addressed first. Actually, many processes are at work that steer the efforts and interests of scientists. Some philosophers of science have forcefully argued that social influences among scientists and political communities dictate the next steps rather than logic or curiosity. Physicists like to insist on "curiosity driven research", but what is often seen is "peer driven research". What defines the curiosity is mostly what the peers would likely appreciate as valuable and they decide in the final analysis on what is publishable [59]. But this is an unfair and colored view of the scientific process, although there is some truth to it. The curriculum of some of our top scientists like Einstein show a different picture. Einstein was often driven by inconsistencies or incoherences in the traditional approach that made him search for a better understanding. In this process he was only minimally influenced by the opinions of his peers.

Progress in science is also very much dictated by the perfecting of instrumentation. A better understanding of mechanical and optical principles in the 17th century quickly lead to more accurate instruments, microscopes, scales, scalpels, melting pots, thermometers, pressure sensors, meters, furnaces etc..., which in turn lead to much more precise verification of theories and claims. The construction of telescopes went hand in hand with the refinement of gravity theory and its connection to the geometry of planetary movement. One motivated the other and the second supplied proof for the first. Another similarly remarkable development was the discovery of the role of oxygen in combustion by Lavoisier who, by making measurable evidence central, would discredit the phlogiston theory and lay the basis for modern chemistry[4]. The ever more precise construction of instruments is one of the strongest drives behind scientific progress. We want to "see" with ever more accuracy, faster, more realistically, with higher energy, farther away, through the milky way, in vivo—you name it. And from there gain

[4]Lavoisier wondered, if there is phlogiston, how can it be measured? By trying to measure it, he discovered that it was not there. On the contrary, what had burned in his experiment had become heavier. Although Lavoisier did not 'discover' oxygen (Priestley is credited for that), he discovered its chemical properties and recognized it as an 'element'.

a better understanding of all sorts of phenomena that happen to strike us: the origin of galaxies, the functioning of cells in our brains, the emergence of cancer, the thermal equilibrium of the earth, ecological systems, economic processes etc... For each of those there is a community of scientists ready to defend its importance and, depending on their societal clout and scientific abilities, they may be more or less successful in promoting their field. As with all evolution, there is part guidance and part chaos, and the progressing direction is unpredictable.

Let us draw some philosophical consequences from this concerning the role of 'reality' in our thinking. When we talk to each other about nature and about testing it (i.e., discovering reality), the cleanest attitude is that we respect it as neutrally as possible as the prime arbiter for our opinions and theories. Even so, 'reality' is again not much more than a concept that lives in our brains. It is what our brain views as being external to our thinking process and to which it seems to be able to relate. If that which we think would "really exist", we would not need the notion of reality.

Thinking cannot regress indefinitely like negative numbers do to minus infinity. At some point it has to start with basic, unproven assumptions. This is what all scientific theories do, calling their basic assumptions fundamental laws of nature, which, in turn, are rooted in fundamental principles of some branch of mathematics. But most of our thinking uses the same kind of reductionism. The more concise that starting point is, the more chance it has to be acceptable to fellow thinkers as a common ground for building a theory. What the term 'reality' then expresses is how the claims derived from the propounded theory conform to what can be experienced outside one's own thinking, and as much as possible independent of personal idiosyncrasies. The experimental conformity then amounts to nothing more than a confirmation of the predictive quality of the theory the brain has conceived, within the experimental constraints imposed by that very theory[5]. The possibility of observation could be taken as the only solid evidence of what may be considered reality.

As a starting point, this kind of acceptance of 'reality' is a necessary minimum. Without it science and philosophy would hardly be possible. While I appreciate the skeptical opinion of a total negativist, an uncompromising idealist or an unconstrained relativist on this matter, I would not consider their respective positions to lead anywhere. So let us be pragmatists[6]. There must be a minimum basic acceptance of principles. However, I do not want to grant more on the other side, for any additional credit given to the 'reality' of human theory (including the concept of 'reality' itself)

[5] A disproval, which would not be based on a precise experimental set up that fits the assumptions of the theory would hardly lead to a trustworthy conclusion.

[6] Pragmatic positions are not new, see e.g., Spinoza in [57]!

would impair the essential function nature has to play as the great enforcer of our correct thinking. All science and physics occur in our brains and not elsewhere in nature, as far as we know. Stationing our brains and our minds sturdily in nature allows us to apply the same scientific method to their own functioning as well. That process is again solely a brain process and in need of further policing.

Let us try to clarify the issue by working out a further example. Does gravitational attraction between masses exist? When we test Newton's gravity theory based on forces between celestial bodies, we must admit that it does an excellent job at predicting the ephemerides. So gravity really exists as far as Newton's theory is concerned and there is plenty of experimental evidence in nature that confirms its predictive quality. Later, Einstein came along and was mystified by Newton's gravity law. How can two celestial bodies 'know' that they have to attract each other with a force proportional to the product of their masses and inversely proportional to the square of their distance? Sounds very strange, Einstein must have thought, there must be something that mediates the information! And, indeed, he came up with a better law in which the phenomenon of gravity is attributed to the deformation of the geometry of space-time due to the presence of masses, much like a mass resting on a gum membrane (a trampoline) deforms its geometry. The 'forces' predicted by Newton's laws have fundamentally changed their character. They have become 'virtual' and their origin is totally different[7].

Einstein's model predicts a number of phenomena that cannot be derived from Newton's gravity law and that have been confirmed by measurements, such as the deviation of light in the neighborhood of a mass. Suns and planets do not compute masses and distances, they are subjected to geometries they generate by their mere presence. But this insight is, again, just a brain process. Remarkably, when a new insight arises, physicists burn their bridges and claim they now know how things 'really' are and state "the universe is geometry"[48] as the ultimate truth. They should know better!

What then is the correct law of gravity, Newton's or Einstein's? It can be shown that when properly limited to non-extreme conditions, Einstein's

[7] Actually, Einstein's "falling elevator conceptual experiment" shows that a 'falling' object does not undergo a force. It only experiences gravity when it is prohibited from falling, such as resting on the floor or, to put it differently, a falling object is free floating. This also explains why all objects in the falling elevator have the same velocity and acceleration with respect to the earth independent of their mass. The mystery of Galilei's falling balls from the tower of Pisa is solved. The so-called falling objects are actually at rest in their common inertial system, their movement is just an illusion due to the choice of reference frame.

general relativity theory reproduces Newton's law, and hence one could maintain that Newton's theory of gravity is contained in it. The general relativity theory is simply more powerful. It covers a larger domain of validity with fewer basic assumptions. But there is also an unbridgeable qualitative difference between the two theories. Even though one theory can reproduce the results of the other to some extent, they say very different things and the 'semantics' cannot be reconciled. Gravity has a very different effect in one theory than in the other. This does not prevent astronomers from using Newton's gravity to compute ephemerides as it is so much simpler.

What can be considered a 'fact' in this example? Clearly, when Galilei was releasing balls of different masses from the slanting tower of Pisa they were racing towards the earth. That fact is based on direct experience and is common to all gravitational theories so far (except perhaps for quantum mechanics that gives them a tiny chance to move upwards). That there is a force attracting the falling ball to the earth is considered a fact in one theory and fiction in the other. In Einstein's theory it is a wrong conclusion from a factual experiment. The 'fact' that a ball released from the tower moves towards the earth with a specific acceleration is much more certain than the contention that a force is acting on it—since Einstein we have no problem to view the latter as a convenient substitute for what 'really' happens—but the conclusion that there is no such thing like an 'absolute fact' is unavoidable because any claim to this is mediated by a brain process that uses representations of its own that are in need of interpretation. We shall consider the question of 'certainty' in more detail in the chapter on Epistemology.

We believe that something 'exists', when its sensual emergence (in a generalized sense, including sophisticated instrumentation) conforms to our thinking and perception. Nature then says, "Okay, your prediction is correct!". It does not say, "Okay, you have discovered what I am!" The gap between thinking and nature cannot be bridged. I wish to argue that this has to be so. It turns out to be the unavoidable duality between phenomena and the structure attached to them by observers. Nature offers various processes to our investigation that our brains can view as coherent and hence as structures. It is the same mechanism as the one that attaches meaning to sounds (to signs or other types of symbols). Meaning takes on many forms. The point here is that phenomena do not determine structure nor does structure force specific phenomena, although there are strong constraints between them (for example: both Newton's and Einsteins's gravity theory have to predict the same phenomena.).

While the discrepancy between meaning and physical structure may necessarily look like duality, it is not duality in a classical sense. It is a necessary ingredient of knowledge and the communication thereof. Meaningful communication between agents first turns meaning into phenomena (e.g., a sensation into the sounds of a spoken statement) and then, after passing through the communication medium, resurrects the meaning from the observations. The analysis of the duality between observations and the semantic coherence attached to them (in many layers) is in need of further elaboration, to be covered in the chapters on Semantics and Epistemology.

If one consequently avoids acceptance of the (classical) full dualism between a mental world and a natural world, then one has to accept that the mental world created in our brains belongs to reality, but only as a mental construct, which has the specific ability to construct correlations validated by experience. This is a kind of homomorphism which is necessarily incomplete (it cannot be an isomorphism since nature will always be larger than the representational framework). Our minds mimic reality in the sense that they construct bodies of 'knowledge' that do seem to correlate well with certain observable phenomena, but cannot claim to be structurally identical. The imperfection lies in the fact that (1) many phenomena escape attention, and (2) only those that show some correspondence with a potential brain structure are actually observable (granted that instrumentation may largely extend the observational abilities).

The contacts human minds in general have with the outside world more or less resemble what we personally experience as our contacts with other people. We know some things, interpret a lot, and there is a much larger number of things about another person we do not know. The picture one has of a close relative becomes more precise the better the communication with one another. A full "proof of existence" of the other person does not seem like a relevant issue. Much more relevant is whether the correspondence between the thinking and the experience pans out. What one person believes about the other can never be absolutely true, even though it may be consistent and acknowledged. The notion of truth only goes so far as is relevant to the mental picture one person has of the other.

However that may be, skepticism about existence is not a futile exercise. Each piece of presumed knowledge constraints the mental picture one has and may thus prevent further awareness. The mental pictures we create must be able to shift, evolve and refine, continually putting into question what we deem to be reality. The reality of our brains allows for orderly shaping and reshaping, at least in our minds, what each of us considers reality, and which, in conjunction with others, construes a larger, more globally shared experience of reality. Even though all this is no more than a belief, it is a belief that allows us to live, or, maybe more precisely, that allows the perception and awareness of what we call living, ever in need of continuous refinement.

The conclusion that reality arises as a conjunction between nature and mind mediated by intelligence is unavoidable. Such a statement may appear overly pretentious, abstract and imprecise, as most highly abstract statements are. It must be seen as a path or program for further investigation and specification rather than as an assertion of unavoidable truth. The key role therein is played by intelligence, which we are now ready to explore.

Sue Savage-Rumbaugh, Kanzi and his sister Panbinisha working at the portable symbol keyboard.

Chapter 6

Intelligence

This chapter introduces a new element on the borderline between (modern) natural science, technology and philosophy: intelligence. Although the notion has a somewhat troubled history, it provides an essential component for further discussion, especially when viewed in conjunction with the theory of evolution. Problems that the chapter tries to elucidate are: "What is intelligence in its most primitive form?" and "How did intelligence evolve to reach the human level of expertise?" The chapter starts out with a circumscription of the notion itself in which the necessary distinction or 'duality' is found between 'structure' and 'meaning', or, in the context of a language, between 'syntax' and 'semantics'. We explore the (chaotic) theory of emerging intelligence and establish that meaning-structure duality in its many forms is a necessary constituent of evolving intelligence, a point that has not been properly understood in the past, leading to the unnecessary and confusing mind-body dichotomy. The role and mechanisms of 'abstraction' are also elucidated as brain processes and the notion of 'consciousness' understood as an additional layer of intelligence. Abstractions are private to the mind (brain) and how they might 'exist' in 'reality' is considered as a kind of 'homomorphism' between brain processes and observations.

> "L'homme n'est qu'un roseau, le plus faible de la nature, mais c'est un roseau pensant" (Pascal [46]).

To understand intelligence seems to give headaches to many people, philosophers as well as scientists! To many philosophers, intelligence is a faculty of the mind that cannot be explained by natural phenomena, at the same level as 'consciousness' (which may be considered a special kind of intelligence). To scientists, the notion escapes the fundamental laws of physics, although it could, with some effort, be 'explained' by equations governing non-linear dynamics where it would linger on the "edge of chaos[1]". And yet, I shall argue that intelligence may not be all that mysterious, as it plays an essential role in natural evolution from the start of life on, and perhaps even before. How can intelligence originate from very humble origins and then develop into a major force of evolutionary success, at least as far as our earth-bound perceptions go? But before engaging in further explorations of the evolutionary nature of emergent intelligence, I want to concentrate on the notion of intelligence itself, because it will play a major role in our further discussions and in particular in our approach to ethics.

'Intelligence' or 'understanding' may be thought to be the same. People of Latin origin like "to read between", while people with Germanic roots prefer "to stand under". The concept commonly refers to the capacity of the brain to interpret observations, make connections between different types of phenomena, imagine scenarios, evaluate them, devise strategies, communicate them and organize efforts to achieve some benefits. Humans experience these capacities as making sense of what is, what happens and what could be.

Unavoidably, intelligence is closely linked to our ability to model, abstract, discern and discover, not just the face value of phenomena, but the similarities and manifestations of their hidden relations. It allows us to see or just to imagine commonalities behind distinct manifestations, a faculty we call 'abstraction'.

We experience these abilities to attach structural information to phenomena primarily in three ways, spatially (*aggregation: things that constitute a greater whole)*, temporally (*chains of cause-and-effect that evolve in time)*, and ontologically (*generalization: the notion of belonging to a larger class*), which occur in different areas of the brain. For example, we see people as being constituted of cells that build various organs, evolve over time from fetus to adult, and belong to the class of mammals, which itself is a subtype of the vertebrae etc... Besides the ability to recognize patterns and abstract them, intelligence can also handle 'dynamics', imagining scenarios and anticipating the evolution of things.

Intelligence is, without doubt, a wonderful ability. It allows us, human beings, to organize our world and obtain some measure of control over it. The more we understand, the more we can anticipate, and the more we can attune our actions to our expectations and desires. To see relations and connections turns out to be a matter of life and death, given the relatively weak physical constitution of humans and our precarious condition within the earth's habitat and the universe in general. It allows us to anticipate

[1]As was mentioned when we talked about the Hodgkin-Huxley equations in the chapter on Chaos.

danger and hence avoid potential harm before disaster strikes.

It is crucial that the estimates we make with our intelligence turn out to be reasonably accurate. By misjudging, we may harm others and ourselves as well. Our actions may easily have unforeseen consequences and so our need to know and to know accurately is paramount. What we think we know can be highly uncertain. We may know that we do not know or cannot predict some phenomenon, but, worse yet, there are many effects we are not even aware of. Even so, we develop theories about ourselves and our world which amount to not much more than ludicrous beliefs, like the belief in witchcraft that is still popular today in many primitive societies, or the belief in absolute heavenly bliss to whoever immolates himself for a religious cause. The history of human thinking is littered with dramatically failed ideas and beliefs[2].

Before examining how our common views impact intelligence, let me first describe its mechanisms. As already suggested, intelligence is closely connected to our ability to abstract in various ways, hence to the structure of our brains. It is safe to state that a great deal of human brain activity (and the brain activity of mammals in general) is devoted to analyzing connections between perceptions within many layers of abstraction. Neurophysiologists have established that more than 90% of neural connections are devoted to feedbacks which connect a layer of abstractions to its lower level instances [30].

A good example of this can be found in language, the most impressive intelligence faculty of humans. Our vocal cords are capable of producing a great amalgam of different sounds. We learn to associate specific objects to sounds, mostly in an arbitrary way. The sound "tschèr" has nothing to do with a chair, although English speakers will immediately make the association. The association is learned and imprinted in the brain and, from a young age on, native English speakers have specific neural connections dedicated to it[3]. Recently, neuroscientists have been able to measure the activity of a specific neuron directly *in vivo* and have been able to characterize whole neural zones dedicated to forming precise space-time associations between visual and auditory events. By having seen his or her mother pointing to a chair and pronouncing the word at the same time, the association becomes hard wired at the site of a specific neuron in the brain

[2]They may be considered chaotic developments that might lead to new perspectives, and sometimes they do as they may provide new insights that then turn out to be accurate and effective in another direction—an effect sometimes called 'serendipity'. Still, for the new turn to be effective there must be an agent that recognizes it!

[3]I understand from neuro-scientists that the establishment of a language in an infant's brain happens through 'pruning' of neural connections that are not regularly enforced. Babies who have not been talked to regularly gradually loose distinct linguistic ailities.

of a native English-speaking child.

But language does not stop there. From words, sentences are made, and they develop a meaning of their own. It is very likely that the association of sounds recognized as words ("John", "sit", "chair" etc...) is evaluated in yet another layer of the brain leading to the understanding that John is sitting on a chair. Next, sentences are concatenated into paragraphs that stand for a new concept binding the sentences together. John sitting on the chair is related to John wasting his time watching television. And it does not stop there. Our brains then move higher in abstraction to the level we call 'grammar' where we analyze sentences and, based on word order or other cues, recognize the structure of a language and talk about the use of a subject, verb and object. Already, five or six layers of abstracting neurons build on the mere faculty of associating sounds to objects in a given context. It is, of course, an astounding faculty, but one that raises a number of questions.

The first might be, "How does the brain do it?" While there may not be a complete theory on this issue, there are strong indications that it might work like 'formal semantics' in computer science. We can base our understanding on a 'functional correspondence' between neural circuits and formal computer languages, as both systems use 'memory' but store it in different ways. Let me try to explain how this connection works.

The distinction between 'syntax' and 'semantics' is basic to computer science. It is an essential distinction in any 'natural' language as well. 'Chair' is good English syntax and its semantics indicates an object with four legs, a horizontal board on which one can sit, and a vertical back. When we see something that has these features and is of human size, we would call it a chair. We have made the connection between the abstraction and the syntax used for the abstracted notion. In the brain, such a relation is made through synapse-neuron connections. Remarkably, the pattern recognition ability of the combination of our sensory organs and brain will activate this connection as soon as we see a construct that fits the rough definition of a chair, even though it may be either imprecise or totally out of context[4].

We are used to the possibility of any language to express both syntax and semantics within the same integrated framework[5] but in elementary

[4]Computers are not very good at this kind of 'back-activation', even though it is a major feature of search engines such as Google. In our brains, the pattern recognition and retrieval is immediate. Google needs a lot of computations to achieve a similar result, but thanks to the speed of both computing and communication the result is good as well, and also different in character, leading to new possibilities our brain is not capable of, like the consultation of immense databases scattered all over the world.

[5]E.g., a Dutch Grammar uses Dutch grammar to explain the structure of a Dutch

computer science one makes the distinction. That is often necessary because many computer languages typically have a specific aim, they are either command languages (like the very popular C language) or descriptive languages of a specific domain (like a language describing the architecture of a house or mathematical equations) and hence not suited to explain themselves. However, structure without semantics is pleonastically meaningless. The semantics fixes the meaning and, in the process, the context needed to interpret a given structure. Therefore, with any basic computer language at least some additional semantics has to be provided (modern so called "object oriented languages" like C++ have in-build mechanisms to do so.).

Computer science advanced greatly with the realization that semantics in itself needed a computer language to be properly expressed. Hence arose 'formal semantics', the development of a formal language to express the semantics. Such a language again needs appropriate syntax and will use signs, words and rules to construct correct expressions, which then will need interpretation that establishes their meaning, and we are escalating the abstraction ladder one notch. These efforts usually end up, after a number of stages, in a natural language like English, in which the meaning of the not yet defined terms in the last abstraction is expressed mostly as a recipe on how to use the top-most syntactic layer. We saw this happening in Logic before (for example: 'modus ponendo ponens', which states that if a proposition q follows from a proposition p and p is true, then q is true).

The important point is that semantics can be formalized. The formalization can be purely for documentation purposes and merely descriptive, but it can be *operational* as well (i.e., another computer language that compiles and runs). That is what happens most clearly in the engineering field of computer-aided design (CAD), where each layer of abstraction has its own operational capability and the next layer in the hierarchy provides semantic content for the previous. It should be noted that even in this highly formalized context, the semantic hierarchy does not have to be strictly hierarchical. Upper layers provide meaning to layers that are much deeper, but also vice versa, a 'lower' layer can give meaning to items in a higher one. Such cross-over provision of semantic information is observed in the human brain as well, although arguably there is a central boss called 'consciousness' that maintains global control, or at least tries to do so.

Given this understanding of abstractions and its connection to layers of structure and semantics, we now have to move to the main problematic issues with intelligence and abstraction. As already discussed, there is a strong belief among humans that the structural intelligence we generate

sentence. You need to know Dutch to learn Dutch!

is actually ingrained in reality, or, if you prefer, actually 'exists'. From a logical point of view, the mistake is easily characterized. Abstraction is an inductive process, it is a faculty of the brain to establish and select (rightly or wrongly) various connections within a more global abstractive construct called 'understanding'. This whole network of neural connections (or their equivalents in language etc...) does not exist as such in nature outside the brain (*note:* here the word 'exist' is used in a justifiable, negative way). Therefore, one cannot deduce constituents or structures of reality from them. The only possible 'downward' move from abstraction to reality is one of a validity check: 'do the properties assigned to real life objects or processes by the abstractive process pan out?' The deduction from concept to nature is not a process of nature itself, it only happens (again) within the brain. Because of the importance of insight in the fallacy that "concepts exist in nature", I have to discuss a number of examples to make my point clear before moving to the complementary point of why the abstractive faculty in humans is so necessary and how beneficial it is when properly used.

I already mentioned how the common societal view on their social position has degraded women over the ages and consigned them to be second grade people and citizens. They are now hopefully recovering from this unenviable state thanks to improved understanding of genetics. This is, of course, a pretty obvious example, but there are many more and even very subtle ones. We judge our fellow humans' behavior according to our principles. This is sometimes all right, in particular when the context in which the judgment takes place is shared or at least well understood. Most misunderstandings between people can be traced to (often subtle) shifts in the contextual setting from one person to the next. This is the reason why non-verbal communication is so important. When somebody issues a judgment on specific behavior, the non-verbal information communicates the intentions of the speaker, and while the listener may disagree on the proposition, he or she may still react empathetically because of the sympathetic context. We know how dangerous it is to try to settle conflicts by email, or in former times just by mail. The necessarily terse communication looks so raw. Much has to be inferred from the scant words used. Even when one chooses words carefully, they may be interpreted completely differently by the other party.

Semantic confusion is most patent in the political scene. When a midwest American utters the word 'socialism' and becomes highly emotional about it in relation to the newly proposed health care system, what he or she rejects is a system in which tax dollars are presumably used to subsidize people who have not been able to make it in the competitive American society and hence do not deserve any assistance, not even to relieve their suffering from a disease they may not be responsible for. A European socialist understands something quite different by the term 'socialism'. There the understanding is the grooming of a society of opportunity for each, independently of pedigree. It does not mean subsidizing and rewarding lack of performance. Illness can strike anyone with (almost) equal probability and it makes perfect sense to spread the risk to the benefit of all. It also turns out to be cheaper for everybody. Whether this is socialism or just intelligence is up for debate. The difficulty is the conversion of the principle into practice. There is no single recipe, and when one considers the various systems that have been created in different countries, the differences are remarkable. Equal opportunity is also an American value, but it is played out in a different way in the USA than in, say, Germany. Each may have its pros and cons and each will have to be improved constantly while evolving, keeping in mind the original intentions and inductively assessing the performance of the system. Just as one cannot reject an abstraction such as 'socialism' on the basis of a peculiar understanding, one cannot deduce from the principle how it has to be implemented either. The abstraction is no more than a reference, whose meaning has to be covered by ever further elaboration: it does not provide for any intrinsic content. The term is no more than a 'token' to which an always incomplete meaning has been attached.

In the same vein, moral conduct cannot be derived precisely from a general principle. In our democracies, the principle of respect for human life is deeply ingrained (and rightly so), but one cannot deduce from it how to behave in a concrete situation, for example when trying to determine how to handle a concrete case of abortion or euthanasia. Some will claim that there is human life as soon as the zygote has been formed and hence must be protected at all cost. But the principle immediately defeats the purpose as it prevents very meaningful treatments of infertility, where some zygotes have to be necessarily discarded, while the overall result actually promotes life. Nature also does not follow the principle very well, as it spontaneously aborts fetuses, probably when the reproductive system determines that something is not right with them. A similar situation happens at the other end of life. Present day medicine is very much capable of continuing life, sometimes almost indefinitely, even when it is not at all meaningful nor even bearable. How to deal with terminally ill patients cannot be derived from the principle of maximal preservation of life. One may think that for this case some other principle has to be invoked, but I believe that also is doomed to fail. A principle in itself does not contain the necessary informative content to deduce specific actions from it. Additional information is needed about circumstances, effects, actors, diagnostic estimations etc...

The negative effects of beliefs in the absolute validity of an abstraction become most dramatic when combined with religious fervor. The absolute ban of the Catholic Church on the use of condoms (and contraceptives in general), because of a straight application of the principle of preservation of life, in this case in the name of a divine law dutifully interpreted by the infallible church, has led to hundred of millions of innocent victims of AIDS, putting these very church authorities in the ranks of the biggest (and most effective) murderers of history. They might even argue that the only thing they did was preserve God's law and God's intentions, maybe it is even God's wish that overcrowded mankind be thinned out a bit. Such incredible barbarity transformed in an act of love! Given the history of the Catholic Church and how heretics were burned in past times just to save their souls, such thinking should not surprise us. It illustrates my point perfectly on what I would call the "fallacy of abstraction", although we should be careful not to put the burden of such fallacious thinking solely on the shoulders of religious authorities. All authorities are in danger of taking their general principles as a motivation for their concrete actions, often just thinly veiled as decoy for the naked exercise of power or the unfeathered quest for profit.

The fallacy of the 'reality of abstraction' lies precisely in the belief that abstractions are actually part of nature, so that some absolute value can be attached to them. However, only the brain generates abstractions, nature otherwise does not. A tree cannot tell you that it is a tree. The ability to abstract is part of our human intelligence, and I want to argue now that, on the positive side, intelligence, and hence abstraction, plays an important role in natural evolution and that it is even present in organisms that are not human. But that would require a somewhat better understanding of the nature of intelligence, a topic I want to discuss now in some detail using "design engineering" as an example of how abstractions are used creatively.

We already met the distinction between syntax and semantics in computer science, and the various layers of abstraction in linguistics. However, there are other fields in which controlled forms of intelligence and abstraction play a major role and lead to impressive results. Designers and design engineers in particular work in a restricted 'world' or 'universe' that consists of the objects they are handling, their properties, performance and relations. They describe these using very specific terms, often incomprehensible to those not educated in the field. Engineers designing integrated circuits like computers (chips) use some five to ten hierarchical levels of descriptions and specifications, all related to each other in a syntax-semantics fashion. They use language, but more often they use schema's, graphs and pictures as specification and communication vehicles. Very well known even to the lay person are electronic circuit diagrams consisting of components (transistors, resistors, capacitors, inductors, diodes etc...) and conduct-ing wires interconnecting them[6]. A diagram can have different meanings to different people. The same circuit could represent an audio amplifier, a piece of WiFi circuitry or a switch, its interpretation being fully context dependent. Often the interpretation will be given by another level of description, hence a semantic level with respect to the original, which in turn will have its own description (in this case often also an appropriate graphical or diagrammatic representation).

The syntax-semantics connections between the various types of description need descriptions themselves, because descriptions in the various layers take place in different 'worlds'. The electronic circuit can be interpreted as living in a world of continuous time-dependent voltages and currents or, alternatively, as a circuit interpretation of the geometry of the chip, while the logic diagram deals with bits and logic functions that the circuit presumably executes. Between the various types of description there have to be modi of understanding that allow interpretation of one diagram in terms of the other. There is a lot of abstraction going on in this inter-level communication, and, interestingly enough, the semantics goes both ways. The logic description explains what the circuit does and the circuit explains how the logic is realized. In addition, both modes of representation have their own, internal, abstractive mechanisms, namely 'aggregation' and 'generalization', which may or may not be compatible with each other when the two descriptions are intended to represent the same electronic objects. The moral: one should not confuse 'abstraction' with 'semantics', a confusion that is easily made as semantics has an abstractive effect in many cases, and, conversely, abstractions can be used to convey semantics. Semantics is provided by a context, while abstraction collects common properties. Although one cannot say which is more primitive, one may think 'semantics', because to collect objects in categories, one needs their identity, which is provided by the semantics, but, on the other hand, a recognition of similarities may provide a means to define identity.

Let us explore the case of chip design a little further. The electronic abstraction hierarchy does not stop with circuits and logic. The logic diagram just implements what should happen with the data. Engineers have developed a method of describing what happens with data as yet another layer called 'register transfer', and have made it part of what they designate as the 'architectural level'. However, not all logic circuits implement a computer architecture. Some may just be memories or process controllers, modems, codecs, or what have you in the menagerie of electronic devices.

[6]Interconnections have different physical aspects and interpretations in the various layers of description. In the chip layout and the circuit diagram they are just wires, in the architectural layer they represent data transmission and in the functional layer, causal relationships.

For all these types there are what engineers call 'behavioral descriptions', which specify how the relation between the input and the output of a device should be, or, more generally, how the device is viewed from the outside and how it interacts with it, thereby abstracting from (neglecting) its precise internal functioning in favor of exclusively considering what an external observer can experience. Yet another semantic layer, and semantic correspondences[7]. Behavioral descriptions and semantics are closely related as they allow expression of what a system 'means' to its outside world and define a new, irreducible layer with new types of objects, connection rules and potential abstractions. So we see that in such constructs various layers of semantics and abstractions intertwine.

In order to design and produce the large number of electronic devices we know nowadays, electronic engineers have developed not only these various semantic layers, but also automatic methods to convert one into another, given specific design strategies (in case of the conversion from a higher semantic level to a lower) or verification algorithms that 'extract' behavioral information from a given lower level description. The whole human-generated but automated design intelligence is contained in these synthesis and analysis programs. Often, the design program does much better than the human designer. It is more reliable, can use masses of compiled information and bank on advanced, inaccessible knowledge. It is an interesting paradox that, by their higher abstractive power, humans can generate programs that are significantly more intelligent at executing a given task than they themselves will ever be capable of.

And designers do not stop at the mere generation or verification of the results. With their designs they want to achieve something, not just things that work, but things that also contribute to some kind of improvement, the improvement of a product, profit for their company, even a new system that will improve the environment (e.g., a sensor that measures toxic gasses). In addition, they may strive at making the design itself 'better' in many ways: consuming less energy, cheaper to produce, employing less environmentally noxious elements or showing greater functionality to its users. This is the ethical dimension of the design world. Even this new super-dimension can often be formalized. Many designers have to follow the design ethics of their company, and their designs are evaluated (often automatically) by a program that assesses the quality achieved. The ethical policy of a company can be a great contributor to its economic success, for better or worse. In the competitive economic environment it has great evolutionary value. We shall come back to this point when we discuss evolution and natural

[7]For those who would think that all this is reducible to physics, I would remark that only the circuit level can be considered more or less "physical". All the other levels, although very formal, have nothing to do with physics.

selection.

Besides the verification trajectory mentioned before, there is lots of feedback going between the various layers. That is as in brains. The main difference is that the design trajectory is more formally structured than brains are, which is at the same time a strength (for insight and transparency) and a weakness (not as flexible, each level is caught in its private idiom). Another very good example of a similar structuring of an intelligence hierarchy is the so-called OSI-model[8] for internet communication: a number of layers starting from the physical (that defines the physical operations), then the data link layer (in which data is transferred), next the network layer (in which communication control is executed, e.g., the famous TCP—Transmission Control Protocol—that regulates what happens with the data when it arrives at a communication node), next the IP layer that acts as the electronic mail system (IP stands for 'Internet Protocol'), followed by a number of software layers. Each of these layers has a very precise way to communicate with, i.e., transmit information to, the layer above and the layer below. Most modern software (almost any program in your computer) that uses telecommunication does so using TCP and IP, it does not 'know' or 'care' about the physical or the data link layer, just like language does not care about neural transmission although it uses it extensively. It is like people talking to each other. The sounds used are no more than a vehicle to communicate meaning, they have no significance by themselves, but they are supposed to code meaning as effectively as possible. What goes over the communication channel consists purely of 'syntax', i.e., structures shared by the sender and the receiver, who have to take care of faithfully converting it to meaning at each side. Hence they are dependent on "sharing of semantics", or, at least, making their respective semantics compatible.

Human intelligence goes beyond mere generation of knowledge based on experience and then followed by classification and the establishment of relations, both static (i.e., abstractions: mainly generalization or aggregation) and dynamic (i.e., causality), which we call 'understanding'. It is capable of using this basis to develop scenarios and gauge what might happen in the future as a consequence of decisions, subsequent actions and reactions. This truly distinctive capability is the deepest and most striking component of intelligence, which therefore could also be taken as its main characteristic: *intelligence is the capacity to develop and evaluate scenarios, based on acquired knowledge and experience.* Such a definition creates a balance between the past (storage of experience and knowledge) and the

[8]'OSI' stands for 'Open System Interconnection', the communication standard originally proposed by a technical committee of Honeywell, and then later institutionalized with the American National Institute of Standards ANSI.

future (how to use that experience or knowledge in gauging the future).

In the chapter on Evolution, we shall explore how intelligence came to be. I want to conclude this chapter with highlighting an important aspect of intelligence: communication. It is both a tributary of and a contributor to intelligent processes. At the tributary side, communication uses intensely the duality between syntax (or structure) and semantics (or meaning). Communication between two agents requires reduction of information to a syntax that is common between sender and receiver followed by re-interpretation of the transmitted data by the receiver. Besides a common syntax for the message to be communicated (in whatever form), this requires compatible semantics at both sites. Neither the translation between syntax and semantics nor the communication of the syntactic tokens (sounds, bits, neural connections, radio signals, ...) are fail safe. Actually, they have variable precision leading to a range of potential misinterpretations. This then raises the question of 'semantic alignment' between sender and receiver, or, more generally, between communicating agents, a task that requires a considerable investment in intelligence at both sides of the communication channel *and* extensive use of feedback to check the validity of the interpretation[9].

Conversely, communication contributes to intelligence in several ways. Much of intelligence is built on acquired knowledge and experience. The acquisition of knowledge requires continuous communication via learning. These learning processes are active in many layers of the brain, both through internal (neurons activating each other and building higher semantic layers in the brain) and external communication. The learning takes place from a very young age on, even in the womb, with each person gradually expanding their field of knowledge by being exposed to larger sources of information. Also on the side of effectiveness of intelligence, communication plays an important role. When we shall consider the relation between ethics and the role power plays in it, we shall discuss the importance of the use of 'proxies' to achieve desired results. The activation of proxies evidently requires communication between the intelligent agent and the actuator(s).

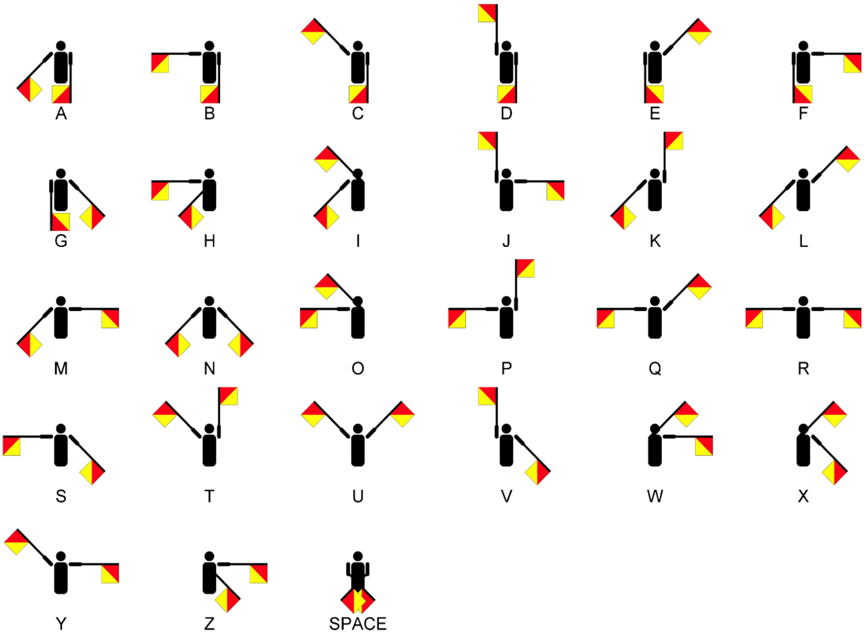
The combination of intelligence with communication and the ability to organize makes for a uniquely powerful constellation. Even so, although the systems we know and use are singularly robust, at every juncture there are chances of malfunctioning or errors. Although errors may occur at the basic physical transmission level, most problems occur at higher levels: wrong interpretations (lack of semantic alignment), sclerotic or downright erroneous 'knowledge', learning disabilities, misuse of authority etc... It pays to study all these "diseases of intelligence" for their own interest and

[9]This is why a large number of neural connections in the brain is devoted to feedback.

the importance of their understanding in potentially improving the human condition. We shall to some extent engage in such an exercise when we discuss "diseases of ethics" in a further chapter.

Let me finish this chapter by drawing attention to the very impressive role communication plays in the elaboration of intelligence in young children. To generate understanding there must be communication and to communicate one needs understanding, a complicated chicken-and-egg problem. It takes a very long learning process for our children to gradually perfect their understanding of the many tokens that impinge on their ears and eyes. Communication, understanding, knowledge building and anticipation are interrelated and reinforce each other gradually. It is all there in potential thanks to our inherited mental capabilities. This process of learning can already be observed in animals with (even much) more primitive brains than humans. It is an interesting, but largely unresolved, issue how precisely the neural network is able to generate this and how it could be artificially reproduced in robots. What is certain is that the more sophisticated the brain, the more intensive training the process needs—only the capability exists at first. In the chapter on evolution we shall go a little deeper into its origins.

While such processes are indeed active in almost all organisms, they have evolved to what we know as full blown intelligence only in humans: the ability to build theory, derive scenarios, imagine new venues and evaluate possibilities based on self-defined criteria. The process requires the gradual build up of both reliable communication (at the syntax level) *and* consistent semantics, i.e., compatible expectations about the origin, effects and outcomes of the shared information. In the next two chapters we explore these processes, first to have a more concrete grasp on them and then further to understand how they evolved from very primitive, but evolutionarily very effective, mechanisms into the hugely complex human brain. The philosophical importance of these insights is the debugging of the age-old idea that somehow the mind is an entity foreign to nature whose properties have to be posited independently of any natural process or evolution.



The flag semaphore = alphabet!

Chapter 7

Semantics and abstractions

Modern technology in informatics and electronics has made considerable headway in connecting semantics, abstractions, intelligence and communications. The present chapter is devoted to analyzing some of the most pregnant aspects of this conjunction, which also forms the basis for artificial intelligence and its many applications. Semantics may be seen as a special case of the human abstractive ability, which itself is attached to what can be called 'higher' levels of intelligence. This chapter proposes a description for this mechanism and illustrates it with examples. Since the advent of computer science, semantics has become 'formalizable', even in multiple layers, as is exemplified by design hierarchies or by the OSI layers in telecommunications. Various attempts at such formalizations are described together with the connections they have to logic, artificial intelligence and progress in time (dynamics).

To abstract is arguably the most basic capacity of the brain. Even some non-brain biological systems have the ability to recognize a pattern and to adapt on it, but not to such a systematic multi-layer extent as the human brain does. It is a necessary ingredient of language, but even species without (known) language have impressive abstractive abilities. A cat recognizes a mouse by combining visual, tactile and auditory information in a coherent way[1]. How the brain of a cat does it has been studied extensively. Language is a very advanced example of many layers of abstraction and semantics grafted on each other.

Abstraction is a process in the brain that attaches a tag or symbol—actually a neuron—to objects (represented in other neurons) that happen

[1]It is known that most species have abilities to recognize specific, life enhancing or life threatening situations encoded in their genetic material, which then generates the appropriate neural structures during their development. The issue here is how the resulting brain actually performs such specific recognition tasks. Species with more complex brains have more general, less specific abilities, which require several semantic layers and extensive learning processes to become operational.

to share a property, thereby representing this fact physically as a single entity, token or tag[2]. Birds recognize their prey as adequate when it satisfies a number of characteristics such as shape, color, sound, etc... They also recognize their peers by their twitter, a primitive but impressive use of abstraction to communicate. The *ability* to learn about common properties is, of course, genetically determined, but much of the content is acquired from parental instruction or from experience. Learning produces firm structures in the brain that consist of a network of such 'tags'. Researchers in neurophysiology are nowadays capable of measuring the activity of a single neuron *in situ* and *in vivo*, thereby establishing its function[3]. For example, the brain in most mammals has layers of neurons dedicated to the near simultaneous conjunction of visual and sound signals in a specific context. This is an example of a layer of abstraction that abstracts 'simultaneity'. The notion of simultaneity itself sits in yet another 'higher' layer, which triggers other components when active, such as 'potential prey'.

To understand this brain function properly, one might take a look at how the human mammal visual system is connected to and controlled by the brain. The images our eyes capture are extensively processed after they pass through the retina by layers of neurons, which finally produce a stable visual scene for a good length of time (many seconds to minutes). While the brain retains this stable image, our eyes continue scanning to detect variations that occur in the visual field in an action called saccades. The background image stabilization mechanism fixes the stage on which the few moving actors are detected by the continually searching eye movements. To understand this, just observe yourself looking at a scene and notice how you keep the background image steady. Because of this remarkable effect, the layers of neurons behind the retina are considered an extended part of the brain. In addition, it is known that subsequent layers behind the retina are capable of detecting and extracting certain characteristics of the scene, in particular motion. A prime example of an integrated abstractive system!

The brain makes similarly a spatial image for the auditory system, and then yet another layer of neurons synthesizes the coherence between seeing and hearing. There are many more neural layers in the visual system than just described. The ability to generate these layers is innate and results from automatic development in any mammal at the fetal and neonatal stages, utilizing the capacity of neurons to grow connections to other neurons in a massive way and then pruning these connections until some stability is achieved through adaptive enhancement or attrition (a process that is most active in young infants [21]). The ability to learn in

[2] Characteristically, the precise form is not at issue here at this level of the discussion.
[3] For detailed information on the various aspects of these processes, see [33].

this fashion is a genetic property of humans and even of mammals, but the learning process needs careful grooming. Infants in whom this mechanism is deficient, or whose learning abilities have not been properly stimulated, develop major physical or mental deficiencies. Later in the development of a human, higher layers of abstraction will be added from learning through parental and peer relationships. Learning thus combines biologically innate with nurtured components in a tightly integrated concert.

In most species, the abstractive ability stops at whatever level ensures successful existence and reproduction in their competitive environment. The more successful or easier survival is, the less developed the ability will most likely be. In other words, success breeds failure. Only where there is competition is increased ability necessary to ensure good chances of survival. The abilities to recognize and then to abstract are primitive forms of intelligence and necessarily provide better chances for survival, what we may call "intelligence enhanced evolution", an important topic that we shall discuss in the chapter on evolution.

The obvious hierarchical structure of abstractions in the brain is only a skeleton. There are many more connections between the layers, both upwards across layers—e.g., neurons detecting sounds connecting to neurons representing words—and downwards, higher understanding directing the lower layers. These criss-cross connections appear to be the most intensive and take care of various feedbacks. The notion of feedback may not be immediately obvious, but how it works can be understood easily. When you think you have misunderstood a word, you will generate a feedback loop. You ask your friend to repeat the word and you will check whether your first understanding was correct. Feedback works 'downwards' activating instances, or 'upwards', establishing links. When you think of philosophy, e.g., you may think of Socrates, and then the sounds to pronounce the word 'Socrates' immediately come to your mind and your lips. Obviously, the higher level of philosophical abstraction has activated your sound producing system and you know precisely which sounds to utter. Your brain has made a "downward" connection, from a top layer where 'philosophy' is located, to a lower layer of sound production.

To give a primitive example of these mechanisms, one that played a role in the early days of robotics, suppose that a certain "universe" consists of wooden blocks with varying colors and shape. There will be neurons in the brain for each of the colors and neurons for each of the shapes. Suppose now that we observe a given block. The image of the block will linger for a while in the visual system and be further analyzed by a color and shape processing system (our visual system disposes of a number of such physical recognition processes) that activates the correct neural connections representing the color and the shape of the object. When a block with similar characteristics is seen some time later, these same connections would be reactivated. In addition, the image itself may diffuse deeper down in the visual neural stack and be stored somewhere in a deeper compartment for immediate later retrieval, so that we say: “Oh, that is the block I saw yesterday”. These are complex biological mechanisms, but quite a few of them are understood.

Besides spatial recognition and characterization, our brain has a built-in set of neurons that keep track of time and encode the order of events. This is done symbolically through notions such as “yesterday”, “last week” etc..., which are tagged first to specific events, and then to categories of events for easy recognition.

Although the abstraction mechanisms through adaptive tracking may seem simple in principle, the end result is highly complex because the hierarchical structure is intricately connected and random feedbacks run between the layers. And this does not even consider how such a system builds itself, genetically and through learning, using the plasticity of the brain, namely its ability to strengthen or weaken connections through usage.

I do not want to go into more details of these biological processes, but let me try to make the classification issue a little more tangible with an artificial example. Suppose we are visiting a shoe shop where items are tagged with price, size, gender, materials used, color, etc... Because of the bulk of the shoes, organizing the racks according to the various characteristics causes organizational problems. There needs to be a section for men and women with subsections of shoe types, in turn with subsections of shoe size, etc... Shoes, however, come in different colors and each rack will have shoes with different colors next to each other. The characteristic “color” is not addressed very well in this organizational system. Modern electronics provides a solution to such a problem (extensively used already in store houses), the RFID (Radio Frequency IDentity). It is a wireless chip that can tag all sorts of characteristics wirelessly. Suppose that the shoe-boxes of our shoe shop are equipped with RFID tags and suppose we want to see all the red shoes at once. We would broadcast a signal for ‘red’, all tags would recognize the signal, and only the boxes with red shoes would be identified, e.g., by a red LED. The RFID tags contain the shoe information, recognize the color code and activate the shoes in the red class. Something similar happens in our neural systems, except that the signaling is not done wirelessly as in the example just discussed, but through a large number of criss-crossing neural connections. Wired connections with adaptive strength!

Since the number of neurons in the brain is immense, only a relatively small number neurons can actually be interconnected. The information management of so many neurons and connections must encounter serious complexity problems if it is to make sense of the mass of data it has in storage. How the brain handles this is not known at present, except in some very rudimentary way. Organization is an absolute necessity. In the shoe shop example, this is done by creating physical sections where shoes of a given type belong. We see in this example that one ordering principle already forces a specific physical architecture at the exclusion of any other. Neural connections have an attractive solution to this problem. They can superimpose various hierarchical orders in different directions, much better than a shoe shop can. The shoe store could superimpose orders also if it were to use LED's on each box as suggested above. In the brain, this is done in a more selective way, thanks to its plasticity which allows the creation of new connections during learning processes and the deletion of others that seem to be irrelevant from disuse. As with the Internet, the possibilities seem endless, but without further organizational principles this would produce more chaos than intelligence. With the internet, we observe that organizational constraints are created on top of the possibilities for random connections. We know them as 'Skype', 'Facebook', 'Wikipedia' or any of the more dedicated connection media, and they also have the property of superimposing ordered systems on the random interconnection possibilities. That is what neurons do also, but using their own networking mechanisms, which seem to be as powerful as the internet is.

Order beats chaos, but at a high cost. One ordering principle precludes another. Countries have been organized around capitals, which become the main hubs of communication. People in the periphery have problems connecting to their close neighbors across the border. When one ordering principle becomes too intrusive, people invent another one that appears more convenient, and then we have a potential conflict of principles. So long as none is too strong things may go reasonably well, but if one principle gets reinforced by sheer imposition of power the result may be very destructive. The organizational principles of some species achieve great evolutionary advantages, especially when enhanced by intelligence. But then we observe them overpopulating our planet and destroying many other organisms. They may easily destroy themselves in the long run [19].

Abstraction as an ordering principle produces the same effects. Its introductory advantage is the reduction of chaos while its collateral disadvantage is the reduction in possibilities and diversity. To avoid excessive reduction, several abstractive principles must coexist, producing networks of interpretation in various directions. However, the number of such principles necessarily remains limited. The most important ordering principle appears to be timing. The human brain obviously has sophisticated mechanisms for tracking coherence over time. In a computer most items carry a 'time stamp'. More sophisticated is the relation between cause and effect, but this can easily be mistaken or exaggerated. Language is even more sophisticated in its reliance on ordering principles. Specific sequencing of words and sentences conveys meaning. One step further is the derived ability to predict events with reasonably accuracy using what we believe are causal relations. When our predictions pan out, then the causal relation is reinforced in the brain, yet one more example of coding in the timing domain. This ability seems to be located at a fairly high level of our intelligence. Primates are able to store learned predictive behavior (for example, habitat-specific food gathering knowledge), but are not able to establish new connections derived from an understanding of food cultivation, such as seed planting. This is yet another layer of abstraction seemingly not available to primates [4].

Computer scientists have devoted considerable effort in formulating what they call 'formal semantics' for the languages they have defined. Formal semantics requires a syntax, which itself may require higher level semantics to provide meaning to its statements in turn. The upward chain will soon end with some very general statements about expressions. With descriptive languages, used for specifying designs or writing down mathematics[4], the situation is a bit different. Using such a language, one can build one semantic layer on top of another such that each layer has its own representational power. It is remarkable that the semantic layers of our natural languages are not really distinct and use the same basic framework throughout. In view of this fact, computer scientists have tried to create a more universal language than their original command languages, so that semantics and syntax could coexist, as well as descriptive and imperative modi: "two plus two equals four" or "the door is open" (descriptive), "shut the door" (imperative) or "do you mean the front door?" (semantics). This more comprehensive computer language is called 'object oriented' and has conquered the modern computing world. It was first proposed by Adele Goldberg of Xerox as the Smalltalk language [28]. The language itself defines classes of objects. Operations are made subservient to the type of objects for which they apply. The classes define the context and the operations, what can be done effectively within that context. The overall semantics of this global system turns out to be very simple. It defines what is meant by a 'class', an 'object' and an 'operation', while the language

[4]Original computer languages like FORTRAN or C were 'imperative'. They were designed to tell a computer what it has to do. A classical statement in such a language is "x=x+1" which means "increase the value of the variable x with one". Such languages are not well suited to describe objects or relations. To accommodate this, new languages were designed that are purely descriptive, and were called 'applicative'. In such a language a statement "x=x+1" makes no sense, but "x=y+1" does but just states the 'fact' that the value of x equals that of y plus one. In present day computers the two types coexist.

itself provides the means to express more detailed (or class-based) semantics[5]. Such an object-oriented language exemplifies the difference between abstraction and semantics. The semantics uses the abstraction as one of its constituents, but adds to it connective and functional properties, which we generally view as the 'context'.

Humans are, in general, very good at segregating semantic layers. When we talk about the meaning of something, we know that we are not describing the thing itself, but are putting it in context. When we say "this is a mountain of gold", we might be talking about a real mountain that contains the valuable ore or a new financing scheme that would yield great gains. In either case, there is no real mountain made of gold. Either we say explicitly what we mean or the context makes it clear. Lots of room for confusion, of course, but we can happily live with it, mostly without mishaps. As a species, we prefer flexibility to precision. In computer-aided design, structural layers are explicitly defined and the object-oriented languages are well-suited to this[6].

From these discussions, it should have become clear that the connection between structure (as defined by a syntax) and semantics is not as unilaterally hierarchical as might be assumed at first. Semantics connects structure to a context in which that structure acquires a specific meaning, which in turn may be expressed as a structure within a further descriptive environment. In this sense, semantics expresses relations between structures, but to do so it needs a structure itself, and that subsequent structure will need interpretation in a new and appropriate context. Clearly such a process has, in principle, no end, so we are forced to impose a termination by just letting some notions 'dangle' without further explanation. Since all these are mental constructions, these final notions have no other 'existence' than mere symbols. We communicate them to each other and then communicate the further constructions we make with them, until we have achieved some confidence in the common understanding of the construction rules we share. "Achieving confidence" then means that, using the shared rules and interpretations, we arrive at the same conclusions (or actions) in similar circumstances. In mathematics, this process is done as rigorously as possible, but there are always limits to what is humanly achievable. Most

[5]Or, to put it differently, it has generic semantic constructs, but these represent a peculiar view on what semantics is.

[6]Let me use some caution around this point. Often the classes of one structural layer hardly have any direct relation to the classes of another and the object-oriented language has trouble expressing semantic relations, although this is technically possible by defining new semantic classes and then expressing how they relate classes of objects in different structures with each other, much like some neurons encode correspondences between other neurons that are attached to different types of sensory experience. "Semantic interfacing" is often not easy to achieve.

human endeavors have similar uncertainties.

Classical database theory, based on mathematical set theory, distinguishes two main types of abstraction, aggregation and generalization. The first is an answer to the question, "What are the components of an object in the class?" and the second, "To which larger class do the objects in the class belong?" For example, a chair is an aggregation of four legs, a sitting slab and a back, while it belongs to the larger class of furniture. Such a system represents a very simplified world. Many more possible modalities of objects we know come to mind, such as "Out of which materials are they made?", "What is their history?", "Do they have a special function?", etc... Each of these provides a different external view of objects and new ways of giving them additional meaning, like in the sentence, "The chair I am sitting on has carved legs and is made of very ancient wood, as it belonged to my grandmother's grandmother". The semantic construct in that one sentence already has five dimensions: the aggregation (four legs), the mode of production (carved), the constitution (wood), the historical (four generations) and the belonging (was in our family). Each of these would then have its own semantic connections.

Conversely, each such connection may help to explain a notion, e.g., by aggregation of all the objects that satisfy it. For example, one could say, "A female is a human whose 23rd chromosome pair has two X chromosomes." Or one could say, "Here is a large collection of pictures of females and males, if you see a new person and it resembles more what is on the female pictures than on the male ones, then it will be a female". This 'pattern recognition' approach[7] is the minimal necessary to establish semantics. If no better information is available, that is what we normally resort to. When we meet a new person, it would be neither practical nor proper to start a DNA analysis. The pattern-recognition approach to abstraction produces minimal semantics by using the collection itself to define what its objects mean and then assuming "if it looks like a duck and quacks like a duck, it is a duck". The better approach could be termed 'functional', whereby the abstraction is based on a similarity in generic properties (like genetic properties, the present basis for plant taxonomy).

The next issue to arise is how the meaning of a concept originates. There are two approaches to this question. One looks to the past and the other to the future. The approach from pattern recognition to abstraction is a path from the past. It served us to define the notion, but we need to clarify its workings further, mainly because an original abstraction does not remain stable in the mind after communication and further experience. It evolves

[7] presently known as 'deep learning' in the data mining community.

and its content changes[8]. This is especially true of more abstract notions such as 'good' and 'bad', often taken as the basis for ethics or morals. The historical trace of such notions has been termed their 'genealogy' and the genealogical approach as a method to specify their philosophical content. This way of viewing 'meaning' could be captured formally or mathematically by so called "trace theory", or "Nerode equivalent classes theory" [32]: abstractions are characterized by the peculiarities of what one chooses to forget, and the meaning of something is "what a token that represents the abstraction stands for" (for example, 'gender' forgets about race, age etc...).

A different, and complementary approach is by looking to future consequences. The field of Artificial Intelligence (the theoretical basis for building robots) specifies the notion of "practical semantics" by considering all possible evolutions of the world (what the theory defines as its 'world' under discussion) and then defines the 'meaning' of a statement as the collection of world futures for which the statement is valid. For example, the meaning of 'me' is the collection of potential worlds in which I am present within the full collection of all possible world evolutions, this collection being defined as the 'universe'. Although this might seem a very impracticable definition, it can be handled mathematically as soon as one possesses a (mathematical) formalization or model of possible evolutions in what one considers the universe under discussion [50]. This approach, proposed by the so-called Stanford School of Artificial Intelligence, has the interesting and worthwhile feature that it is independent of accidental opinions or biases. However, it is rather limited in its possibilities because it is dependent on full knowledge of the 'universe' in which it is operational[9]. Apart from high complexity, it cannot deal with chaos. Almost any happening in this world has significant consequences on its future evolution, as we have already discussed in our boy-meets-girl example. There is a myriad of such small events every millisecond, each with the property of fundamentally changing the future world. Looking forward in time, everything gets magnified out of proportion; looking backward, the proportional contribution of each goes to zero. Basing semantics on such chaotic processes seems totally unfeasible. Another difficulty with the Stanford model is, naturally, whether one can get hold of "all possible world evolutions". This would only be possible in the limited context of a precise and simple world model. The mere existence of such a model is highly doubtful, but, as we already discussed, all meaning

[8]For example: a large part of humanity was considered 'subhuman' in the 19th century. Thanks to improved genetics, we now know that all humans were related to each other in a not so distant past.

[9]That may be the case of a robot in a rather restricted setting, but from our discussion of Gödelian logic we know that there is no possibility for a complete and univocal formal knowledge of the overall universe.

takes place in a context and within a given limited context precise evaluations are indeed often possible, for example, the 'world' of a robot in a factory.

These two approaches, past and future, are complementary. The generation of a notion requires both inventiveness (recognition) and observation (verification). Recognition is the historical development of the notion while the continuous observation, or model-based anticipation, of its effects is future oriented. The conjunction of the two makes the notion 'stable' or, to put it differently, makes a statement 'true' as far as 'reality' is concerned. Taken together, one ends up with a fairly precise view on the concepts of both abstraction and meaning and why they are necessarily very limited. That does not make them less useful. Everything under our view or control is limited, and this 'general principle' applies to even our most lofty endeavors. That is what reality amounts to. As far as our limited abilities are concerned, there is always a beyond, more to be seen and better to be verified.

The relation of syntax to semantics is not as simple as one would think at first. Therefore, let me summarize the main points, although in doing so, I risk oversimplification:

1. To express structure (e.g., as causality or aggregation) one needs syntax. The syntax or whatever representational medium (like neural connections) alone does not convey meaning. The syntax alone is supposed to represent the structure under consideration, but it does not contain the recipe for interpretation. For meaning to be attached to it, formally expressed semantics is needed, which in turn requires a novel and different type of structure, namely one that connects the syntax to a domain of interpretation.

2. To assign meaning to syntactical entities (sounds, neurons, sentences or whatever is used for representation) is a prime characteristic of intelligence, which is capable of recognizing common characteristics between phenomena in multiple layers of progressing abstraction, ending with the ability to imagine new constructs and scenarios, from which the agent can derive action plans for influencing the world.

3. In the human brain, and to a lesser extent the mammalian brain in general, the expression of both structure and semantics is achieved by neural coding in multiple layers and intertwining neural connections. In particular, common characteristics of objects or phenomena lead to abstractions, implemented as connections to a common tag.

4. Semantics or the provision of meaning to various types of structure is achieved by identification (pattern recognition) of the structure

and subsequent activation of a specific connection to a contextual domain in the brain. The establishment of such a domain can be genetically determined or can be achieved through learning, under the assumption that the brain possesses such a learning ability. A specific semantic domain manifests its presence through the effects it achieves, in particular the directed actions it induces in the agent. The higher the brain's complexity, the more such domains will be present and the deeper their hierarchy will be, all the way to the top layers of intelligence where imagination, scenario building and long term control take place.

5. The process of abstraction has great potential value because it generates order and direction out of the reigning chaos. It also limits possibilities drastically, forcing agents in whom specific abstractions are active in specific directions, which may or may not be beneficial in the long run. This necessary exclusion of manifold other possibilities means that a large array of equally valuable developments will never happen.

6. Semantics combines elements from the past and from the future. As a learned process, it relies on past experiences, interactions and communication to establish itself. At the same time, intelligence uses the semantic links to derive consequences and generate action in the (real) world, thereby giving the semantics validity and strength.

The duality of structure-semantics created by the brain is what makes the brain capable of "understanding the world". Intelligence, as by definition the master generator of the mental process of attaching meaning to representations of structure, is even capable to observe and interpret its own structures, at least in humans, a process that we call 'consciousness'. In doing so, intelligence may consider itself as belonging to an entity distinct from the world it observes and distinct from its very own brain processes, which presumably it is capable of observing and interpreting as well. This is, in my view, the origin of the notion of the 'mind' as necessarily dual to 'nature' or 'the world'. However, the duality structure-semantics plays at all levels in the semantic hierarchy and somewhere has to find an unexplained end, in this case conveniently termed 'the mind'. How nature created these structure-semantics hierarchies, given our present (incomplete) understanding, is the topic of the next chapter, in which we shall investigate the connection between evolution and intelligence more closely. Based on evolutionary biology and neuroscience, we shall examine the emergence of the mind and develop a view that is fundamentally different from most philosophical traditions.

The ‘Venus of Willendorf’, artistic creation of ca. 25 000 years ago.

Chapter 8

Evolution, creation and intelligence

This chapter is devoted to the connection between intelligence and Darwinian evolution: intelligence as a primary agent of natural selection. Although the term "intelligent design" has been very much misused by creationists, the chapter retains this terminology, but gives it a new and unexpected meaning. Our starting point is understanding the mechanisms of 'intelligence' already described in the previous chapter, the realization that intelligence already exists in the most primitive organisms and is a primary mover of evolution as soon as its functioning is genetically transmitted. It is immediately evident that the ability to sense one's environment, store the information and use that information allows an organism to adapt its behavior for self-preservation and self-enhancement, and that the transmission of this ability to further generations greatly enhances a species' chances for survival. This points evolution in the direction of ever higher forms of intelligence. The interplay between intelligence, which strives at creating order and predictability, and chaos, that generates new avenues in all feasible directions, necessarily leads to the creation of ever new forms and structures. Nonetheless, also intelligence is in turn subjected to chaos and mistakes, even massive ones, are inevitable. The course of evolutionary history testifies to that, if not the state of human affairs—an observation that leads to the necessity of ethics, which will be the concern of future chapters.

Meiosis is an incredibly ingenious mechanism of mammalian regeneration. Although it provides the foundation for procreation by creating *gametes (spermatozoa or ova)*, it cannot be characterized lightly as 'reproduction', since it creates genetically unique organisms in each instance[1]. Meiosis has

[1] Would it be conceivable that at some point in time an exact genetic copy of some human would appear again?

random and chaotic features, but works neither fully chaotically nor fully randomly[2]. In addition, each specific case of meiosis is highly dependent on its accidental environment. E.g., it requires a specific woman to meet a specific man, which in itself is a chaotic process, albeit regulated by a number of structural constraints in space, time and social environment. From this sketchy assessment, two conclusions force themselves on us:
1. all humans are born unequal with different inborn characteristics and aptitudes, and
2. all are born equal as far as the process that produces them is concerned.

It may take some consideration to understand why meiosis is evolutionarily advantageous. At first one would assume the opposite. Why should nature reshuffle its cards every time a new organism is generated, destroying many of the gains made? An obvious advantage is the built-in regeneration of the genome. Organisms' genetic material deteriorates with age and it pays to start all over again with fresh material. Another, maybe equally important, advantage is the generation of novel potentiality from fresh combinations of properties; but to obtain this benefit, conservation of previous achievements is also required. A good measure of structural stability must remain in place during reproduction so that organisms with a surplus of evolutionarily advantageous organization can transmit the property to the next generation.

The combination, or if you prefer mingling, of properties in the meiotic process is not random at the molecular level. Full-fledged genes from the mother and the father are combined in a wholesome manner and their place in specific chromosomes is carefully monitored. This whole machinery assures a good measure of generic structural stability, combined with random selection of properties from one or the other parent. Although the content of our parents brains is lost to us at birth, we do inherit their ability to learn, reason, observe, sense, store information and recognize patterns. All this will allow us to reconstitute part of the knowledge and abilities of our parents[3], but it also offers opportunities to build new knowledge and new behavioral patterns. The fact that many abilities of the brain (in particular

[2] It would take me too far to discuss each effect in detail in this context, but let me remind the reader that chaos is a deterministic process in which each small variation may have large consequences for the detailed development, while randomness is by definition non deterministic, like throwing a dice. Both effects are ubiquitous in nature and often combine in unexpected ways whereby both play a role. Chaos allows for orderly emergent behavior while random noise produces small impulses forcing new directions, which may or may not be consolidated by the emergent behavior. For example: all humans acquire eyes during their development, but their color is not determined originally. More generally, all human fetuses become human but with variable characteristics.

[3] Whether judged 'good' or 'bad', but that is not the point here, see the chapter on ethics.

memory) can be replaced by other devices (e.g., books or concentrated in 'specialists') creates free space for new growth.

All this amounts to an elaborate, but effective, process. It takes about one quarter of our lifespan to regenerate all the necessary aptitudes and raise us up to our parents' competence level. But, given the fact that they, and other people involved in our education, have been able to transmit aptitudes and sources of knowledge during that period without over-saturating our minds allows us to explore new directions, extending the knowledge and aptitudes already accumulated. This process of development brings us to a stage where we can solve problems our predecessors could not. Needless to say, intelligence, as described earlier, plays an important role in this whole process and will be a determining factor in consolidating the evolutionary gains made. I shall argue that intelligence always played that role, even in the case of the much more elementary memory-and-control processes of lower level organisms.

Meiosis is just one example of how nature integrates order and chaos, in this way acting as the great creator of new possibilities. From an evolutionary point of view, it has even more salient features than the ones just mentioned. The fact that a new organism is created by the coupling of two others, that have to meet in what amounts to a chaotic process, has the virtue of continuously mixing up and redistributing properties retained by individuals in the population. To keep this process healthy, selection plays an important role. Properties that threaten the continuous physical or mental health of the population, will affect genetic propagation, sometimes after a long period of undeserved success.

Because this process is indeed highly chaotic and laborious, its effectiveness may sometimes be very questionable and potentially lead to major disasters. The example of Nazism comes to mind. In the period preceding World War II, a whole people succeeded in convincing themselves and their children of the wisdom of an ideology based on racial supremacy and authoritarianism. They even almost succeeded in establishing their rule in large parts of the world (as is the case of some brands of communism presently). The excesses of that ideology also meant its self-destruction, but it was a close call and required major efforts from the opposing sides to bring it down. It is not hard to imagine similar scenarios with different types of transmitted convictions today! On the more optimistic side, there are also many examples where the refinement of knowledge has brought great benefits to humanity, at least for a certain period, think of efficient agriculture and effective campaigns against poverty. But we know that with most of these issues, the final word, if any, has not been spoken.

It is hard not to view the political world, both past and present, as a scene where massive contentions between competing ideologies are played out. The never-ending creation of new possibilities due to the mingling of people, both at the personal and the global level, also ensures that this process is unending. Whenever one ideology tries to subjugate all others, it eventually becomes a victim of its own success. The never-ending creation of new possibilities will attempt to destroy it and will ultimately succeed in breaking its structural rigidity. Nature is always in for renewal and success always leads to failure[4]!

A case in point is the ubiquitous contention between cooperation and the pursuit of self-interest. The latter has even been declared the prime principle of economic wisdom (Adam Smith's invisible hand) that claims

> Every organism striving for profit maximization leads to a universal profit equilibrium due to the balance of competing forces.

The fallacy of this principle seems pretty clear. Profit is generally a zero-sum money game: when one profits another looses. It is then impossible that all achieve a maximum at all times. The 'maximum' has to be defined by other means. For example, a few reach maximal profit at the cost of many who have just enough means to contribute to that maximum. Or else, all have the same profit, maximal under the condition of equality, which would demonstrably be unstable because of the unenforceable rigidity of the equality principle. One could argue that achieving an equilibrium is not a worthy goal, since it would be enough if generally profitable progress is achieved, but we know from experience that the full throttle exploitation of all possible resources sooner or later destroys the system.

On the other extreme, empathy (by definition a form of cooperation) is a much more stable attitude, but has had a very difficult history of establishing itself as evolutionarily profitable behavior. However, we also know that without empathy between parents and children, the laborious and complex process of aptitude transmission would not be feasible. Our present world is in a very early stage of discovering empathy as the means 'par excellence' to bring both peace and sustainability. The generation, consolidation and transmission of knowledge from generation to generation is likely the most important component in realizing ultimate sustainability of our biological world (our Gaia), and it requires systematic empathy for its realization, as it is, by definition, a process of transmission between independent agents.

Of course, there has to be a balance between cooperation and self-interest. When a mother nurtures her baby, the baby aims unwittingly at promoting its own well being, crying when it needs to be fed or wishes to be cuddled. The mother's empathy is a response to the baby's self-centeredness. More generally, most empathy and even cooperation is geared

[4] Yes, always: its necessary rigidity contains its demise.

towards the pursuit of either somebody else's interests or the common good. This is an unstable mechanism as well, because it can easily be destroyed by exploitation.

The dynamics of cooperation can often be observed in nature. Flowers offer nectar to bees and thereby enhance the well-being of both species. This, by the way, also demonstrates how cooperation fits the principle of "survival of the fittest"! But when one species overexploits another, they are threatened with mutual destruction. The excessive profit pursuit in an economic system has a blind self-centeredness that is bound to destroy the cooperation on which it rests. And as nature is so incredibly creative, such situations may arise at any point in time, even in a system that has established a long term win-win situation.

One might say that nature creates 'intelligent' systems in which cooperation and self-interest are balanced. Gradually, an understanding of such situations has developed in mammals, see the study of Frans de Waal, which shows the incidence of empathy in the behavior of bonobo chimpanzees [16]. It is debatable whether these bonobos are conscious of their empathy, but the conclusion that they see the benefits of their behavior is unavoidable. With humans the situation is clearer. We are conscious of our own intelligence. Our empathetic behavior, even when purely instinctive or originally purely based on feelings, gets reinforced by our seeing its benefits, even when they are not self-serving but satisfy other motives.. This can go very far and even endanger the person herself. How is that possible? It shows potential limitations of intelligence, which has a tendency to focus on its own ideologies, thereby overseeing or negating better alternatives.

We already encountered the evolutionary power of intelligence as the ability to see relations, develop potential scenarios and generate the necessary actuators to achieve them. These will be cooperative more often than not, given the intrinsic limitations of power in any individual agent. In addition, the agent who knows is much more powerful than the mighty agent who does not know, provided the former finds the means to actuate adequate power in an effective direction. Intelligence is capable of guiding evolution, because it is able to develop effective theories on how to achieve desirable results and how to device the means of actuating those. Please note that 'effective' does not necessarily mean 'right' in the evolutionary sense. But, just as with any type of steering, the planned direction may not be beneficial in a more global systemic outlook. Cooperation becomes essential to maintain health, but it is difficult, if not impossible to anticipate what is indeed healthy, given the fact that all knowledge (1) is always and necessarily limited and (2) always assumes a 'direction of attention', which necessarily leaves out alternatives. Nonetheless, intelligence is a most powerful ingredient in affecting the course of evolution, and cooperation is its most effective actuator.

The theory of evolution has given a lot of headaches to some philosophers, theologians and creationists. Their simple way to avoid the headaches is to reject Darwin's theory of evolution. Unfortunately, that attitude produces even greater headaches, because the evidence in favor of Darwin is overwhelming and becoming more so day by day, provided the theory is adequately refined[5]. For example, and as already mentioned many times in this book, the process of natural selection is an effective controlling process, whereby favorable past acquisitions enhance further improvements. Nothing like a succession of random trials! Chaos and random fluctuations do play an important role in creating new possibilities (in effect: all possibilities consistent with the present state), but their enhancement is highly selective, as the innovation has to be (1) consistent with previous adaptations, (2) transmittable to the next generations and (3) improving the current abilities (in particular the level of intelligence achieved so far). An important limiting factor in the whole process is the implicit necessity of gradual improvement (except in very rare cases in which a real quantum step can take hold even though sudden change often involves a initial set back[6]). Once all conditions are fulfilled, the process runs exponentially fast, making it irresistible.

Following such a logic, one should admit that intelligence gradually arose during evolution, starting from the accidental creation of very simple types of memory, e.g., a single, one-bit register recording that a certain situation detected by the primitive organism in *statu nascendi* is present or not, and very simple actuation based on that assessment. The important issue is whether such sensing, recording and actuating is indeed propagated to what could be considered a 'next generation'. This requires a much more formidable achievement than just the accidental generation of a memory cell, but this evolutionary potential forms the basis for the success of virussen or other non-cellular organisms that are able to transmit their sensing-controlling properties to offspring. All, even the most primitive organisms like virus or proto-cells, have sensing capabilities, are able to memorize at least some information, act on the information, and reproduce these structures, thereby satisfying all three conditions mentioned in the previous paragraph, and this thanks to the fact that DNA can reproduce

[5] Almost all, if not all, scientific theories need refinement in the light of progressing experimental technology and accumulating evidence, see e.g., the case of fundamental particle physics.

[6] The phenomenon can often be observed when a change of technology is proposed. For example, transistors were originally thought to be inferior to vacuum tubes, but after a few year of costly development they appeared to hold much greater potential and their quality was massively improved, way beyond what vacuum tubes could achieve.

and is capable of generating proteins with specific properties (the process is complex but well documented in the literature).

Whether a paleontological trace can be established that documents the gradual evolutionary 'construction' of primitive intelligence in such organisms, I do not know. This seems like a very interesting issue for evolution theory to establish. But, given many examples of such biological mechanisms, e.g., in fetal development or in brain plasticity, it does not seem impossible to me, given the extremely long time evolution has needed to establish the necessary reproductive mechanisms. It certainly is much less demanding than the accidental writing of a tragedy of Shakespeare by keys on a typewriter that are randomly activated. To compare Darwin's evolution theory to such a process amounts, of course, to dishonest criticism. See in this respect the website creation.com for examples of obvious disinformation.

Once the first steps in the creation of intelligence are accomplished and evolutionarily consolidated, the next steps do not seem so demanding, even though they would require some elaborate adjustments. The construction of further layers of intelligence allows for higher levels of abstraction. E.g., one would get memory cells that record information on underlying memory cells, establishing potential correspondences between them. This requires the necessary sensing connections between the cells, as well as new feedbacks. Given the number of possibilities, many trials in this direction will turn out to be useless and some even detrimental. But the successful ones would provide for a major improvement in intelligence with accompanying evolutionary advantage, provided their connectivity is transmitted as such to the next generation.

Although the emergence of the original, primary mechanisms is long past and may have become extinct in our present nature, most biological processes do operate on the verge of chaos, in every neuron and in any organism, and millions of times per second. Each of these occurrences participates in a micro-creation of a new world that would have been different if the occurrence had been slightly modified. There is no necessary causality active here as most philosophical systems posit. That is not to say that everything happens randomly, quite the contrary. Nature consolidates results through mechanisms such as natural selection, leaving more than enough latitude for chaotic change in the emergent consolidated systems. One could state, largely simplifying, that the consolidated system is governed by specific mathematical equations that are intrinsically chaotic and hence allow for unpredictable developments, which are then checked by selection.

The conclusion that nature's development and subsequent evolution are highly influenced by intelligence at all levels is unavoidable. Humanity alters nearly everything on this earth, for better or worse. We pollute oceans, exterminate species, submerge the earth with our own kin, eradicate forests, and dominate the surface of the earth with our technology. All this as the result of our intelligence, which chaotically selects certain realms of interest and proceeds to use available resources in a self-interested presumably beneficial direction. No doubt our future developments will be equally chaotic: *nihil novum sub sole!*

Although all this shows the power of intelligence, it also amounts to a very tall order for it, one that will challenge the abilities of humanity to a maximum. If our present experiences are anything of an indication, we can surmise that the road ahead will be very taxing. Intelligence does not point in a single direction. It is strongly conditioned by the context it creates as the scope for its exercise. Or, to put it differently, by the teleology (i.e., the setting of goals serving chosen purposes) it creates towards fulfilling its ambitions. The battle of teleologies rages full throttle between individuals, communities, nationalities, cultural groups, religious groups, companies and many other human collectives. We see daily how the contentions play out, sometimes leading to all out wars. Either the destruction eliminates some or all of the contenders, or, more desirably but rather rarely, a more comprehensive arrangement gradually emerges in which the various parties can accommodate their needs and may even achieve much higher gains through cooperation than would have been possible in their former state of conflict.

Achieving a more comprehensive teleology has distinct advantages as well as difficulties. It can go astray in many unfavorable directions and hence is subjected to similar laws of natural selection as is anything else that develops in nature. Further analysis of this dynamic would be very worthwhile, but my goal in this chapter is only to indicate the general trends: (1) any consolidation will be challenged by novel approaches that seem to come up ‘out of the blue’; (2) more comprehensive intelligence allows for more comprehensive solutions, but none are ever definitive; (3) various viable solutions, even ‘healthy’ or ‘sustainable’ solutions, may exist within a single environment and even compete with each other. To illustrate the last point, there is no single definition of ‘democracy’ in a given society. What is viewed as democracy in one society may be viewed in another as an oligarchy of the rich elite. Or, what is viewed as social health in one may be viewed as organized thievery in another.

Both intelligence and teleology originated from biological evolution. The classical notion, seemingly derived from ‘necessary causality’, that evolution should have a definite teleology [42], must be seen as not concordant with any biological or social observation. Nature creates its own purpose of design as it goes along, and this in many possible, competing directions.

Within any arbitrarily defined realm, one or the other projected destination wins out, very soon to be challenged by new possibilities. It may be that there are compelling ethical reasons in favor of a given choice, but why should such a choice prevail if it is not backed up either by sufficient power or by what remains after a long selection process? An exception could be made if the choice results in increasingly ambient intelligence capable of out-playing the other, less intelligent forces. But the chances of a precise alignment of ethical principles with increased intelligence do not seem very high! After all, ethics as conscious quality control is a recent evolutionary phenomenon that has not yet been strongly established in current social and political practice.

To wrap up our discussion on evolution and intelligence, here are the salient points:

- The chaotic nature of biological evolution continually generates innovations in all possible directions compatible with structural contingencies;

- Only such evolutionary features that are dutifully transmitted to following generations have any chance of being anchored in the future;

- Natural selection enhances modifications that are profitable at the expense of those that remain marginal fluctuations. Major improvements often start small;

- Natural selection is supported greatly by improvements already put in place and consolidates them further; this holds in particular for the emergence of ever deepening intelligence;

- At every moment, billions and billions of different and more or less equally likely new worlds may emerge. Only one of them becomes actual (the one we know) for no traceable reason. The hypothesis of 'necessary causality' has no predictive value whatsoever, nor can one conclude from it that the evolution of the world is uniquely determined from the start;

- Intelligence, and in its wake teleology, form together an emergent property of the evolution of our biosphere to a higher level faculty. They have great evolutionary potential, but their development is equally subjected to chaos;

- There are several known mechanisms of generational transmission, ranging from DNA reproduction to education and learning. Although all show chaotic traits, none can be considered fully, or even mostly, random, although chance does play an important role in how they develop, as do the many structuring factors that keeps them relatively stable.

The dynamics of evolution have great philosophical consequences. They invalidate any world vision based on necessary causality and univocal teleology. No wonder the theory of evolution has been attacked forcefully by scores of philosophers and theologians. It challenges their most cherished principles. This raises the question as to how much the quest for principles should dominate philosophy, or, more specifically, how much philosophy should be concerned with attaining a global theory for understanding the world, where "understanding" is understood as "leading to a global theory". The view I am trying to develop is the opposite, namely, that philosophy, as a science in its own right, should warn against a "theory of everything". This statement, as I already mentioned, is not in itself a theory of everything. It merely states the impossibility of universal or even immutable knowledge.

The basic skepticism towards any theory or principle applies to the theory of evolution as well with one major difference: it is a theory that is consistent with present day biological and paleontological evidence, while the other theories, such as intelligent design or creationism, are not. In my view, one cannot claim, as does Coyne, that Darwinian evolution is a 'fact' [11]. It is no more a fact than the statement that gravity causes forces of attraction between material bodies. According to Einstein, they do not. Evolutionary theory lives in the brain while nature does what it does and we humans try to fit consistent knowledge to what we observe. Our scientific brains often do that nicely, but no more than that.

Nature is incredibly creative, so creative, in fact, that it is impossible to contain or constrain its creativity! This leads to all sorts of developmental problems that are hard to keep in check through available controls like natural selection, intelligence or structural contingencies. The potential new directions of development are almost limitless and any containment can only manage a few of them. In any event, even when confronted with the worst possible constraints, nature succeeds in finding unexpected new ways out. Without knowledge of evolution, the old philosophers Socrates and Lao Tzu dimly realized that this was the case. Here is the poem Lao Tzu is thought to have written and which I offer as a tribute to his foresight (nr. 21 in the translation of Witter Bynner [8]):

The surest test if a man be sane
Is if he accepts life whole, as it is,
Without needing by measure or touch to understand
The measureless untouchable source

Of its images,
The measureless untouchable source
Of its substances,
The source which, while it appears to be dark emptiness,
Brims with a quick force
Farthest away
And yet nearest at hand
From oldest time unto this day,
Charging its images with origin:
What more need I know of the origin
Than this?

The next chapters bring us back to more classical philosophical territory and culminate in a new vision of ethics based on the insights on chaos, intelligence, creation and evolution obtained so far.

Chapter 9

Truth

Is the notion of Truth the first casualty of relativism? How can at least some credence be attached to a philosophy in which no assertion can be viewed as absolute, including this one? Having arrived at this point of the development of systemic relativism, a more in-depth discussion of this central point becomes necessary, before the dive is made into a systematic development of ethics. This discussion pursues the line of relativistic reasoning in the mode of Gödel, following the discovery that (1) asymmetry holds that disproval is much easier than proof of a 'positive' assertion, and (2) the stronger the claim the more limited the context has to be. Both 'principles' are then further developed in a variety of contexts, first in the mathematical context and then in physics, experimental sciences, engineering, design and finally in a social or judicial context. To introduce the notion of truth requires identifying a new abstraction layer that defines the verification context. In the process, truth turns from a universal ruler into a careful housekeeper who keeps our thoughts as tidy as possible.

> Mentez, mentez, il en restera toujours quelque chose. Il faut mentir comme le diable, non pas timidement, non pas pour un temps, mais hardiment et toujours (Voltaire).

Unavoidably, our quest for 'systemic relativism' as a foundation for philosophy has to raise the question "what is true?", if only to give some credence to the claims it makes. We discovered already that it is much easier to invalidate a theory than to prove the validity of intrinsically positive statements, i.e., statements that claim a novel specific property to be valid for all in a 'universe', extending its scope of validity beyond what had been conceived originally. We also discovered that without providing a clear definition of a valid context for the 'universe' in question, contradictions will necessarily appear. For an invalidation, just one credible counterexample suffices. 'Positive' properties, on the other hand, require proof that does not allow any counterexample. One may wonder what constitutes a 'positive' property in a logical system where the values true and false are equivalent. A 'positive' property appears to be constitutive with respect to the premisses and definitions that define the 'universe' under consideration. The proof of its validity is a consistency proof. From Gödel we know already that it is possible (if not easy) to formulate properties that cannot be proven from the original set of assumptions. The possibilities in real life are even much larger, and any added property may involve elements that have not been part of the original system. 'Negative' properties do not normally extend beyond the given system, they just show that within the system the claimed property leads to a contradiction. At the very least, it follows that the truth of any positive statement can only be established if the domain of applicability is properly circumscribed, and the positivity of any such statement will depend on whether its establishment is compatible with the original context (i.e., can either be proven or not disproven).

Concerning mathematical statements, the universe is defined as the collection of objects for which the stated, presumably non-contradictory, axioms hold (think about sets, points, numbers and constructs with such mathematical objects). Hence the context is carefully predefined and fully artificial, and therefore also limited to items that only 'exist' in the minds of people doing mathematics[1]. Philosophy may similarly strive to deal with items whose identity is well defined and hence presumably common to communicating philosophers. This means that any claim to truth one may have is restricted to the domain of discussion, i.e., the domain of mutual understanding between minds engaged in philosophy. At first glance, this does not seem much to worry about. However, it is a lot more than mathematics allows because any items under philosophical discussion may not be precisely definable as they are connected to 'real life' and hence dependent on their historical use and perhaps also on perceptions. Neither does mathematics define its objects at random in actual practice. It somehow lives from the expectation that they will have relevance for some interesting subfield of nature, or at least other sciences, for example physics, although mathematicians try to develop their theory in a fully self-contained way, as if it had no physical relevance. Still, mathematics has great problems keeping reality and imagination apart, which should give rise to some worry concerning philosophy's more intimate connection with nature and its much

[1]In the Zermelo-Frankel set theory, all objects ever handled are exclusively sets [29]—all sets consist of other sets. In category theory, this is extended to 'classes', with less constraints but also less properties. Mathematics is constructed so that these objects get their meaning solely from the properties the theory assigns to them.

looser use of language, which is not restricted to precise objects and assertions[2]. This seems like a catch-22 situation: to define the objects you need the objects! How then should we proceed?

A good way to begin is purely exploratory, starting humbly from common usage, and then trying to consolidate insights in a framework that is as trustworthy as possible when the scope of that usage grows. Much more will not be possible, purely on logical grounds, since we do not want to engage in a bidding game between ever more general notions of 'truth'. This might end in a pat situation between some people claiming that the goal of philosophy is to discover truth, while others claim that such a discoverable general truth does not exist, which might be constructed as an even more general truth.

The New Oxford American Dictionary defines truth as, "what is in accordance with fact or reality". This is maybe the shortest possible definition of truth. The problem with it is, not only does it not specify what 'fact' or 'reality' means, but also that in common practice other notions of truth circulate. For example, 'true' or 'false' in formal logic is used in two ways: (1) purely as a 'value' to be attached to a proposition and (2) as the characteristic of a valid derivation. In the first case, the truth value is used to summarize the context, reducing it to a single characteristic that permits purely logical operations. For example, given two propositions p and q from which it is known that p is true and q is false, then the proposition 'q follows from p ($p \rightarrow q$)' is false), while for the second case an example would be, "given two propositions p and q from which it is known that p is true and q is false, then the proposition 'q follows from p ($p \rightarrow q$)' is false" is true (correct) as a logical derivation[3]. Neither of these statements have anything to do with 'reality' as we normally understand it, unless we would be interested in studying the construction of logic itself in the brain as a neurological phenomenon.

The preliminary conclusion is that there are more types of 'truth' than covered by the definition in the dictionary, hence worth exploring further. The definition of the dictionary refers primarily to what we could call 'observational truth', namely whether what one claims is covered by what one can observe, while the 'truth' handled by logic is of a different nature. The latter refers to a property of an argument or reasoning and whether the argument is valid and reaches a correct conclusion, given the premises.

[2]Remember the famous Russel paradox: the assumption of the existence of a universal set leads necessarily to a contradiction. The paradox is solved in the Zermelo-Frankel system by defining the 'universe under discussion' a priori [29].

[3]The example may seem confusing, but the second assertion states a 'truth' about logical derivations—a meta truth—while the first merely produces the assignment or definition of a logical value to the logical operation $\rightarrow$.

These two notions of truth are in a sense complementary. Much of the development of science depends both on the assignment of correct truth values to basic premises or laws, *and* the correct derivation of experimental consequences. Science then proceeds by carefully checking the derived consequences when possible, and the basic laws are assumed valid so long as the consequences check out in the proper setting. Although this is a clear program for generating what we call ‘knowledge’, it is still fraught with difficulties that we have to explore further.

But before doing so, it is necessary to mention further types of ‘truth’ that may not be related to observational or logical truth. In the postmodern era, and in the wake of the impressive development of anthropology, a lot of attention has been devoted to the occurrence of so called ‘narratives’ in various cultures, which are often claimed to provide quite a different kind of ‘truth’ than can logically be asserted or could be verified by performing experiments. There is a semantic connection here, namely, the significance one may attach to a specific experience. Such an experience can be very primitive (like attaching a meaning to a sound or a conjunction of events) but can also provoke overwhelming states of mind or moods (like joy, sadness or awe for the ineffable)—in both cases a leap is made from the occurrence of a specific event to a new domain of signification.

In addition to these notions of truth and surpassing them in scope, there is the strong connection of truthfulness has with ethics. This is an issue we shall discuss extensively when we address ethics later in this book. Let it suffice to say for now on this matter that ethics, viewed as an individual or societal motivation for a life plan, has often a tenuous relation with truth. The advertised motivation may be substantively different from what is the effective aim. Such subverted truth is endemic to political discourses. E.g., what masquerades as patriotism often hides a very different motivation such as racism or the preservation of one’s prerogatives, property or advantages, and this at the cost of even the most elementary human dignity of other people. Lack of motivational or ethical truthfulness is no doubt a deep intrinsic human disease, only somewhat mitigated by the insight that there cannot be an absolute claim to truth anyway.

In all the cases mentioned so far, truth plays an important role, and in the remainder of this chapter, I want to make that role more explicit. I do not wish to discuss the logical mechanics of truth in detail any further—I think this is sufficiently well known and/or already covered—I merely want to make some comments on why truth in logic is both important *and* far too limited for use in a philosophical discussion. Following that short discussion, I shall next review the notion as it is used in science, to complete the discussion with the more general and philosophically relevant question of how truth can be attached to narratives.

Truth from logic

The notion of formal logical truth cannot be transferred intact to our philosophical discussion (in contrast to what some philosophers may think [60]!). For one, a time dimension is lacking in classical first order (propositional) and second order (predicate) logic. And for another, there is no appreciation of a statement's quality, in particular its necessity or possibility. This first inadequacy can be remedied by so called temporal logic, which introduces a rarified notion of time (something like 'sometimes', 'always', or 'before'). The second is remedied by yet another type of logic called modal logic. However, the more complex logic becomes, the more tenuous its consistency. Logicians are either not clever enough to prove that their system is consistent, or the consistency may be unprovable (e.g., because any proof would lead to a regression ad infinitum.). Furthermore, most systems of logic and mathematics ultimately produce contradictions, as is so beautifully documented in Morris Kline's history of mathematics [38]. There we find that even in the extremely precise context of mathematical logic things can easily go awry.

However, one important lesson from the process of constructing formal logic is the subservient role truth plays. Our world of thought is not subdivided into absolute assertions that are either true or not as if truth were a goddess deciding what is acceptable to her and what is anathema. Rather, it is a helpful housekeeper who assists us in keeping our reasoning and considerations tidy. In logic, truth has a rather neutral ethical character where not true is just as good as true. In $p = \text{NOT}(\text{NOT } p)$[4] there is no deterioration in the value of p after two negations. Compare this with, "What John says is not untrue", which does not quite say that John's statements should be taken at face value. Daily life modalities are so much more subtle than logic can afford. In John's case, we understand that although formally true, his proposition is contextually false. From a goddess inspiring awe and deference, truth has been degraded to a housekeeper who has to look for the hidden dirt. Even when the reasoning has been tidied as much as possible, it will never be absolutely clean, just as there is never an absolutely clean kitchen.

In logic the truth value of a specific proposition is already part of the meta-logic. It has to be imported into the logic system from the context, because from a logical point of view, any assignment of truth value to a primary proposition is equally acceptable. In addition, the way the notion itself is handled depends on the meta-system, which may also provide more qualitative notions. Our experience with what we consider truthful shows us that we use the notion not only technically to provide information

[4] Often written as $p = \sim (\sim p)$.

on the interaction between propositions, but also qualitatively, to evaluate the trustworthiness of the statements (i.e., whether the claim leads to the expected consequences, given the context.). This means that a third meta-system is brought in to provide qualitative evaluation. In addition to epistemological instrumentation, qualitative assessment is (perhaps surreptitiously) introduced into the system. Even though this introduces an extra level of complexity, it should not worry us too much as long as we realize that we must provide a new modus of thought for it. Perhaps now is a good time to remember our discussion on aesthetics. Every evaluation will be based on an evaluation system and our discussion must progress toward how such a system defines truth.

Truth and physics

A good, next, place to start with such an effort is the evaluation system used by physics or by science in general. Of course, physics uses mathematics to reach conclusions based on mathematically formulated laws, hence it uses formal logic for that purpose. But logical consistency does not necessarily make a proposed physical law, a so-called 'law of nature', true. A minimal test of truth requires experimental verification of the theoretical conclusions. This is actually a test of non-falsehood in which one honestly tries to disprove one's hypothesis. But that is where things become complex because it raises the question we already hinted at in the beginning of this chapter: what constitutes an adequate experimental system that reveals whether our original system reaches correct conclusions?

The evaluation system has to be evaluated itself for adequacy. In physics this is usually done by the original theory, which provides the necessary specifications of the verification experimental framework needed to prove the assertions. To use the recent example of the Higgs particle, physical calculations show that, in specific collision experiments using known elementary particles, a new particle should emerge with a certain probability having a mass and/or energy within a given range. This means that the verification apparatus must generate the colliding particles with the proposed energy and collision cross-section and should be able to determine the probability distribution of the result (the emergence of the particle with the predicted properties) with the accuracy needed (since the probability to find the new particle is very low, but precisely predicted by the theory.). All these requirements are so demanding that a confirming result convincingly testifies with very high probability to at least the predictive correctness of the theoretical calculation.

Suppose a prediction from theory is verified, then this will amount to "experimental truth". Let's analyze further: (1) a theoretical (or computational) result is true if a certain experimental set up confirms it, and (2) the experimenters are provided with precise guidelines on how they should conduct their experiments. How can this set up be trusted? Is there not too much collusion between proposers and verifiers? It almost looks like a rigged police investigation, where the policemen select the evidence based on what they want to find (not uncommon in investigations under pressure).

There are three aspects to this question that make it less contentious than I am stating for the purpose of scrutiny. First, regulations exist to prevent collusion between theoreticians and experimenters. Second, the proposed experiment must be meaningful and capable of testing the claimed properties (this technical issue has often been a problem in the past and requires precise experimental discipline). Third, and most importantly, the property claimed and tested can not be considered universal, but rather a property valid within a precisely circumscribed theoretical context (based on precise premisses and derivation methods). These three requirements may be considered part of a third, supra-meta-evaluation system. They immediately raise a number of instrumental questions. How to ensure independence (for the collusion question)? How to assess the relevance (for the question of meaningfulness)? How to assess the scope (for the question of relevance)? All this shows that, even at this very constrained level of verification of physical laws, truth is by no means a simple and undifferentiated notion.

How is it then that we have generally come to treat physical laws as more or less universal? I could simply blame this on humanities' habit of making unwarranted sweeping generalizations. But that is too facile an answer. The trustworthiness or honesty of science production as we know it is generally not a contentious issue (it may be so when non-scientific interests, e.g., political or economical, are involved and society certainly has to defend itself against those), the problem is deeper and inherent in the scientific method itself. To produce trustworthy results and experiments, science has to drastically limit its field of vision to what it can prove given its timely insights and abilities to analyze and demonstrate. Truth can only be found in a well-defined niche, in which all potentially intervening disturbances are under control. To see clearly, the field of vision has to be drastically reduced.

Nonetheless, science has found a way to alleviate the situation by building edifices cemented by the notion of truth. It uses the assessment of truth of a property or proposition as a building block in larger theoretical constructions. Modern mathematics and, in its vein, modern science proceed in this way. Knowledge accumulates thanks to the notion of truth. A property can be used indiscriminately once it is signed off as 'true', a building block in the larger construct of knowledge, provided the context to which it applies remains the same and the original premisses remain valid. All subsequent constructs using true properties in a logically valid combination and in the same context can therefore be considered true as well, signed off as true and used further. Logical constructs pervade modern science in this way. One could state that the difference between modern science and its ancient predecessor(s), as well as a major reason for its success, is the systematic use of abstracted truths.

Such constructs work well as long as the basic principles hold (both axioms *and* context restriction). As every experienced mathematician knows, the danger looms that soon the original assumptions will be forgotten and unwarranted use of a property outside its valid context will be made. The notion of a truth as a validly trusted claim remains strongly attached to its system of premisses or axioms. There is no universal claim to truth. This may be obvious for logical or mathematical truth, but once the notion has been elevated to the sphere of trust, the rules of the game have to change. The issue moves to a different level, that of a trustable world view, shared by people and societies. The scientific edifices remain a necessary part of our outlook on the world and the experience of our lives, but they do not determine it.

'Truth' as something reliable provides for a powerful unifying principle, but no certainty. However we look at it, we remain explorers penetrating a thick bush filled with wonderful plants and animals, but also many unexpected dangers. Growing up as an individual or evolving as a society, we gradually develop a sense of what can be trusted and on which principles we can rely. Our notions of truth consolidate our findings. Our survival as a species surely depends on doing this harmoniously with nature. Every acquisition of new insight will help temporarily, but we should remain alert and aware that it may be superseded by a more reliable approach. One productive aspect of this proceeding is that trust can be shared, the sharing of knowledge being the prime example. Knowledge consists of contentions that have achieved a high level of reliability. We accept (internal) logical consistency as a prime condition, but we should remain aware of the intimate relations to the implied or declared context. The internal consistency of a body of knowledge has to match our experience of nature's behavior, and for that we are developing the necessary experimental verification. But what can actually be verified is a small and eclectic subset of the immense diversity of nature, which, thanks to chaos and emergent behavior, cannot be reduced to a few principles[5].

Trustworthiness as defined above requires independent and impartial verification, not unquestioned authority. But neither is there an absolute

[5] Not to talk about the essential limitation of abstractions.

independent and impartial agent that can perform the verification. One could state that 'nature' or 'reality' itself plays that role, but it will not act by itself to satisfy our need for truth and trust. Some may argue evolution does this, but typically we have no time to wait for its verdict. So, we have to create our own intelligent verification agents, and make them as independent and impartial as we can. They have to belong to a separate meta-frame with its own rules and processes, as well as its own method to establish the 'truth' of its claims.

This may sound like mission impossible, but design engineers (in particular electronic engineers like me) know very well how this works. For us it is daily practice. For every level of abstraction in the design trajectory there is verification software. These are separate programs that establish whether a given design at a certain level of definition satisfies the design objectives of that level within acceptable tolerances. It confirms or declines the claims made by the designer on the specifications and goals. Such a verification program is supposed to generate the necessary confidence in the quality of the design and sometimes even provides proof of validity, in the best cases but very rarely. Verification 'by proof' is often very hard to do. Verification 'by example' on well chosen examples is much easier, but of course not conclusive, with the added temptation that the design is manipulated to be good for the examples and for nothing else. To develop a verification program, one has to create a "model universe", i.e., a frame for the modi operandi of the class of designs considered. This is quite similar to what physics does when it creates an experimental environment capable of testing its assumptions. It involves the definition of the context for the verification program, i.e., for the system that will try to establish trust in the design and hence confirm the 'truth' of its alleged properties within that frame.

The verification context is not determined *in principle* by the designers themselves, but is derived from the scientific and technological development of the field. The (meta-)verification frame that it requires will, again, typically be produced by different agents than the design specialists themselves (although these agents should have intimate knowledge of the design principles.). In the case of electronic design, the verification software developers are typically numerical analysts or programmers with a keen knowledge of both physics and engineering, and in recent times their frame has expanded to include environmental, economic or even social components and hence requires inputs from these fields as well. Nonetheless, specific designers have a crucial role in the verification process. Not only are they using the verification apparatus, they often are also choosing what kind of verification would be relevant to the endeavor. As things go, the designer is in many cases the only real specialist on the scene, and although reliability should be independently established, often there is no other possibility than a blind trust in the designer's abilities. Rules of conduct become necessary and many professional fields have therefore established a kind of "design morals" for their practitioners, including sanctions should they not adhere to the rules.

Beyond science and technology

So far, we have encountered the notion of 'truth' in three different guises: (1) truth as consistency (logical truth), (2) truth as fact through physical verification, and (3) truth as perceived reliability (acceptance of a proposition because its validity can be trusted). In many real life situations these various guises co-exist. When the testimony of a witness in a court of justice is accepted, it is an act of trust in the witness having observed a fact correctly and reporting the observation as experienced. When that witness is confronted with an inconsistency in the testimony, then trust in the correct observation of the fact is shaken. Some systems of justice require at least three independent witnesses before a certain contention can be accepted as a fact. That such precautions can lead justice astray is of course well-known. A clever criminal can generate appearances that may mislead thousands of witnesses. The conclusion here could be that trust in reliability does not qualify as a valid characteristic, even though confidence in a certain contention is often used as a building block in a 'derivation'. For example, when a DNA analysis of blood or saliva on a victim is presented as evidence, there is implicit trust in (1) the correct acquisition of the samples, (2) the reliability of the analysis and (3) the chain of custody (CoC) surrounding the physical evidence. All this pleads for restricting the notion of truth to the very rarified context of unadorned facts[6] and fully sanctioned derivations. Nothing can ever be absolutely certain, but one can try to come close by using critical reasoning and impartiality as much as possible.

Can the notion of truth be saved beyond logic and science? Modernism associated the idea of scientifically verified fact with uncompromising truth. In our postmodern era, much has been made of analogical truth that transpires from narratives, stories and experiences that may inspire people. The

[6]What can be considered a 'fact'? Even for Wittgenstein, who wants to restrict considerations to 'what is the case', the notion of 'primitive fact' is elusive. That it 'exists' without being tangible or reachable does not make sense. That something or some happening is seen as a 'fact' requires an observer who recognizes it as 'fact' as sanctioned by their perception and worldview. Many 'facts' of the past would not now be considered facts due to improved means of perception. What somehow saves the day is that humans are able to share the notion of 'fact', but that certainly requires a lot of ethical discipline, as mankind's history testifies.

question is, do we need another notion of truth to account for an alternative angle on understanding? For example, Tolstoy's novel *Anna Karenina* may give more insight into human psychology than an entire treatise, as may Jesus Christ's parable of the Good Samaritan provide insight about ethics towards strangers. Where does "truth by imagined example" fit? In order not to contaminate or weaken the notion of truth too much, I shall relegate the question about the significance of narratives to the area of semantics and the related epistemology. Truth plays a role in this endeavor, but only at a level where the 'truth' of the analogy is concerned, or, more precisely, the relevance of the example to the question under consideration (e.g., what is the ethics behind the story of the Good Samaritan?). The truth value is not about the plausibility of the story itself, but about its exemplary function, hence not outside our previous context.

To conclude the discussion on truth, I wish to emphasize two points. First is the very important role truth has to play as the fair housekeeper that keeps the human knowledge environment tidy. Second is its dependence on the context in which it operates. Each context has its own notion of truth and must have it validated through the mediation of an evaluation method, itself dependent on a meta-context. Many of these contexts are intertwined, helping one another to establish reliability, this being the main reason the notion of truth exists. At some point the upward chain of abstraction from evaluation context to evaluation of the evaluation context has to end, not because a next level would not be meaningful, but because a regression ad infinitum has to stop somewhere. This last level of evaluation can only be psychological wherein a community at a given juncture in time would assume an adopted truth principle to be self-evident and hence worthy of undisputed trust. At that point, the level of a commonly held belief is reached, whose future can only be highly uncertain while nature and knowledge evolve in unpredictable ways and hence require the re-establishment of truth and trust at each juncture of the deepening evolution. Proceeding, a new level of understanding and truth has to be reached and the new house has to be kept tidy in ever more comprehensive ways (this is in a nutshell the modern history of science!). That the limit is never reached may be considered our predicament, but it is the opportunity for evolution (our intelligent) nature provides in an impressive way.

This brings us to a more general question that we need to address next, that of what can be considered 'knowledge', namely, what may be considered 'certain'. Philosophy has in the course of its history developed a separate discipline for this issue called epistemology, the topic of our next chapter.

Chapter 10

Epistemology

The scrupulous development of 'systemic relativism' would not be complete without a discussion of epistemology, namely, what one can know for certain. A preliminary, more limited discussion took place in the previous chapter on 'truth'. The present chapter is devoted to the notion of 'knowledge' and, even more pertinently, the relation between certainty and knowledge: can there be such a thing as dubious 'knowledge'—a "contradiction in terminis"? Is relativistic knowledge possible? The epistemological question has occupied many philosophers, and the starting point here is the book of Louvain professor Fernand Van Steenberghen, both an Aristotelian and a Thomist, augmented by the analysis of the transition between sensing and knowledge inspired by the American philosopher Peirce. The chapter then places the discussion in the context of 'intelligence' and the structure of the brain. We clear a first hurdle when we clarify the connection between 'information' and 'knowledge'. Next, we review various types of knowledge, and give particular attention to the post-modern notion of 'narratives', illustrated by three examples. The discussion then focusses on the question of certainty, bringing in Wittgenstein, his language games and statements such as "what is the case", as well as Kant's view that full knowledge 'exists' but is unattainable by reason. We conclude with why a "natural law of everything" is a provable fallacy from the Gödelian perspective. In a systemic relativistic philosophy the question of knowledge has to remain open at the top, leading to the possibility of never ending improvement by enhanced trustworthiness, which is developed as a more appropriate notion than certainty.

What do I know for certain?

This is commonly considered the central question in epistemology—the theory of knowledge. It is the very first question one may want to ask when one starts philosophizing, the belief being that without some certainty no knowledge whatsoever is possible. Although the term is pretty recent, epistemological thinking goes back at least to Plato, who was perhaps the first to theorize about it seriously. In the last three centuries, many philosophers have devoted much effort toward gaining insight into the possibility of knowledge. Among these are the Louvain School of Aristotelians and Thomists, exemplified by Fernand Van Steenberghen [58] as well as, with a very different approach but on the same issue, the work of Peirce in Indiana [47]. Many philosophers have struggled with the issue, most notably Kant, who came up with a fresh, but also quite controversial, approach (to be discussed later). The Aristotelians and Thomists like to call themselves 'realists', in that they claim absolute certainty of the experience of reality by human consciousness and therefore strongly oppose all kinds of skepticism on this issue (including relativism of course). The question I want to address in this chapter is whether a framework for a theory of knowledge is possible within a relativistic way of thinking.

An interesting preliminary question is actually, "Which comes first: logic, linguistics or epistemology?" (Aristotelians would also put ontology in the list.) We cannot even ask "what do I know for certain?" if we have not at least a good understanding of what is meant by 'knowing' and 'certainty'. Aristotelian philosophers argue that the only possible way to start is from an admittedly superficial, common understanding of these terms and then move into a more justified language from there, hopefully ending at a point where insight can be formally consolidated. This approach is not uncommon to mathematics or science in general. First we develop a good informal understanding of the issues at hand and, when that is acquired, reset, start again and do it systematically. After the reset one formally establishes the context or framework, including the rules of derivation and then proceeds within that agreed upon framework (Wittgenstein: establishing the rules of the game). Contemporary mathematics has demonstrated the general adequacy of this approach very convincingly. By detaching the structural frame from the actual application one can even make the concepts used and their mutual relationships untainted by specificities, thereby increasing their applicability to various contexts that fit the framework. It is the best one can hope for in the sense of combining precision and generality, but the approach is not a panacea as it cannot be anything other than dramatically constraining to the established formal context.

So then, what is our common understanding of 'knowledge'? When I observe a primitive sensory system with memory—say the temperature sensor of my central heating—what it senses is some property of the state of the environment (here the ambient temperature). Therefore, I could say the sensory device 'knows' that temperature, and moreover, it is able to act on that knowledge by turning the heater on or off. At the same time, another knowledge process has been active in my mind, namely its knowledge of the presence of the sensor and its function. In addition, I know that I am sensible to temperature, this being the reason why the sensor is there in the first place, since I asked our plumber to put it there. So the mere observation that there is a temperature sensor engenders a whole slew of knowledge components.

Brain specialists would not have too many problems explaining these layers of knowledge. They would say that in the brain of an advanced organism, neurons collect information from other neurons and combine common properties of their states into a new 'super state', so that layers of knowledge are built on top of other layers. Similarly, or ultimately, observers can observe themselves observing. One could say 'they know that they know'. They have recorded their own process of knowing, which may be viewed as the central building block of consciousness.

The issue becomes even more interesting when sharing knowledge is at stake. In recent times, some people have made a distinction between 'information' and 'knowledge' claiming that being aware of a fact (e.g., knowing the temperature) is not really knowledge, it is just information on the state of the current environment. What then would constitute 'knowledge'? A typical English dictionary uses words like 'understanding' or 'expertise' acquired through experience to describe knowledge. The occurrence of the latter can be explained reasonably well by the human brain's ability to abstract and propose structural relationships in space and time (as described in the chapter on intelligence). One step further connects the notion to the human ability to imagine and evaluate potential or even completely fictional scenarios.

People communicate such imaginings as 'narratives' and use the descriptive abilities of language to share situational representations and derive qualitative views from them that are both instructive and emotionally laden. Such narratives can cover a wide range of situations and can come to constitute the sole guidance people retain concerning how they should lead their lives. Narratives, therefore, can define personal and social ethics and constitute a store of knowledge concerning most, if not all, questions concerning how human beings conduct their lives.

This short survey already shows quite a few distinct potential characteristics of what we call knowledge. However, the epistemological question is, "How certain is such knowledge?", and the question stands for each type of claimed knowledge, since it presumably determines whether the claimed is indeed 'knowledge'. No wonder each field of understanding or expertise has developed its own criteria of certainty.

To explore the various ramifications of the question further, let us start with some select narratives. From the perspective of certainty narratives may be dismissed as fiction. Famous philosophers from Plato to Krishnamurti find them unethical as they oppose reality with situations that do not ‘exist’. Presumably, this judgement is derived from the idea that certainty can only be obtained through ‘what really exists’, or, alternatively and to cite Wittgenstein, ’what is the case’ [64], at the exclusion of mere imaginings. Needless to say, and in the light of our previous discussions on existence, the thesis I want to defend will be very different. Let us consider three famous narratives from the point of view of the certainty they may convene.

My first choice is Shakespeare’s tragedy ‘Hamlet’. The tragedy starts out with the ghost of the old murdered king roaming around during the night on the ramparts of his castle and leaving behind a dubious message to the sentries on duty. Whether Shakespeare believed in ghosts I do not know (we cannot ask him), but this first scene is definitely a clever artistic ploy to compactly sketch the situation at Elsinor, which is one of lugubrious deceit, felt and imagined by most everybody, even by mere guards. The roaming ghost, imagined or symbolic, convinces Hamlet of his uncle’s guilt, and this sets the stage for the further developments, both psychological and physical. As the events unfold, Shakespeare exposes a diversity of situations in which psychology confronts reality and vice versa. The strength of Shakespeare’s development is that he creates and highlights a succession of situations that bring the characters of the dramatis personae vividly into focus as they confront the (im-)possibilities they are subjected to. In the process, an impressive number of critical relationships are explored dramatically: parent-child, lover-beloved, husband-wife, murderer-victim, together with all sorts of psychological qualities, defects as well as qualities that turn into defects and vice-versa. What maintains the audience’s interest is not only the evolving plot, but the fact that people recognize the various psychological conflicts and have no difficulty gauging their intricacies and connecting with the ethical issues being addressed. One cannot escape the conclusion that Shakespeare, even though presenting a totally fictional story, describes situations that are more true to life than life itself. This homomorphism with reality engages our scenario-building-faculty more than what most of us with less talent than Shakespeare could have imagined, and, as we already discovered, it is our imagination of situations and scenarios that drives our intelligent human interaction with the world. Shakespeare’s contribution here is the realism of his enormously creative fiction.

As a second choice, I propose Johann Sebastian Bach’s *Johannes Passion* (St. John Passion, BWV 245). It used to be said that one should not search for meaning behind music. Music is art and art speaks for itself, it needs no explanations, it is what it is. Not so with Bach's Passions, where it is much more. Bach wrote a lot of music simply for the beauty of it (within his very elaborate concept of beauty of course), but in the case of the cantatas and the Passions the situation is very different. In these compositions, every note, melody, harmony and instrumental color has both a musical and a narrative purpose (even an instructional one). Conductor John Eliot Gardiner wrote a magnificent *Portrait of Johann Sebastian Bach* [25], in which he states, concerning the *Johannes Passion*, that one does not need a sermon when the music re-enacts the story so well. He writes further, on p. 195:

> The springboard of his (Bach's) achievement is his direct interaction with the Gospel itself—its underlying themes, its antitheses and symbols—here more perceptively than in the following *Matthew Passion*. The symbols spring to life every time the music is performed and help us make sense of the outrage and pain of suffering, the contradictions and perplexities of the Passion story. Bach connects all along with the underlying human drama in John's account and brings it to the surface with the sympathetic realism of a Caravaggio or a Rembrandt.

And what goes on in that human drama? Conviction, betrayal, sorrow, lack of sensitivity, opportunism, senseless ideology, lack of meaning, anxiety, suffering, barbarity, courage, pity, responsibility, love, care... Is there any human emotion left out? Each of them finds its unique musical expression. For many listeners, the achievement of Bach in this respect is beyond comprehension, in particular since nobody before or after him has come close to such a depth of expression. Of course, there are components in the development of the Passion that are difficult to comprehend for many of us in contemporary society for different reasons. I am thinking specifically about the theory of sin and atonement, the belief that Jesus Christ suffered and died to redeem the sins of the world. The concept of atonement and redemption is not easy to fathom, given our present understanding of nature and the world. It is the way our Lutheran forebears struggled with the existence of evil in the world, given that, in their belief, the world was created by an all-knowing and all powerful God—how could He create evil? Our own, evolutionary viewpoint does not assume that natural evolution is 'good' in itself, and certainly not good as conceived by us as humans, but however that may be, our modern confrontation with evil is just as strong and powerful as in Bach's time, if not even more given our fairly recent war history. That innocent people have to suffer for the faults or even the ambitions of others is very real, we experience it daily and in the Passion of Christ it is epitomized. That makes even that issue accessible to unbelievers, so it is no surprise that the whole of the Johannes-Passion provides for a deeply felt musical narrative, whose most remarkable aspect is its non-linguistic or non-verbal communication, supported by John's highly concise verbal narrative, but going largely beyond it in emotional expressivity.

Before engaging in a more difficult third example, let us pause and consider the issue of 'certainty' in the two narratives just mentioned. The historical correctness of each is highly debatable, even though they contain a substrate of historicity (you can visit Elsinor and Golgotha!). But neither Shakespeare nor Bach was overly concerned with historical correctness. The simplest way of describing their intention is possibly "to be true to the human condition[1]". The 'certainty' of each story is not *that* it happened or not, but *how* it is relevant to our common lives, our views and our emotions. We relate to them because they relate to us. In another direction: these authors do not make statements that are either true or untrue (although they let their characters do that at times), but they create situations, scenarios, that put major challenges on their character's ethics (with our definition of ethics), in such a way that it induces a participatory enrichment of insights and feelings in their audiences. The emotional involvement of the audience produces a kind of telescoped life experience, in situations that a specific person may never encounter but that nonetheless challenge her/his judgement and consideration. The conclusion is that such narratives play an important, if not determining role in the elaboration of people's personal and social ethics. Their contribution forms a "database of ethical knowledge" as much of literature and theatre does—I'll come back to that important point.

As a third example, let us consider mythology as a form of narrative. We can look at the mythology of the ancient Greeks and Romans or else stories about the creation of the world transmitted from generation to generation in Native American West Coast societies (as for example, the stories of Turtle and Raven). Such stories do not seem to fit our categories of truth or certainty. They may be characterized as symbolic, with no relation to any notion of truth. Nonetheless, the character of truth is often attached to them, and non-believers have often been persecuted (even moderate and reasonable Socrates was condemned for inducing unbelief of the gods in his pupils). I believe we reach the limit here of what can be approached with reason and intelligence. As there are many cultures that do not have a written tradition, it is difficult to assess how much belief the ancients have actually attached to such stories, but given the fact that unbelief was often persecuted, I have little illusions about this question. Given

[1]Perhaps indirectly, as they realized that is what works artistically, and in Bach's case conditioned by his Lutheran outlook, but their desire to involve their audience emotionally is overwhelming.

our modern experience with the story of creation as recounted in the Old Testament, even today there are large segments of the population who literally believe in the factual occurrence of creation as described in it. The latter is testimony to the power of narratives as a source of 'knowledge', but it puts the question of 'certainty' and the meaning of the term 'knowledge' on edge.

Before moving to other types of knowledge, let us make a preliminary conclusion. The 'truth' of the narratives does not concern the 'facts' as the narratives present them. The accounts are fictional, whether or not people believe them literally. The claimed truth is at a different level. It is, minimally, the assertion that "it is a story transmitted from our forebears, generation after generation, and found valuable by them". Respect for ancestors and one's lineage is an important component of most cultures. This seed then gets reinforced artistically, as it provides many themes for representation (in particular in cultures without writing), and gradually a whole environment is created that appeals strongly to the imagination. Deeper meaning is gradually attached to the representations. The conditions of life, nature and the cosmos in general harbor many mysteries that occupy our intelligence. Narratives fill part of that void of knowledge and the best of them do it in a way that is effectively reinforced through accomplished artistic expression. Conversely, as seen in the Bach example, a compelling narrative may provide the occasion for the development of exceptional artistic talent. Does such a narrative then provide a worthwhile connection to our life experience? The answer is necessarily up to the experiencer, the beholder, the observer or the practitioner. Narratives form a base of potential experience and motivation and may be very effective in generating what is considered genuine, even when leading to results that are questionable from other points of view (like 'scientific truth'). When could they then be dignified with the term 'knowledge'?

Narratives develop a life of their own. What you 'know' about them is, besides their naked content, what function they have in the various contexts in which they are active. These contexts may be religious, psychological, artistic, and/or philosophical. Such actual and contextual information may have a high degree of trustworthiness and hence may be considered more or less 'certain', more or less, because all information remains dependent on various contingencies like the structure of the language it is expressed in, the media that report it and the varying semantics attached to the message.

But there is more. As their occurrence is closely related to the human ability to imagine and develop scenarios, narratives may have a 'projective' property through which they may influence the future, which, as I already argued, is a major evolutionary property. To put it differently, they can be motivational in inducing or preventing innovative actions and thereby strongly influence new developments, especially since they are an effective means of transmission between generations. In a sense, they become autonomously generated knowledge, creating their own truth. The world may not be as they describe, but may become that way because the narratives work their way into our minds and actions. From narrative they become predictive, and this with increasing certainty. They become a repository of 'ethical knowledge'. This type of knowledge can take a variety of forms: causality relations, 'If you do this, that will be the result'; structural relations, 'When two convene in my name, I shall be in their midst' or, semantic statements, 'Love is unselfish'. Building on this, they may provide complete plans for how to act in certain situations (see the parables in the New Testament), which then can be extrapolated to more general cases, very much like jurisprudence in court cases.

How does the property 'certainty' fit with this type of 'knowledge'? It seems that neither the notion of truth nor of certainty are appropriate. But this raises the fundamental question whether knowledge and certainty can actually be dissociated or whether 'uncertain knowledge' can be considered 'knowledge' at all. An easy way out is to state that 'truth' and 'certainty' belong to logic, they do not belong to narratives. They can perhaps be used to characterize 'information', where the latter can be thought correct or not, in contrast to narratives, for which possibility, faithfulness to the human condition or psychological relevance might be more appropriate qualifiers. But, as I argued before: (1) it is a chimera to think that 'information' can be evaluated outside a well defined and understood semantic context; and (2) a narrative provides a different type of knowledge than what its pure and uninterpreted content brings. Another solution would be to agree with Wittgenstein that the correctness of a narrative is determined by the rules of the language game of which it is an instance [63]. But language games do not define semantics. There is no univocal correspondence. Semantics is not covered by language games, for the simple reason that parties that talk to each other may use the same game rules but differ in semantics. Another solution then is to let certainty be variable in degree and relative to the semantic domain that is applied. This holds just as well for information as for narratives, a simple example, as well as metaphor, being that the same object can be considered white or black depending on the ambient light[2]. This variable interpretation of certainty in itself constitutes a piece of knowledge, which would be dependent on semantics of its own.

The variability of the certainty that can be attached to any type of knowledge may be seen as a problem by people caught in the quest for

[2] If the ambient uniformly colored light incident in the eye is stronger than the light reflected by the colorless object, the latter will look black. In the opposite case, it will look white.

absolute truth. A mitigated position would be Kant's where precise knowledge is postulated as 'existing' but 'unattainable to human reason' (a position that could also be attributed to Socrates) [35]. A much more positive outlook is to see the quest for knowledge and certainty as a symptom of the enormous creativity that is a hallmark both of nature as we know it and of our own faculties, both part of nature and singularly distinguished in it. Imagination is the motor behind creativity. The discovery of full certainty and truth, or, if you prefer, the discovery of the "natural laws of everything", would signify the end of science, and if everything could be predicted with certainty, it would make the world and nature fully automatic. Luckily, the likelihood of such a scenario is almost nil, but the corollary is acceptance of continual emergence of new directions both in evolution and in thinking. This latter position is much more 'certain' than the former, but it is a special kind of certainty, non-predictive and requiring perpetual renewal of any system of evaluation. In particular, it requires the perpetual renewal of ethics, given the new opportunities that arise at every corner.

It would be interesting to continue our investigation along this path and develop theories of relative certainty for narratives in diverse circumstances and for various purposes, since much of our lives are strongly influenced or even governed by them. Treatments of ethics, semantics, epistemology (like this chapter) and other philosophical issues attempt to do that from a philosophical point of view. However, at this point I want to move on and delve a little deeper into what seems to be disjoint semantics on certainty opposing science and narratives.

The methods of science are often contrasted with those of common wisdom based on narratives. The idea that a given scientific endeavor does not depend on a narrative is, I believe, mistaken. The scientific mind will try to get as rigorous as possible, but the way it does that, in particular its approach to the issues, is based on a formulated 'understanding' that cannot be described any differently from a narrative. When Newton says that the movement of massive bodies are determined by a system of differential equations involving the forces between them acting in an 'Euclidean space' (and moreover that these forces are described by gravitational attraction), *that* is a narrative (as I observed already, Einstein's narrative is fundamentally different[3]). To work out that narrative, Newton conceived a

[3]Why is Einstein's theory more certain than Newton's? Because: (1) it can reproduce Newton's results when applicable, (2) it explains (actually predicts) phenomena that are not covered by Newton's theory, and (3) it is consistent with similar but non-gravitational phenomena in dynamics, in particular how 'virtual forces' originate. Does Einstein's general relativity contain Newton's? The correct answer is no. Einstein's notion of gravitational force is fundamentally different from Newton's. It provides a good example

very precise mathematical game based on a collection of rules and formulations that, in themselves, constitute a mathematical narrative[4]. Science distinguishes itself by trying to restrict the narrative to the absolute bare minimum that cannot be covered by precise inferential (and computational) rules, thereby achieving as much transparency on its unproven assumptions as possible. But that does not diminish the determining impact the original narrative has on the overall theory. By being so precise about the origin of its claims, science achieves the following close 'certainties':

1. that the inferences (mostly based on logic and mathematics) faithfully implement the basic assumptions;

2. that the theory can be used in a controlled predictive mode, within a carefully defined and hence restricted environment.

Newton's laws and the resulting mathematics are capable of predicting the movement of celestial bodies to a high degree of accuracy. Still, quite a bit of criticism on that assessment is possible. All the experiments we so far are able to make have limited time frames, and, as far as humans are able to investigate the cosmos, we have to do it from our tiny earth in the huge cosmos, at least for the time being. To achieve anything like a convincing theory of astrophysics, a much larger narrative is needed than the one provided by Newton (or even Einstein), and it is therefore questionable that the laws derived so far can be the basis of it at all. Nonetheless, whatever narrative is proposed, it leads to behavioral statements on the objects considered (e.g., celestial bodies) that can be verified. Hence, there are relatively simple means to falsify a scientific theory (a situation that has happened often). But the contention of certainty, namely, that a theory provides a complete account of 'what is the case', remains an unverifiable narrative. It simply becomes a matter of belief! The progress of science depends highly on the imagination of scientists and hence on the new narratives they are devising. The impressive way Einstein constructed both his special and his general relativity theory is a good example, well documented by himself.

Are there then no fundamental laws of nature that are unconditionally true (after having accepted the logical and mathematical framework in which they are formulated as part of the deal)? A good candidate would be Einstein's general relativity theory (gravitation in the space-time geometry). Let us assume, for the sake of hypothesis, that it can be considered absolutely certain. Even so and due to the chaotic nature of gravitation,

of different theories that are able to produce the same results mathematically in some instances but different ones in others.

[4] In this case: differential calculus.

such an immutable law would still not determine the evolution of the universe. Some major effects may be explained from it (e.g., the validity of the big bang hypothesis as far as present astrophysical observations are concerned), but it would not be hard to argue (mathematically) that the theory leaves room for lots of unexpected developments, including our own biological evolution. The scope of such a theory is at the same time universal, as it acts everywhere and at all times (it actually defines space-time), and limited, as it only describes one basic property of nature and allows nature to develop many unexpected and unpredictable features that are not covered by it. Is this hard to understand? Hardly! Everything that happens is restricted by physical constraints that do not fix everything and do not prevent unexpected emergent behavior. Even so, general relativity is based on a small number of concepts (mass, position, momentum, energy) which have to be brought in correspondence with experimental phenomena. E.g., how to interpret 'mass' in relation to other physical objects is presently under heavy discussion in the light of the (relatively new) Engler-Brout-Higgs theory. Absolute certainty appears to be quite variable even in physics!

There are very few (and extremely limited) theories that can be proven consistent. Most mathematical theories are actually provably inconsistent at some point [38]. This leads to an interesting inverted theory of certainty such that whatever one conceives as concept or theory at some point will be proven incorrect with almost certainty. Does this save the concept of 'certainty'? We would be very happy with a somewhat mitigated term such as 'very likely'. But then, very likely with respect to what? Likelihood needs at least a base set on which to assign probabilities. The conclusion, in particular in the case of a scientific theory, is that the likelihood lies in the sanctioning by the scientific observers who trust the observations, the theory and the fit that can be established between both. Unavoidably, and as we also established in the case of 'truth', certainty is exchanged for trustworthiness, based on theoretical consistency and experimental concordance, given the actual means available. This is as good as one can get in the scientific realm, but is it different from what happens in societies dependent on narratives? The only difference I can see is one of degree. The more verification precautions one takes (all limited by present day 'knowledge' and technology), the more trustworthy the claimed facts become, but they remain susceptible to falsification at all times.

What remains has been seen as the fundamental epistemological question: "Is there anything that we can know for sure?" Historically, the best candidate for this is Descartes' statement, "Je pense, donc je suis" [18]. Descartes himself immediately attached to this the following observation, "Je pense" may prove my existence all right, but is there anything outside of me? The issue has occupied philosophers after Descartes without providing for a solution (a proof!) leading Kant to call the whole issue the scandal of philosophy. Philosophy incapable to *prove* that there exists anything beyond thoughts in an elusive "Je"! Later on, the whole exercise was considered futile, as it was only a way of playing with words, hopefully according to some rules that would make sense somehow [44, 63]. In view of these developments, the issue may be dismissed as irrelevant. But that is a mistake. Even the fundaments of mathematics are, with the best possible efforts, shaky, but that does not make their investigation meaningless. Quite the contrary, they lead to ever further deepening of their value and improvement of their reliability. That these exercises are eminently useful even for daily life is testified by the impact formal logic has had on computer architectures, cryptography and the refinement of geometry, just to name a few cases.

Where then is the misconception? By trying to embrace too much, one remains empty handed. 'Absolute certainty' is an unattainable principle. Worse, like 'absolute beauty', it does not make sense. This last point is easy to prove (think of Gödel), but then, how can one deal with it?

Humans have an incorrigible tendency to attach absolute meanings to words, as if that were possible. The development of semantics is an activity that takes place, first in individual people, and then in an expanding community, when people try to harmonize the meanings they attach to what they try to communicate (one conditioning the other). In that process of sharing by an expanding number of people, some 'certainty' about meaning develops: "What I think is more or less what you think, or what everybody who considers the issue is thinking", as happens in mathematics or physics, where scientists convince themselves, their colleagues and their students of the certainty of a piece of knowledge. Granted, this development is based on the acceptance of sets of precise rules and procedures of thinking, which are remarkably communicative, but nonetheless belong to a specific faculty of the human brain. That this faculty is limited and amenable to further development should be obvious and this awareness should caution us against claims of completeness.

The remainder of this chapter is rather specialized to the classical issue 'whether anything exists beyond consciousness?' and can be skipped without impairing the general line of thought.

On the aristotelian-thomistic position

Let us now examine the Aristotelian-Thomistic position on certainty, as beautifully described in Fernand Van Steenberghen's book on epistemology [58]. The starting point for what becomes 'absolutely certain' is where human consciousness meets an object in the external world. Via sensory perception, human consciousness encounters objects that are definitively external to itself and which it tries to incorporate into its store of knowledge. In the terminology used by the modern Thomists, objects are transcended into the knowledge world that is immanent to the individual. 'Transcending' means that the transcended objects somehow acquire a new identity within human consciousness, and 'immanence', that conscious knowledge is altogether another category that transcends sensory and corporeal experience. It exists as a property of consciousness. All this emerges from a careful analysis of the personal act of conscious awareness which concludes that the 'reality' of the object-consciousness encounter cannot be doubted without consciousness itself being annihilated as a concept. However, the analysis in its pure form as given by the Thomists is also not allowed to go beyond the mere reality of the object-consciousness encounter. Any other property assigned to either side would be open to uncertainty. I do not want to say anything more about this analysis here, as it is largely documented in the literature (see Van Steenberghen, e.g.). Let me simply state that it is an impressive piece of philosophical research that provides a sturdy (metaphysical) basis for realistic scientific reasoning.

Nonetheless, a problem remains with the Aristotelian-Thomist position in that it is based on unquestioned use of language, in particular the implicit presupposition that what is said has a non-equivocal meaning that is universally shared by all discoursers. To clarify this point, let us not doubt the 'reality' of the object-consciousness encounter. The issue here is what meaning to attribute to the statement "absolute certainty of the existence of at least 'something' "—the bare minimum needed. To say "something must exist" should, when starting from the Cartesian prior, mean "something must exist for me", since at the Cartesian starting point one is not yet able to generalize to various observers, and moreover, the consciousness-object encounter requires a consciousness, i.e., an 'I'. This brings in another actor/object, 'I', whose 'existence' then has to be beyond doubt, at least according to Descartes. More precisely, in this view the thinking defines the 'I'. Going back to our original discussion on existence and its biological basis (see the chapter on Reality and Existence), the situation is now that this 'I' seems to create internal structures that reflect (or are homomorphic to) 'external' phenomena, hence the further assertion 'there are external phenomena' can be made. This is no more than a biological statement, based on our understanding of the human brain, its functioning and its position with respect to what biology considers the world external to a given organism. All this cannot be anything other than a belief based on a primordial biological narrative. The question of how to prove the existence of a world outside the 'I' cannot be solved within a closed philosophical system because the assignment of meaning to the concepts used in the statement already requires such a system. Or, to put it more succinctly, one would need to know what the existence of existence is. Biology takes priority over philosophy[5]!

Philosophy reaches the ceiling of its potential here. Although philosophers might wish differently, that ceiling is imposed by biology. Philosophers are human and hence constrained by the biology of their species. That there have been many attempts to move beyond that ceiling does not mean that these are or even can be successful. Quite the contrary! Philosophers like Descartes and Kant should be credited for clearly seeing this ceiling of human limitation and reducing fundamental assumptions on existence to the absolute unproven and unprovable minimum. Once the unprovable basic assumptions are formulated, the next step must be the development of meaning for the terms used and we are back to semantics and our previous discussion where we concluded that the 'existence' of anything external is only a brain construction that produces structures that are predictive of observable phenomena, which, when verified, only make the theory consistent with 'reality' as conceived in that theory (an issue dealt with in the chapter on Semantics).

There now remains a residual issue, which is extensively addressed by Peirce in his theory of Pragmatism, sometimes called Pragmaticism. It is his contention that in the contact consciousness-world (or senses-observed) there has to be a first contact that is not consciousness-dependent. It is the 'place of entry' of an observation in the sense-brain system. According to Peirce, 'Something external' triggers the observation without any interference of consciousness (and as far as we have analyzed consciousness, the brain). One could say there has been an outside 'signal' or 'token'. But, again, we need some biology to interpret such a statement, and then, a meaningless token is no more than a meaningless token. That it can be interpreted as originating from 'something', or 'is something' in its own right is already an interpretation based on a semantic model. Necessarily, one reaches the limits of knowledge in our present understanding of its functioning. It is quite possible that other, more incisive models may be constructed, but if we stick with the present day understanding of the

[5]This is not unlike the situation in mathematics vs. logic where set theory takes priority over logic simply to allow assertion of the 'existence' of mathematical objects. More precisely, set theory introduces a primary hypothesis 'there exists a set' and then the whole construction of sets, numbers and other mathematical objects based on just the few Zermelo-Frankel axioms becomes effective [29]. Without that primary hypothesis, set theory remains valid, but its subject is empty. That all these mathematical objects do not 'exist' in 'reality' might be considered a philosophical truism. They only exist in the human brain!

brain, that is it!

In our present scientific way of thinking (at least as I look at it and e.g., following Kant [35]), no human concept can ever grasp full 'reality', even of what it perceives as a singular object (a quark?). In the brain we construct models of partially grasped reality. Kant would have us making constructs that are totally devoid of contact with reality, but I would not go that far. We 'fit' models to what we experience, evaluate them and accept them when there is at least some concordance. We may err in this, but that is the procedure. In order to construct such models, we set up a semantic framework that is justified by the assessment of effects the use of the notions produce. Everything we state takes place in such a framework, whether conscious or not.

The problem with the Aristotelian-Thomist position is that the framework it uses is not made explicit and hence remains open to interpretation. The consequence is that further construction and derivation rules are lacking, or, if one resigns oneself to a reduction to an absolute bare minimum ('something' and 'I'), one ends up knowing everything of nothing (to use the words of G.B. Shaw). The better approach is to make the basic assumptions and allowed modes of reasoning explicit *and* accept their intrinsic uncertainty. This removes any claim of 'absolute truth' or 'absolute reality', but has the marked advantage of allowing progress within the framework[6]. So, on the one hand one accepts the Aristotelian notion of 'reality': something exists (to exist turns out to be the meaning of 'something') and there is a biological 'I' that knows it, but this is nothing more than a common, pre-philosophical intuition, which is then formalized by positing it. It is the starting point, or starting assumption, for a theory of existence. The real work is to develop a framework in which further properties can be built on these notions. This is the job of science in general and philosophy in particular. The process does not produce absolutely certain knowledge, but knowledge that has a certain amount of trustworthiness within the constraints of the framework and the possibilities of human experience.

Can anything then be absolutely certain? This is, in a nutshell, what the central "epistemological problem" boils down to as posed in what I call the Aristotelian-Thomist framework shorthand. But the question begs the question, and we are back to the main issue, namely the necessity of relativity with respect to a context framework. We have gone full circle. At first it seemed that the statement "there is no absolute truth" is a self-contradictory statement, an absolute affirmation of the impossibility of absolute affirmations. And now we have somehow the opposite, namely,

[6] Such an approach has been called 'intuitionist' by mathematicians, in contrast to a 'reductionist' approach that limits the basic axioms and derivations to what can be proved without any reservation [38]—an approach that risks to end in nothing.

that to assert absolute certainty with certainty we need absolute certainty. What a bind! At this point it should be clear that the whole issue is contrived. However we do it, we have painted ourselves into a corner from which we cannot escape with clean shoes. But the solution of at least this problem lurks before us: we are limiting our options too much. To stay with the painting analogy, the only way you can escape from the corner in which you are caught is via a third dimension (through a hole in the ceiling or by waiting until the paint has dried, but the existential paint never dries!). Your working space is constrained by walls you cannot cross without breaking out of the constraints, but we had seemingly already reached the highest level possible (no 'deus ex machina' is available any more). As indicated earlier, the escape is provided by allowing the biological basis for our reasoning and consciousness to take over, with its fundamental limitations on the possibility of full knowledge. Philosophy is entitled to criticize biology, much as logic is entitled to criticize mathematics and physics, but cannot replace it. It provides a meta-level of consideration, which does not and cannot contain its subject.

The role of philosophy then, and in particular ethics, is not to establish impossible certainties, but to develop a higher level 'quality control' system on the trustworthiness of assertions, very much like an engineer who develops evaluators to assess the quality of his products. The level of 'certainty' of any given statement is then merely defined as the quality and, in particular, the reliability of the 'knowledge' conveyed (the term 'knowledge' itself to be interpreted as feasible, consistent or trustworthy rather than certain, its range of validity to be further described or inferred). There are of course many general statements one can make, presumably with varying levels of trustworthiness. A famous example is the statement 'everything moves' (panta rei) or 'everything evolves'. Very few such statements would be considered philosophical. Most belong to the realm of natural sciences or that of practical living. A statement like "matter is either living or dead" already smacks of biology, and "the I who observes can also observe itself" of psychology.

Consciousness and the 'I'

Descartes adage *"Je pense donc je suis"* sparks the question "what is this *Je*?". Consciousness is the ability I have, and, as I can presume people in general, to be aware of oneself, in particular, one's own thinking. Thinking is one thing (perhaps a computer can do that as well), being aware of one's own thinking seems of a totally different order. Let us approach the question in two tacts: first is the issue of the relationship between what I call 'me' to the world I am sensing and next how that 'me' itself (the subject) can become an object of the observation as well.

The consciousness “I am aware of” is my capability to observe, take in what I observe and make it part of an internal world of observations, which includes myself, the observing agent, as an object as well. The Aristotelians have termed this the ‘immanence’ of consciousness. It is a store of information that does not consist of exact copies of what has been observed (and certainly not of the presumed objects themselves), but of a number of distillates that characterize what consciousness considers to be observed objects, providing them with properties that make the observed world accessible for further processing and interactions. Some of the mechanisms involved are fairly well understood. My visual system, for example, starts out from an almost conformal copy of what has been seen, tainted of course by the light and color sensors in the eye. It stores a three dimensional image in my neural system of what I am seeing, but as the scene moves, this fairly stable image gets replaced almost instantaniously by another, and so on. During a stable phase, the memory store has taken what it considers essentials from the image, characteristics that it has learned to recognize and which provide information for a higher level of abstraction, from visual sensations to classes of objects. After implicit analysis of the scene, the I, my consciousness, moves to the next scene and restarts the recognition process.

In these few moments of observation, many things have passed through my brain, beginning with the short-term images I had stored. These are not taken in randomly. Only the very first impression close to the visual system may be considered spontaneous, although even then I have some influence on what I am actually seeing. Aristotelians insist on the absolute certainty of the existence of experienced ‘objects’. I would rather view this as the definition of what can be meant by their ‘existence’, the recognition of the build-up of related structures in my brain resulting from my observations. The object I see in front of me I call a ‘table’, not because it is ‘a table in itself’, but because I consider it to fulfill the various properties I attach to the class ‘table’. What it is in itself does not really exist as an external entity. You need a human observer to identify the conjunction of connected components as a table[7]. Suppose I would not dispose of the notion of ‘a table’, which could happen if I had belonged to a culture that does not know about tables and chairs, and suppose I encountered a table for the first time, I might not even consider it to be a single object, but a strange combination of pieces of wood with funny poles sticking out, to each of which I might attach ‘existence’ without giving a status of recognition to

[7]Other organisms have a similar ability to identify what seems of importance to them, like a cat a mouse.

the whole. Most likely I would not even have recognized the combination as a 'something'.

My brain has learned over the years to recognize structures that it also has learned to consider meaningful. The process of generating meaning (semantics) is a unique adaptive capability of brains, which we discussed before in the chapter on Intelligence, requiring age-long learning. And there is more. Our brain is not only able to connect components into what it considers coherent entities, what it calls 'objects'. It is also capable to connect events into what it sees as coherence in time, assigning an identity to them (I am not just seeing a table, but the same table as the one I saw yesterday). The identification of coherence in space and in time are closely connected, in addition. We recognize 'table' as a property that remains stable over time (it is the identity of the notion 'table') but we also assign identity to a specific table as a permanence over time. All these brain processes are not unique, a computer is capable of identity assignment to objects it is made aware of through sensing equipment. One might call the processes 'biological' or even 'physical', because they are due to the 'storage and retrieval abilities' of brains and computers, augmented with pattern recognition and learning abilities (which, for sure, are hard to program on a computer, but which have developed naturally in neural systems thanks to the evolutionary power of intelligence). And, for sure also, the attachment of meaningful structure to objects and events is emergent. Tables do not become tables all by themselves.

The fact that we can observe and analyze these processes happening in our thinking mind brings in consciousness. Each of us discovers this faculty at an early stage in life. The discovery of 'I' in young children is a fascinating experience to watch! I belief that 'I' now is the same person as 'I' ten minutes ago or even 'I' as the child shown on my parents photographs. But that is not an evident statement, as I know from biology that in that short period many of the molecules and cells that constitute my body have changed. To conclude from there that my body has changed but not my spirit or soul is a very bold assumption, but one can understand why people use it to make sense of the perceived continuity of the 'I'. The assumed continuity in time, based on the experience of one's brain processes, is the actual, and possibly only, content of self-identity[8]. Nature is very complex, and the assumption that I am the same person as my

[8] A full representation of the history of a person's development over time would consist of an immense amount of data which is, of course, not feasible even with the immense number of neurons each human possesses. It has to be replaced by a succinct and accessible notion of identity that consists of a brain produced distillate of connections. A discussion on the many ways this may be produced is not the topic of this chapter nor of this book.

CV says is a way of viewing (abstracting) the phenomenon of continuity that allows what I consider an 'I' to be born, to grow, to live and finally to die, thereby overlooking other processes that may be more general but less visible to the untrained eye. See, for some sobering thoughts on this, Dawkins' treatise on the Selfish Gene [12].

That we believe in personal continuity makes a lot of sense. It produces coherence in space and time and is consistent with our human view of experience (we do not like chaos, a component of the situation that we like to neglect). One would be hard pressed to find a competing system with the same qualitative properties, although such is not inconceivable (and has been proposed). *I am 'I' because of the singular continuity of experiences my brain is able to build continuously over time, from young age on. Nobody else has build the same or even a closely similar 'trace' of experience and behavior (to use a term of the computer scientists) than I, but I may expect any of my fellow humans to have developed a widely different but qualitatively similar 'I' due to the similarity of our overall biological aptitudes.* And there is more. *Nobody else will derive identical projections into the future from that trace.* Identity is firmly rooted into the biological ability of consciousness, but it is a faculty that may have difficulty developing in adverse circumstances, especially when people lack the freedom of personal development due to poverty, slavery, illness or other unfavorable conditions.

This also means that, from the start, the 'thinking I' is forced to consider the trustworthiness of its own thinking process, and hence to develop a theory about it as well, very much in the line of its making theories about any experience it has. It is as if it creeps into higher levels of its consciousness to observe the complexity of the process itself and derive some of *its* properties in turn. Eventually it may reach the level of 'quality control', which it calls 'ethics'. The assessment of 'trustworthiness' is its main characteristic, but other correlated notions like generality or consistency play important roles as well, as do relevance, completeness and minimality, which shows again that the choice of one characteristic orients the further discussion into a specific direction.

No doubt self-identity is a very practical and workable notion. It forms the basis of most of our human social life and its value lies precisely in that it provides a conceptual framework in which many experiences can be placed, information ordered, human interactions structured and ethics (quality control) developed, thereby necessarily neglecting potential other viewpoints. It achieves a number of valuable properties apart from those I already mentioned. Not only does it explain very adequately where and how knowledge is generated, stored and transmitted, it also provides the basis for societal order through the accumulation and preservation of experience and knowledge, and by attaching extreme importance to personal development and responsibility. However, we know that societies differ greatly in the ways they allow individual freedom and account for responsibility, ways that depend ultimately on the commonly accepted (often unconscious) view of what an ‘I’ is.

My brain has created my ’I’ through its ability to record the continuing personal evolution. Nonetheless, although personal continuity and its biological roots has a (very) high degree of plausibility, its value and the challenge is definitely in the ethical consequences, to be discussed in detail in later chapters. Even so, we should be careful not to over-emphasize the point. It is not because a view seems evident and valuable that it should be promoted to the status of uniquely valid, and its straightforwardness may need correction, as do all strongly held convictions—they do all suffer from the directivity of abstraction we already discussed. My view on the constitution and properties of my ‘I’ is a selective amalgam of biological, cultural and experiential elements. It also evolves over time, adding new elements and erasing older ones. At issue here is not whether what we believe is true or highly plausible, it is the imposition of a singular view that requires moderation.

To conclude this chapter on epistemology, let me draw attention to another quality aspect that is often overlooked, and that I would call ‘balance’, ‘equilibrium’ or ‘even-handedness’. Too strong an emphasis on certainty, even when mitigated to trustability, restricts the comprehension of a total scene to only what can be known with reasonable accuracy. E.g., we restrict science to what we can model accurately, thereby restricting ourselves to the very few modeling methods we master. Balance is related to scope and scope to the capacity to integrate, literally ‘to comprehend’ (take together). On the opposing side, a helicopter view misses out on details and what we end up knowing becomes more global but also less precise[9]. The immanent reality we construct in our minds with care and effort (including our ‘I’) is doomed never to be comprehensive or complete in any way. The relativity of knowledge is due to inherent biological limitations (our brains!) rather than to lack of trustworthiness, and the task of epistemology is to document and understand both the limitations and the value of the components of our knowledge. That is very different from and more important than the search for non-existing absolute certainty and has to be a driving force in our coming treatment of Ethics.

The next chapters are largely devoted to an exploration of the capacity of humans and human society to charter their lives, the topic we have

[9]This goes the opposite way of Shaw’s earlier remark: a generalist knows less and less of more and more and ends up knowing nothing of everything!

defined as Ethics (following Socrates). An important premiss in our considerations will be the ability humans (and their society) have to charter their future, at least to some extent. We defined the 'I' by the very personal traces of our past in our brains, now comes the time for the other constitutive component of our consciousness or self-identity, namely our inborn ability to project our identity into the future (as we discussed in the chapter on Semantics, the meaning of any notion has a past component for its genealogy, and a future component defining its effects.) This projective ability can only be possible if the planning persons are also capable of effectuating their intentions, i.e., if they dispose of the freedom to do so. Our exploration therefore starts with an analysis of the (presently hotly contested) issue of Freedom.

Martha Waijop, *Dust in the Wind*.

Chapter 11

Freedom

In this chapter we test the insights gained so far on the issue of the "existence of freedom". The issue has been hotly contested in recent times. Recent results in neurobiology show that most, if not all, human immediate decision making is done before any interference of 'conscious' thinking. Time might be just a concatenation of split seconds leaving no room for freedom anywhere. Even though one may accept immediate determinism (even in a probabilistic 'quantum environment'), there are very good arguments against long term determinism due to a number of factors that relate chaos to the functioning of the mind and, in particular, the ability of intelligence to conceive scenarios from random connections of information and the chaotic impulse to explore new and unexpected situations. Hence, short term determinism and long term freedom, although the latter then has to be qualified by necessary structure-generating constraints leading to emergent behavior. The chapter ends with the surprising assessment that the surfeit of freedom may actually be more of a problem than the lack of it!

> Je me croyais un honnête homme, me voici dans la peau d'un criminel!

We were hiking in the French Alps, near Lance-le-Bourg, towards a small hikers' pass at 2500m altitude, two colleagues, my youngest daughter Muriel and I. To our right, there was something like a glacier attached to the vertical rocks and leading to the pass. Both sides were formed of shale typical for the region made up of sharp foliated thin layers covered with dust. My friends and my daughter decided to climb the glacier, jutting their hiking boots into the snow, quickly gaining height. I went by the rocks, painfully, but I thought much more safely. Both parties reached the pass around noon and were awed by the almost 360 degree view it offers on the Parc National de la Vanoise. We enjoyed our sandwiches for lunch and, by two o'clock, under the shining sun, we decided to descend. We discussed whether to go by the glacier or the rocks. Finally, we made a decision for the glacier and I started going down first, followed by my daughter. After just a few meters, I heard my daughter scream, "Hold me, I am sliding down!" Looking up, I saw her sliding towards me. Below us was the approximately 30 meter deep, very steep glacier. I still had a good grip, but none of us had crampons on our boots, which of course we should have had. In my mind, I had a split second consultation. Should I let her pass and go down the glacier alone, limiting the number of casualties, or should I try to stop her, with almost certainty that I would go down with her. I took hold of her, and together we went down, trying to brake as much as possible with our boots. Some 20 meters lower I was able to throw her to the side, and went down another ten meters until I got enough grasp to stop (luckily, the glacier's steepness had lessened). I was then sitting there on the lower side of the glacier, at first wondering whether I had broken anything, or whether she had. After some five minutes recovering from the excess of adrenaline, we both realized we were basically okay. She was badly scraped on her exposed legs (I was luckily wearing long pants), but apart from cramps, scrapes and strained muscles, we had both survived the accident without major damage.

I had made the right decision, even though it was the most risky one, at least for myself. If I had acted purely on the basis of self-protection, I would have decided otherwise. Was I, at that split second moment, free to decide one way or the other? There are good arguments for two perspectives on this dilemma: first, the decision was forced on me by my immediate psychological state; and second, this state resulted from years of conditioning as a thinking person, a father and a product of my culture and ethics. Obviously, hardly any freedom is present in this set of conditions, if freedom is understood as the freedom to choose one way or another *at that very moment*. The conditioning that is already in place is so overwhelming that what one shall decide can be predicted with almost 100% certainty.

Yet, we do believe in our general ability to make free decisions, maybe not in the split seconds when the actual choice is made, but in creating the conditioning that prepares the final outcome. The proceedings go more or less as follows. Suppose we, as a family, want to go on vacation next summer and have not decided yet where to go. From talking to friends, reading newspapers, watching advertisements and so on, some areas have captured our interest. Our minds are in an "exploratory mood", garnering elements that may contribute to the decision-making. We may think about what we want our vacation to be, e.g., enjoying rest and nature, going for sports, exploring interesting places, or combinations of all these, and, as a result, some plans seem more promising than others. This phase of the process may be fairly neutral as far as the outcome is concerned, especially with people who are able to adopt a noncommittal, reflective attitude. Then we may start making our choices more concrete, considering prices, documentation and other practicalities, and we try to guess or predict what will be more or less compatible with the desires we have been grooming. When the time for the final decision comes, we are fully conditioned and we push the red button. All this illustrates that any decision is preceded by a long period of conditioning, which may or may not be ultimately effective as there are other processes that may interfere, such as self-preservation, anxiety, or just plain fickleness. It may seem that the process of conditioning is one we can control much more freely than what happens at the moment of decision.

But the problem whether there really is freedom in the process remains because time may be considered just a concatenation of split seconds and hence the whole process might be thought to be determined if only any small step from one instant to the next is determined. I shall show a bit further that this is an erroneous viewpoint and that one may not extrapolate to long term determinism just from what happens in the immediate. The question is often formulated as "the existence of free will". When put this way, one immediately gets an inkling that something fishy is afoot. The mere asking of an 'exist' question, and moreover one that asks for the existence of a general principle, would already be highly suspicious. As we discussed in the previous chapters, abstractions do not exist outside the mind. However, such 'technical' observations are hardly satisfying in view of the great importance society attaches to personal freedom. This is demonstrated by how many people end up in prison because they presumably have committed criminal deeds in perfect command of their mental abilities and hence were 'free' to make those choices, as is being concluded by the courts. On the opposing side, physics has no room for freedom. It is either deterministic or stochastic with fixed laws. The gap seems like the distance between the Dead Sea and Mount Everest.

In the second chapter of his book *Evolving Freedom* [17], Daniel Dennett makes a convincing argument that there is no contradiction between physical determinism (even accepting quantum indeterminism) and freedom as soon as the system is complex enough, as might be considered the case in the famous "life game", in which the stepwise evolution of a pattern on a large chess-like board is determined by the local surroundings of each elementary square. Depending on the starting pattern, the game may create new patterns automatically which e.g., look like living birds or other animated creatures and seem to have a life of their own, coming to life and eventually dying. The situation appears to be chaotic, small changes in the initial or subsequent patterns produce surprisingly different further evolutions. Although the system is automatic and evolves deterministically, it is capable of generating many types of 'life game beings', reminding an observer of biological reproduction. However, I find Dennett's argument that this type of behavior may be viewed as 'free' in the limit (when the board gets to be very big) still too low level (I mean by this: it does not take the multi-layered abstractive capabilities of the mind into account), although the conclusion is valid and can be convincing when supported by system theoretic arguments, which I want to develop now.

As a starting point, and for the sake of argument, let us accept determinism in all micro-step decision making. We shall see that this 'worst case' assumption will not greatly influence the result. Next let us observe that the human mind has the remarkable capability to imagine its future, given its present circumstances. It can formulate hypotheses and estimate their likelihood based on past experiences. This capability is not in contradiction with physical determinism, thanks to the ability of our human brains to (1) recognize structures of causality, (2) identify these structures as potentially applicable to future evolutions and (3) draw conclusions for actions from these evaluations. Robots can be programmed to have such abilities, and natural selection has produced it in advanced organisms as well. The human ability to imagine all sorts of unrelated issues that then appear to be strangely relevant is extraordinary—we call it 'intuition'. At this point of robotic technology it is unclear whether robots can be programed to have the same intuitive ability, because they operate following programmed rules. But with each new robot generation, designers employ greater sophistication using large arrays of randomly acquired data and learning processes. It is a continuous evolution that end up largely exceeding human abilities in certain directions.

In the early days of computer science, the famous English mathematician Alan Turing discovered that all computers could be modeled *in principle* by an exceedingly simple mechanism, now called a 'Turing machine'. This is nothing more than a reading/writing head which reads or writes characters on a tape that it can then move left or right under its head to proceed to the next step[1]. Turing showed that any computer program (written in a computer language) could be executed on such a machine, including a compiler, which is a program that translates another program into elementary computer tasks (i.e., a program that 'understands' other programs). This language-mathematical fact gave rise to the materialistic idea that any activity of the brain could, in principle, be similarly reduced to a Turing machine. For example, John Conway's famous 'game of life' already mentioned gives rise to all sorts of unexpected effects, in particular creation

[1]Look up 'Turing Machine' in *Wikipedia*!

of peculiar objects and their annihilation, and has been shown to be equivalent to a Turing machine. To be sure, such an equivalence only extends to the potential execution of specific tasks. It does not concern physical characteristics such as speed, efficiency, handiness, or person-machine interfacing, which, with all the equipment we normally use, is very different from a Turing machine.

A materialistic viewpoint then concludes that any brain activity and any intelligence is, again in principle, reducible to a Turing machine. Hence, the claim that intelligence is just pure mechanics. The argument is somewhat akin to physical reductionism, which claims that everything can, in principle, be derived from basic physical laws. As I argued before, neither physical laws nor Turing machines can predict what emergent behavior as it happens in nature will lead to. They only produce conditions under which emergence may appear, as do many other physical laws such as gravity. No doubt, the Turing machine itself is also capable of producing emergent behavior as is whatever system that obeys chaotic laws. That we humans have models in our heads capable of explaining certain admittedly important phenomena does not imply that all occurring phenomena are adequately explained by any of those models. Therefore, I do not want to spend more space refuting materialistic arguments, to concentrate rather on the issue of freedom, which is of more importance to our main endeavor, the foundations of ethics. Let us review therefore another attack on freedom and free will, namely from logic.

In a tightly reasoned and well written essay [60], Jan Verplaetse argues that free will does not exist and hence responsibility has no logical grounds either. These claims are backed up by recent (and some not-so-recent) experiments in neurophysiology from which claims are derived that our behavior is fully conditioned by our past, be it nature or nurture (causal determinism, already posited by Spinoza [57]). A short summary cannot substitute for a careful reading of Verplaetse's book, so I will not try to summarize his excellent work. However, to properly criticize his theses, I need to at least state his position, and the best way to do so is to quote the summary of his main arguments put in the form of a syllogism, which I translate literally here (the original is in Dutch, [60], p. 37)).

> Premiss 1: If causal determinism is true, then alternative options and source control are excluded.
>
> Premiss 2: Alternative options or source control are necessary for responsibility.
>
> Premiss 3: Alternatives for causal determinism are irrelevant or excluded.

Conclusion: Responsibility is excluded.

Verplaetse then goes on to motivate each of the premisses extensively to arrive at his main conclusion, the exclusion of responsibility by causal determinism based on neurophysiology. The translated title of the book is *Without Free Will* or, alternatively, free will does not exist. We are dealing here with precise claims about nature, not merely with some ideas. A strong indication of the non-existence of immediate action control is the well-established fact that humans (and mammals in general) always anticipate an action before they are conscious of it, i.e., before the cortex is able to make a thoughtful decision on it. I do not doubt these contentions, but I shall show how they do not imply long term determinism. Verplaetse gives a thorough discussion of the position of various philosophers on the issues of free will and responsibility, basing his taxonomy on the acceptance/rejection of various parts of the syllogism mentioned above. He finally arrives at the position of the "hard incompatibilists", those who accept the complete argument along with its conclusion. The book ends with a discussion of the consequences for human and societal behavior in view of this hard incompatibilism. In particular, he voices strong objections against (formal) blame and punishment, arguing that we obtain improved personal relations and social order when we discontinue these unconscionable activities. On these latter consequences I shall not argue against Verplaetse, but rather offer different arguments against blame and punishment in a later chapter.

However, I claim that Verplaetse is mistaken in his syllogistic reasoning. A question of "existence" is, in its absolute formulation (does "free will exist?"), senseless. Concepts do not 'exist' as objects or properties of nature, they only exist as concepts, i.e., structures or, if you prefer, entities in the brain, which human beings share to some extent, the exact structure of these objects being an interesting topic in brain research. Any conceptual entity needs a context or framework in which it acquires its meaning and the question of free will is no different. Hence, let me start with considerations on free will, before tackling Jan Verplaetse's main arguments.

Humans share common notions, but each of us also has an individual viewpoint. When we observe other people, it is immediately obvious that, from our point of view, they are able not only to move in different directions in space, but also to engage in activities in time that are unpredictable for the observer. Although each of us can often predict what a person we know very well will do next, we also know that the chance of overall predictive success is pretty low, especially over longer time periods, unless we update our assessment regularly.

In physics, one talks of 'degrees of freedom' to characterize all the independent parameters a given complex body has. For a single point-mass one settles on six (three to characterize the position and three the velocity—thanks to Newton). Roughly speaking, this is what the point-mass 'remembers' from its past: its actual position in space and its actual velocity, what we call its *state*. Most physical models will start out with defining such an initial state and assign numerical values to it. Two point-masses have twelve degrees of freedom, n point masses 6^n (the number easily gets out of hand). This might suffice if the universe would just consist of elementary point-masses that are free to move relative to each other, constrained only by the so-called gravity forces between them, which do not impose rigid ties between the quantities (like what happens in a so-called rigid body). This might suffice if the universe would consists of just point-masses, but the physical world-model soon has to introduce a whole menagerie of peculiar elementary particles such as electrons, protons, neutrons, quarks and several others, which exhibit additional degrees of freedom beyond their positions and velocities, like charge, spin and what the physicists have called *flavor* and *color*[2]. From an observer's view of a system, it can produce movement of each particle in each of the dimensions of freedom it has depending on circumstances. However, these degrees of freedom do not translate to freedom of movement of the system under consideration, because the particles interact with each other and the laws of interaction determine the direction of future evolution once the state of the system is fully characterized. For example, in classical (Newtonian) mechanics the evolution of a closed system is determined by its initial state—but we know that chaos reigns even though the laws of motion can be considered deterministic.

Much has been made of this determinism (as well as the reversibility of time), but, as soon as there are more than two interacting particles, we know that the situation becomes chaotic, as I previously described, chaos as the property of a system where small deviations in initial conditions have a massive influence on its evolution. Although this erratic effect of chaos is spectacular to observe, it is not even its most important aspect. More important is what one could consider the other side of the coin, namely, that initial conditions hardly matter. Systems are never really closed, hence unpredictable disturbances or 'fluctuations' happen all the time, small presumably, but enough to turn the system in another direction, the unpre-

[2]The recent theory of Quantum Gravity [55] claims that space and time, or in fact space-time, do not 'exist'. They are composed of probabilistic patchworks of geometric elements. The issue is not really relevant for our discussion which holds just as well in a continuous as in a discrete world. In this model, space-time seems to be supplied in discrete, geometrically fitting parts as the dynamics of the model progresses, much like electrons or other elementary particles. The issue also puts the notion of existence on the line in a not subtle way. Nothing 'exists' except as components of a model.

dictability being the essence of chaos[3].

It follows that chaotic evolutions have qualitative properties that are hardly dependent on the initial conditions, in particular when a large collection of interacting bodies are involved. Hence, the degrees of freedom are really there. Determinism by initial conditions does not eliminate them. If that is indeed the case (as I believe it is), then a further conclusion would be that all physical dimensions of freedom are indeed available to a system. But then, the system can still not be considered free to use them, since the usage would be determined by accidental and random external influences. I want to show that this further inference is not correct in the case of organisms with brains and neurons, while it is, undoubtedly, correct for a simple moving stone ("Spinoza's stone") or a three body system under gravity.

The abstractive distance from the physical notion of "degrees of freedom" to free will may seem very big, but, before diving into further neurological and psychological aspects, let me make an additional observation that has to do with the relativity of the framework or context. Suppose two persons are interacting, let me call them PA and PB. What PA observes as freedom for PB may not be considered freedom by PB (or perhaps by another, more global, observer of the interaction). Even when a closed system is being observed (if that were at all possible[4]!), the degrees of freedom appear real, although the actual movement is, at least immediately, determined by the conditions existing just prior to the observation. The point I want to make is that even in this very elementary case, freedom is

[3]A related issue is: what is 'chance'? We have defined chaos pretty precisely. However, chance is much harder to fathom, and heated discussions by specialists in probability, if not philosophers and other scientists, have been raging ever since Pascal introduced the notion. I do not want to take sides in these discussions, but let me mention the Bayesian point of view (now universally adopted in telecommunication systems), which posits that probability theory can be applied to situations in which there is no knowledge of detailed behavior, only of global statistics. The detailed behavior may be deterministic, but is unknown, therefore it can be considered random with a certain probability. For example, the percentage of drug addicts in a certain society may be known or guessed without counting the actual numbers—whether any member of the population is an addict or not is deterministic but unknown. The relation between such percentages and law enforcement, or some other remedial measures, can then be studied purely based on such numbers, for example how much clinics there should be or how much law enforcement, depending in turn on the reigning philosophy of dealing with addiction. Chance and chaos interact. Chaos allows chance events to push the system in totally different directions, but whether such a 'chance' is a pure random event or just lack of precision and/or predictability is immaterial.

[4]In quantum mechanics, just observing a system already disturbs it, but one can always "conceptually" observe, i.e., use the parameters of the model to compute the evolution. Incidentally, this shows how, even in physics, natural laws are conceptual rather than "real".

a relative notion. The same happenings look like freedom from one point of view (PA's) while being devoid of freedom from the other (PB's). It is tempting then to say that PA is mistaken in the view that "PB is free to go in any available direction", while PB is correct in stating, "there is no such freedom". Yet it is true that however the system evolves within the perception of PA, it will cause PA to change his behavior (again, this change may be psychologically deterministic in the PA context, but will look free from the context of PB). A statement like "there is no freedom" is the result of faulty reasoning. The fact that in the whole set up there is a deterministic component does not make the system deterministic as a whole. *We are, de facto, never able to deal with a complete system, and then, even if we could, it would probably be highly chaotic, since all physical and biological systems known so far are.*

The previous paragraph invites further discussion. Its last statements may seem to overly state the case of 'non-existence of determinism', thereby contradicting a basic tenet of systemic relativism, which might hold that such general claims cannot be made meaningfully. Chaos in an evolving system is by definition deterministic. Once the (closed) system is known and its initial conditions are known as well, the future evolution is fully determined, and hence, there is no freedom there. The arguments we made so far for the availability of freedom hinge on the lack of full knowledge of the total system and its initial conditions. One could state that once those are known, everything is fixed for ever. The acceptance of freedom is therefore claimed to be a mere side-effect of our lack of knowledge and not an intrinsic property of nature. However, this way of reasoning is a fallacy for several reasons. First, full mathematical knowledge of the total system is not possible (there are too many variables and effects to take into account in any real life system). Second, chaos as a deterministic process is a property of the mathematical equations governing the process's evolution, and the 'existence' of such equations as fully describing the system is a mere modeling assumption, perhaps true for a limited ideal universe but only approximatively true for a 'real' one, at least in the agreed-on experimental setup (and hence potentially not true in a broader context). Only knowledge of partial systems exists in our modeling world (systems for which there exist complete mathematical descriptions). In addition, infinite precision of initial conditions is a mathematical fiction, much as the 'existence' of all mathematical objects (a point, a line, or a plane). It follows that the presumed determinism of the 'overall system' is no more than an unprovable assumption, a belief as well, but a belief that is massively contradicted by any experimentally corroborated theory of nature.

The next arguments, often used in a philosophical or psychological context, concern the statement that whatever physical freedom exists, determined or undetermined, it is not relevant to the psychological situation. I certainly buy the essence of this statement, as I do not believe that physical arguments can be used on psychological issues (except for very primitive questions like whether anything is physically possible at all—I do not believe in ESP for example). In my view, the physical questions just considered are only exemplary of the kind of reasoning one has to get into just because the physical situation is so much simpler than the psychological, and it already shows major difficulties. There is a tendency to simplify psychology beyond anything that would even be worthy of consideration in physics. This may be alright as long as one is aware of the massive simplification, i.e., of the operational framework. A lot of simplified psychology goes into marketing e.g., but hardly anybody would consider it of relevance to solve a complex issue like the 'free will', because marketing psychology deals more with mass behavior than personal decision making, although, on the average, it does influence personal decision making.

We saw already in previous chapters that our immediate actions are highly conditioned by the state of our brain, if not already by our sympathetic system. One could state that whatever behavior I initiate at the next instant of time (say time $t + h$ with small time-increment h) is determined by the state of my brain at instant t plus the immediate inputs— Neurophysiologists will tell you that this is indeed the case. And, as with physical systems (where this also more or less applies), the temptation is to state that if behavior at $t + h$ follows from my state t, it must also be true that state at $t + 2h$ follows from the state at $t + h$ and so on. Hence, my state at $t + Nh$ for any positive integer N follows from the state at t. The argument should be made a little more precise. We are not dealing here with a closed system (as we assumed for the physical system we considered previously), but with an open system in which influences from outside come in permanently. So here is how it goes now. The state of a brain at $t + h$ is determined by the state at time t and the outside influences between t and $t + h$, hence is determined. Same for $t + 2h$ from $t + h$ and hence from t etc... The conclusion is then that the state of the brain is fully determined by nature plus outside influences. Hence, my behavior will also be fully determined by all this at any point in time.

The argument seems irrefutable, but it is mistaken. The human brain has a capacity that goes beyond "being determined by the initial state and intermediate outside inputs". It is the ability to make estimates combined with the plasticity of the Central Nervous System. To a certain extent, *we can tune our conditioning*. That is, we can anticipate possible consequences of potential behavior. While this capacity is limited (most of us cannot make their heart stop beating), we can imagine scenarios and gradually influence how the brain reacts to circumstances that somehow fit the imagined conditions. This is the basis of all learned behavior. (Here it is considered as a property of the human neural system, but there are good arguments that it happens in any cell, be it at a highly limited scale.)

Let me give a simple example. Say that you would like to learn sailing because there is a lake in your neighborhood and it seems fun to you to have a little boat and spend time on it, enjoying wind, water and scenery. You start imagining what it would take to achieve that goal, you talk to friends, you consult the internet, you look at potential boats and so on. After a while, you make up your mind for a given course of action, combining wishes, information, tastes, and influences. Suppose you then take sailing lessons. Sailing is not a natural capacity and you will have to adapt your behavior to the required techniques. This typically involves understanding, at least phenomenologically, how the wind affects the sails, what the properties of the boat are, and very soon you also understand that you have to adapt your intuitive reactions as well. For example, when your boat is on the verge of capsizing, what you have to do is let loose the main sail rather than pulling it harder, an unnatural move at first. We are used to tensing up when things turn bad, so a de-conditioning is called for. Because you have been working hard at teaching yourself to be a sailor and imagining what you should be doing, you will succeed in the re-conditioning, and, after a while, the correct movements will become natural.

A hard nosed determinist will claim that all these movements have been conditioned all along, starting from your wish to sail, your talking to friends, the keys you touched on your computer to consult the internet, the strategy you developed, the sailing schools you considered, and the boat shops you visited. At every time t, you had an actual conditioning, took in inputs, and decided deterministically on the next move. But this is a very myopic view. It is like saying that you can get from Brussels to New York by taking a compass and making the next step depending on its reading. The whole process of re-conditioning or putting in place any type of conditioning *is based on evaluations at a different level than the one at which the actual action-decision is being made, and on which the local immediate determinism has no grip.* And although the consultation of that level may still be deterministic at the time the conditioning is put in place, its overall outcome is undetermined. The only determinism is that you will abide by whatever decision meets the quality criteria your previous conditioning has put in place. The outcome of the evaluation process is independent of that conditioning. It may be deterministic at some other level of consideration, but for the actual agent, it is free (the agent can go one way or the other, he has only delegated control to the result of her/his evaluation). It follows that the myopic point of view has effectively been put to bed. What I would call a "myopic mistake" is actually of an epistemological nature. The development of the present conditioning (and, as I said, I do accept that any actual action is fully or at least very heavily conditioned) is the result of a process with a continuum of imaginings, influences, and micro decisions at what one could call a higher level of abstraction. Modeling the process of our decision making as a limited sequence of deterministic decisions is very far from any observation of human behavior.

So the question of the correct model is still very much open. But is there such a thing as the 'correct' model? Models are what they are, they fit reality and/or accuracy to some extent—or even not at all. We already know there cannot be a comprehensive model of reality, for strictly logical reasons, logic providing the most elementary form of epistemology (I'll come back to this question, since the hyper-determinists like Verplaetse claim proof from logic). In most of science what is asked of a model is a form of predictability, at least in a well defined context. The 'model' under investigation here is the "system theoretic determinism of action and behavior". It may very well be true that if we know the state of all the neurons of our brain at time t and the inputs we get from t to $t + h$ we are able to predict our actions in that period. How can this be reconciled with the unpredictability of our conditioning at time t? First of all, at a microscopic scale, because the movement from t to $t + h$ is a fiction. It is adequate for certain types of actions, namely those that produce immediate stimuli, but not for other types, in particular reflective actions, that involve many iterations and spurious influences. For these types of 'actions' there is massive randomness in space and in time that is not caught by discrete decision making. To put it differently, if the precise conditioning of the action-oriented parts of our brains were known at every moment in that period, we could predict what we would be doing a year from now. However, this precise conditioning is unpredictable. The conditioning system takes place at a different "level of abstraction" in the brain than in our immediate motor system. The "no free will" model is inadequate for long term prediction of human behavior[5].

[5] There is even a more elementary, mathematical or physical reason to question the determinism in single subsequent steps. These are dependent on the actual structural system parameters at each step, which vary as the system evolves from step to step, dependent on other accidental quantities (parameters and states) in the system, in particular conditioning parameters, accidental modifications from interferences from other parts of the system or external influences. Only linear, time invariant systems can be assumed structurally free from such influencing factors, which are accounted for by non-linear or time-variant parameters in the equations that model the system. Chaos, higher level influences and random events combine to make any evolution at least partially unpredictable and dependent on factors that lie outside the control of the actual system

'Free will' does not exist in absolute terms, it is no more than a conceptual model and hence based on a number of assumptions that only have validity within a realm of situations for which the modeling assumptions reasonably apply. As humans, we use many such conceptual models, conscious or not. It helps to make these models explicit and to evaluate their effectiveness. As with all such models, none will be ultimate, some will be better than others, some may overlap partially and what is 'better' will therefore not even be determinable (depending on a evaluation model). Every culture applies a notion of free will, so it helps to first clarify its usage before attempting to sketch a realistic formal framework for it.

Before doing so, I wish to bring in the closely related notion of 'responsibility'. Responsibility plays an important role in societal commerce. When I accept a job or a task from another person or organism, there is a division of responsibility. I promise the task execution and the other party promises a reward for it. The parties have formalized their connection in terms of clearly defined and mutually agreed on obligations. From the point of view of each party, the other has the 'freedom' to execute the task, it would not be meaningful to make the contract if that were not the case (as in the case of slavery). This freedom is real in the sense that, as far as each party is concerned, the task can either be executed or not and the contract ensures as much as possible that it will be. It may be that the parties themselves have no psychological or other means to avoid the execution. In the same vein, there might be no freedom involved at all when viewed from an all-knowing and independent observer. From that perspective, the behavior of all involved parties may be totally predictable, given how they have been conditioned, their history and their societal role. But it is also not hard to imagine situations in which one or the other party will fail, either willfully or due to circumstances. (Needless to say: an all-knowing observer does not exist, I would even claim that it *cannot* exist.)

When I sign a contract with a university to become a professor, the university (and society at large) assumes that I sign the contract out of my free will. It will also hold me responsible to execute my role. Whether, at the time of the contract, I was psychologically capable of withholding my signature is totally irrelevant to the transaction. Probably I had no other alternative readily available *at that very moment*. 'Free will' then means that both parties accept a deal for which there are many other possible but perhaps not actual alternatives (I could go to another university and my university could have nominated somebody else). So, from the point of view of the limited knowledge both parties have, there is free will, there are alternatives and there is control, respectively. That may not be the case

dynamics.

for an all-knowing, universal predictor, but such an entity cannot exist, not even within basic laws of nature. And 'non-existence' is not a kind of existence either (as it would be in elementary logic or in physics).

That the situation of relativity just described is very real is exemplified by what has happened to people under authoritarian regimes where societal contracts functioned differently based on a different evaluation of available freedom by the subjects. When the regime disappeared, people were held responsible for 'collaborating', but they had no other viable alternative except working within the system. Even under such constraining regimes, there were numerous possibilities (degrees of freedom!) open to them, but different from those in the new context. Both free will and responsibility are hence dependent on the implicitly accepted framework. Contracts are made, but also breached. The contextual framework then may define what will happen (or it may leave the consequences to chance, which mostly results in catastrophe.). This, again, may be an explicit or implicit process.

In the most transparent cases the consequences are very well defined. In the society I know, when I borrow money, I have to pay interest. If I do not repay the loan in time, there is a default on the contract. This is considered a breach of promise and becomes subject to further coercion. In any well-functioning society, contract breaches are foreseen, and reasonable sanctions are imposed—these are part of societal ethics, for example in Napoleonic law there is a principle of 'legitimate contracts' wherein mutual obligations have to be balanced, even in case of defaults. Contracts that do not satisfy this requirement are called 'leonian', where one of the parties assigns to itself disproportionate rights, like the lion in the tale of de la Fontaine, exploiting the weakness or lack of freedom of the other party. The underlying motivation is 'free will'. Society assumes that when I accepted the contract, I had the freedom to (1) choose it and (2) execute it. By signing the contract, I promise to fulfill its stipulations and if I do not (maybe even for very good incidental reasons), I accept the liability as well. In other words, from the point of view of society I have freedom. The same holds conversely for the other signing party, even when it is just an institution or public authoritiy and I should be able to obtain fair compensation if they breach the contract. In a slightly broader context there may not be any such freedom, for example, because something happened that was beyond anyone's control. Such emergency control may be foreseen (modern societies have quite a few safety valves), but there are limits to all such 'parachutes', the most obvious reason being lack of foreseeable knowledge of potential derailments. One learns by experiment. "Material fatigue", say in airplane wings, was only discovered after disastrous accidents and nobody can ever guarantee absolutely safe functioning of any system.

In a broader context, do I then have responsibility for the "choices" I make in my life? Or, to put it differently, can the clear definition of responsibility in contractual agreements be extended to my whole life situation? Put this way, there does not seem to be a contract at work. However, often there is an implicit one, or, actually, many. The system of obligations and rewards is from the start very real, but also very implicit. The game plays out at first between parents and children, then students and teachers, and later just between arbitrary citizens at large—we are all acting within the context of an implicit 'societal contract' that regulates our public behavior. The massive availability of (degrees of) freedom in almost any circumstance is what makes the game meaningful. Let us explore further.

In a rigid and deterministic system there is no game, since all moves are predetermined. Think about two computers playing chess with each other. If they use the same program, the course of action can be fully determined on both sides, each side knowing what the other would do next and taking it into account (or not depending on the cleverness of the actual program). If their mutual algorithms are unknown to each other, then the evolution of the game suddenly becomes interesting, at least from the separate viewpoints of each computer-player. The game can only be deterministic for a super computer-player who knows both programs and even then, random effects that cannot be reproduced might have been included in the programs. In real life, the supply of freedom is much larger than in a chess game, and in such a massively chaotic system as our natural system is, determinism just melts away.

The fact that most transactions between humans are based on implicit, virtual contracts creates a lot of room not only for possibilities, but also for misunderstandings. Fortunately, humans are such that things go well in most cases because we are able, from a very young age, to communicate not only mutual expectations but also mutual understanding and acceptance (another case of feedback). The topic of communication is of great interest in itself, but the question under discussion here is 'free will'. From the perspective of parents, a child does possess the freedom of putting his/her room in order or not, and, depending on the actual implicit understanding between child and parent, that may or may not happen with varying consequences. The child may or may not experience this as freedom, but in the course of growing up, the child may decide, after deliberation and consideration of consequences, to go one way or the other. The child will adopt a course of action that may look deterministic ultimately, but only after consideration of many possible options. Every child and parent are different, there is no superhuman who can know or predict how and when things will go one way or the other, or even unexpectedly in an unforeseen direction. In all these goings on, the occurrence of freedom and the assumption of mutual 'free will' is very real, but it exists only as an ingredient *in* *the relationship* and not as a specific property of an action.

To summarize and simplify to the most salient features, here are the main ingredients.

- First, there is the immense array of possibilities offered by the complexity of chaos, the sheer unpredictability of evolution allowing all sorts of tiny influences to move the course in any direction, allowing for maximal exploitation of the available degrees of freedom, while the chaotic situation prevents a single unified mechanism of system dynamics (e.g., chaos at a lower level with order at a higher).

- 'Free will' is a constituent ingredient of social commerce. It is how one party views the abilities of another[6]. It allows the distribution of responsibilities towards achieving a common goal between independent parties.

- Although the actions of a person are constrained by immediate conditioning, humans have a pervasive capacity for anticipation, which allows them to put in place (at a higher level of abstraction) the adaptive mechanisms that will influence the course of events and cement anticipatory reactions.

- The latter goes as far as modifying the conditioning, due to the plasticity (and of course higher level capabilities) of the human brain.

- Immediate actions of an agent are most likely deterministic due to the necessity of conditioning, but the local determinism may not be extrapolated to larger time segments as it just melts away in the system's higher level dynamics.

- Finally, in view of the incidence of large scale chaos in all manifestations of life, the assumption of global system determinism amounts to the 'existence' of an all-knowing and all controlling agent, which definitely does not make sense[7].

What then with Verplaetse's syllogism? As in the basic first and second order systems of logic, the syllogism lacks the dimension of time (logicians have developed an extension of logic for that purpose, in which they introduce some very rudimentary notions of time, albeit sketchily and with difficulty). I then have to take issue with both premisses 1 and 2, because

[6]Or even how a single party views itself, whereby that party acts in two roles, observer and observed, at the same token.

[7]When one accepts the incidence of chaos and emergent behavior. The alternative is the belief in an all-knowing and all-powerful entity which steers any and every occurrence that happens in this universe.

they treat properties that are assumed to be universal and valid over all time ('causal determinism', 'source control' or 'alternative options') as if these properties are either there or not and cannot grow out of nothing and gradually arise within the evolution of a given system. Nature does not evolve through syllogisms. A syllogism is nothing more than a link in formal reasoning on presumed universal properties (namely the axioms that govern the conceptual system under consideration). It is bound to the logical system in which it is operational. Whether the system has anything to do with nature or real life is beyond its control. This is a modeling issue for an environment in which dynamics (evolution) play a major role. Even some common and elementary dynamic systems may have finite escape times (after a short time the system does not exist any more). Nice try from Verplaetse, but a highly unnatural result! However, there is one aspect to Verplaetse's reasoning that has to be taken very seriously, and where his reasoning does apply, and that is the determinism in the immediate, action-oriented system. Because of this, many of his conclusions on guilt, punishment, and so on, remain valid with qualifications.

How freedom is structured in the brain requires a much closer look at how the brain functions. Our actions at any given instant are highly conditioned by our past experiences and the processing the brain has given them. This is part of what we call 'knowledge'. In the course of our education and life experiences, we build all sorts of prototype models for what we call 'reality', actually how we view the evolution of things in various typical situations. When a new situation arises, we match the information we are experiencing with the large collection of models we have in store, and then the matching produces sequences of impulses driving us to act in ways that have already been anticipated. This process can be very primitive, as with the inborn danger avoiding reflexes, or very elaborate, as when people take immense risks out of conviction. This process of conditioning seems intrinsic to how the brain functions and forms the basis of our behavior. We possess "super-ego's" in many layers. We can also observe strong contentions between these levels when a higher level tries to dictate a behavior that a lower level has great problems accepting. The result can then go one way or the other, depending on the strength of the imposed conviction and the pressure of the situation.

'Pleasure' plays a great role in this conditioning, but to develop a sensible argument, I have to extend that notion beyond common usage. The contention between various systems of neurons active in the brain is mediated by the transmission of messenger chemicals that enhance or inhibit the transmission of impulses in synapse-axon connections. Although this is a very complex process, some chemicals, known as neurotransmitters, emerge as main players. Much of what we choose to do results from the hidden effect of enhanced or suppressed concentrations of neurotransmitters in the brain. This then manifests itself in what we would generally call pleasure, reward, excitement, anger, sadness or other psychological states. Neurotransmitters are produced by specialized neurons and then create a global conditioning when their generating neurons are activated by circumstances. Our brains have inbuilt processes that are strong producers of conditioning neurotransmitters, appetite for eating or having sex in particular. But at higher levels our brains are capable of creating new self-sustaining systems in the course of our education and life experience. These processes produce big differences between people and determine what motivates them. Extreme efforts in sports, arts or science produce a great sense of achievement in some people while being considered extremely unpleasant or even painful by others. This is the pleasure and reward system at a long term level, called 'super ego' by Sigmund Freud, and, from the point of view of the neural mechanisms involved, it is the same kind of process that produces pleasure from eating or sex, except that it functions at a different level in the abstraction hierarchy of a brain. Asceticism is a higher level of seeking pleasure, but it is seeking pleasure nonetheless. Pleasure seeking is the basic mechanism of long term conditioning of the brain and the behavior of individual humans, so one should not have a negative opinion about it (as most stoics and moralists would) and, instead, appreciate the many productive effects of this wonderful mechanism!

A central factor that we have to take into account is the plasticity of the brain, whose structures are conditioned (modified) by the processes just mentioned, but are also conditioning their influence. It is a perpetually active dynamic process, more dynamic in youth and slowing down in old age. Situations we get into may greatly influence or even impart its functioning. It is known that prisons breed crime, and war brings people from their higher selves into their lower selves as Lao Tzu so beautifully expresses it [8], so that the excellent systems established by Sigmund Freud's moralizing super ego in a person are totally destroyed in favor of primitively rewarding, but horribly ugly, impulses. Sometimes, the lack of higher level controls appears to enhance pleasure seeking in the most abject ways, like pleasure in torture. The observation of humans shows that we can set up pleasure systems on almost any type of behavior, including the destruction of our fellow beings on a mass scale—*homo homini lupus*. The same neural processes that produce the highest works of art can also produce the worst crimes towards humanity, all conditioned by the plasticity of the brain.

The issue we have to consider at this point of the discussion is whether the conditioning of higher level brain structures obey the same rules of determinism as what happens in immediate actions. Is everything deterministic after all, all super layers included? I claim that nature has found ways out of such a bind. It injects randomness, thereby creating arrays of new possibilities, which are offered for evaluation by the brain's anticipatory faculty and whose results can be installed through conditioning. This may be done in principle by a variety of processes. While we already observe re-conditioning directly in the propagation of genetic material through natural selection, a much more involved and subtle process happens in the brain. At first it appears to be just pseudo-freedom, in that there is no direct conscious effort involved. It just happens. And then the various abstraction processes start playing with the imagined possibilities, enhancing some and discarding others, forming new conglomerates of coherence. The brain's capacity for projection into the future is due to extra layers of abstraction humans have as compared to other mammals. We are capable of imagining the consequences of the assumptions and the actions we might decide on and attach various types of value to them. I mentioned 'pleasure' as the most instantaneous evaluator, but we are also capable of projection outside ourselves and of figuring out the longer term consequences for other people, society, even the whole world. The fact that we can dispassionately set up large arrays of possibilities and then see opportunities in various eligible directions is what makes freedom a reality.

Are we then responsible for how we have structured our brain? Given the fragile structure of our decision making process, this is a very touchy question. But here also, relativism comes to the rescue. Responsibility is a notion defined within a societal system. It does not 'exist' as an absolute. The same deeds may be responsible in one system and irresponsible in another, just as the same proposition can be true in one logical system and untrue in another. There are many examples of this so allow me to give two for clarity. In a system where there are no schools, parents would be held responsible for the education of their children at home. However, in our society, they are responsible for forcing them to go to school at a very young age. It is conceivable that with the evolution of the internet, schools may become obsolete, and we might revert to the previous system or else, force our kids to spend at least six hours a day on the internet (which most of them are already doing anyway). Here is another example. In a patriarchal society, men have to take financial charge of their wife/wives. In an equal rights society, responsibilities are distributed between the sexes, but even then, there could be great differences depending on the accidental social environment to which people belong. Moreover, these societal systems keep on evolving, creating ever new flavors of responsibility. Societal evolution is very much like the evolution of aesthetics, there are no absolutes and also the dynamics plays a major role.

Responsibility is the necessary corollary of freedom. When, in a given society, we hold somebody responsible for some deed, that implies we hold the view that the person has the freedom to choose differently. The inevitable result is that a given societal (or equivalently ethical) system has to define responsibility as it relates to its concept of freedom. Conversely, from the point of view of the individual, their choosing responsible behavior might actually reduce to choosing societal conformity. This may be necessary for the protection of society (the deeds they are contemplating, even when acceptable as such, may be considered destructive in the given societal context), but behavior imposed by society may equally well turn out to be needlessly restrictive or intended to serve other purposes than the preservation of society. An imposed societal system may clash with new, attractive possibilities that present themselves to an individual and interfere with their sense of responsibility. It forces them into a conformal societal model if they do not want to suffer unpleasant consequences. So, in most cases, they will 'choose' to conform, often just out of self-protection, or perhaps because of inability to gauge the future and oversee the consequences. If they do not do so, society will consider them to have made the wrong decision 'freely'. To be sure, the intent of the person may be criminal (the person estimating that the profits of an action qualified as criminal by society far outweigh potential unpleasantness) or, conversely, society may act in a criminal way as judged by the individual or by a competing societal system.

Given the fragility of the classical notion of freedom as we understand it in a societal system, one can wonder whether it is a useful notion after all. Respect for individual freedom has more to do with respect of humans respecting each other's possibilities than with freedom to do what one wants. It is one of the central questions of ethics. As Jonathan Franzen so beautifully describes in his book *Freedom* [24], the paradox is that there is no greater slavery than the absolute freedom of refusing any constraint and any responsibility towards others. In many cases, the freedom of one is the constraint of another. My state's rules and regulations limit my freedom. Conversely, the unlimited freedom of a dictator limits the potentiality of his society. The freedom some societies award themselves to handle their environment indiscriminately restricts the fresh air and fresh resources for others on our planet. The notion and definition of freedom in society is a central component of its ethics.

In conclusion, here are the main ingredients so far:

- The instantaneous actions a person engages in are generally determined by the person's state of mind, which is a result of their history. There is no instantaneous freedom.

- Looking backward into the past starting from a given action, anticipatory elements gradually play a role in the person's mind. While some actions may be totally instinctive, most are the result of imagined potential trains of events that have built up in a person's brain. These models are not uniquely determined. In the events leading to a certain action, the person evaluates their applicability based on actual observations and ends up acting in accordance with the internally emerging model's directives.

- The process just described is not one-layered. Several abstraction layers are involved that condition the outcomes of the modeled choice process and the evaluation of its state.

- Humans have the unique capability to imagine scenarios and anticipate on their outcomes. The decision making criteria connected to them are to a good measure arbitrary and can be revisited over a life time, based on experience, social influences, and reflection. This "model design process" is the theater for the contention between freedom and responsibility.

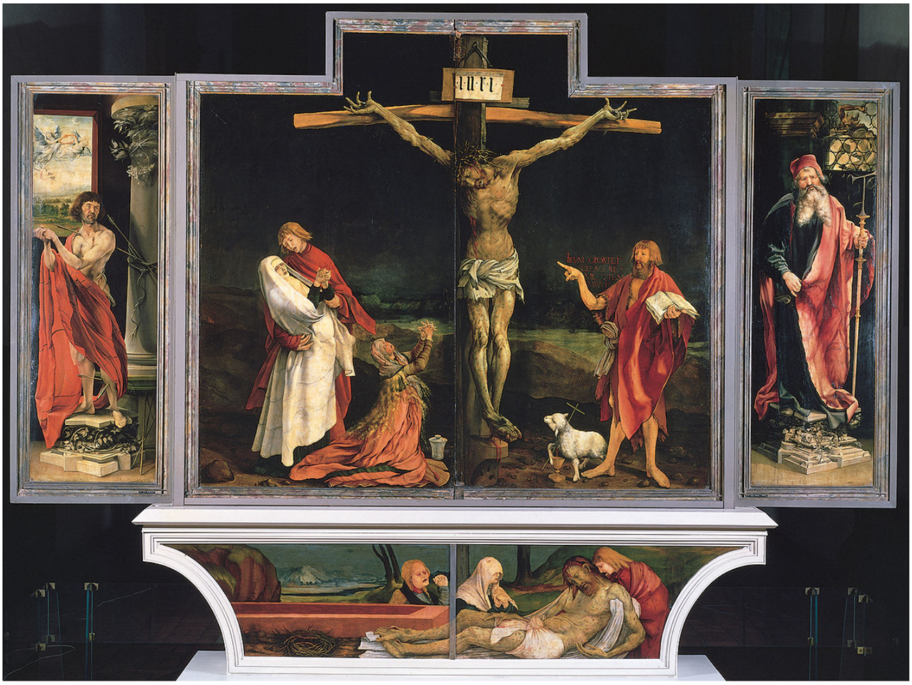
- There is no contradiction between immediate conditioning and the long(er) term freedom to choose directions. Determinism at one level of modeling does not prevent new types of behavior from arising at higher levels of abstraction that are not determined by the basic system, thanks to the ubiquitous phenomenon of emerging behavior.

- The neurally induced feeling of pleasure via a variety of neurotransmitters is the main agent of conditioning in the brain. Their actions are partly inborn and partly nurtured, in which case they are the result of long term conditioning through learning. They may lead to the most elevated and most abject types of human behavior and are understandably difficult to recondition once firmly set in place, although it still remains possible to recondition the conditioning to some extent.

- Responsibility is learned behavior based on the reactions a person (or any other type of agent such as a society) has constructed as responses to (modeled) circumstances and the evaluation of anticipated effects.

All things considered, a surfeit of freedom seems to be more of a problem than a lack of it. There is an interesting paradox in the observation that too much freedom is constraining because the agent concerned does not know what choice to make, and hence goes off in more or less random directions, determined by accidental states of mind. The lack of clarity, and hence insight, on consequences leads to behavior that turns out to be destructive. Even worse, poorly limited use of freedom of action available to a person will allow them to follow the path of least resistance, that is, the path that produces a maximum of momentary pleasure, whatever that may lead to.

Let us be realistic. The problem is not the availability of freedom, it is how freedom has to be managed, at the personal and the societal level (and many levels in between). But then, managed according to what criteria? Freedom is closely related to power. An agent with a lot of power has at the same token a lot of freedom to exercise it—no power, no freedom. I am not talking of raw power, but of effective power, the ability to get something done. Agents with little power will typically be very circumspect with the use of the little freedom they have available. The discussion leads us immediately towards ethics and how to deal with freedom and power in what has to be understood to be a 'good' way.



Matthias Grünewald, Isenheimer altar

Chapter 12

Personal ethics

Having dealt with the basic tenets of, and issues with, systemic relativism, this chapter returns to the Socratic question of "what is leading a good life?"—the central question of ethics. The theory developed so far puts ethics in a new light as a 'layer of intelligence' that allows for guided evolution towards new possibilities or consolidation of previous ones in the personal and the societal sphere. The consequences of this view are enormous. They make ethics a central component in human evolution, geared as it is by emerging possibilities due to chaos and the resulting intelligent drive for creativity. That these processes are fraught with difficulties should be obvious to any observer of the world scene and the profound impact all sorts of developments (the internet, communication, social networks, arms technology, genetics) have on both personal and social behavior. An aid to understanding the positioning of ethics is (again) the analogy with design engineering since, following Socrates, ethics can be viewed as "how to design one's life" or "how to design society". As the experience of design engineers goes, many good design aims and strategies are possible depending on multi-faceted evaluations of what may be considered 'good'. This brings in a new question: how to evaluate competing ethical frameworks—i.e., the ethics of ethics. The situation is open-ended, inviting ever deeper considerations.

Let us return to Socrates' question "how to lead a good life?" using the ancient Greek interpretation for the word 'good' as "in accordance with one's genuine nature". Also in accordance with Socrates, our purpose will not be to give answers, but to clarify the question and hence the role of ethics. This chapter starts the discussion by considering our personal lives, leaving the role of persons in society and the development of societal ethics for a following chapter.

Relativism has been decried as making ethics impossible, i.e., as being un-ethical. The position I shall defend is just the opposite. In the view of systemic relativism and the incidence of chaos, i.e., the situation our biology and our world is in, ethics becomes a necessity, but it cannot be an ethics based on questionable universal laws. A claim to a universally valid answer to the Socratic question amounts to a blatant disregard of the creative and evolutionary potential that resides in each individual person. Nonetheless, ethics is presumably based on 'principles' because that is how language and communication works. So, the question arises whether there are anything like ethical principles in systemic relativism, and, if so, what they might be and what role they play.

The danger of thinking in absolute terms looms large in the formulation of Socrates' question. There is no overreaching authority from which 'good' can be derived. Socrates was certainly not speaking of applying a natural law or universal principle to the concrete human situation, although the history of philosophy shows that ethics has often been seen as a quest for deeper insights into what might be general principles that characterize good behavior, such as the classical golden rule, which seems to go back to Confucius in its negative formulation "do not do unto others what you do not want to be done to yourself" or the Kantian fundamental law, "Act only according to that maxim by which you can at the same time will that it should become a universal law[1]". The issue of what could be 'imperative behavior', necessary in certain circumstances, is the subject matter of what we shall call *morals* following Bernard Williams [61], for which a more specific treatment will be needed.

This chapter is therefore necessarily exploratory. Can we figure out how to deal with managing our personal lives when nobody tells us either what we should do or how to go about realizing what we decide to do? Left all alone with our own discretionary capabilities, can we successfully direct ourselves? What would be 'success'? Despite interactions with our peers, parents, friends, teachers, even forebears, books, gurus, lawmakers, and politicians, in the final analysis it is up to our own intelligence (or lack of it) to decide our course, "wie ein Held zum Siegen"! Taking into account, in addition, what we are actually capable of, which may not amount to that much given all our limitations, the exercise of ethics is maybe the most difficult one can engage in, once one takes it seriously, as Socrates wants us to do. Luckily, life goes on even if we don't. The old Chinese teacher says, "A person with outward courage dares to die, a person with inward courage dares to live!". Our quest for ethics is not an academic exercise. By its very nature, it engages our full humanity.

Our global understanding both of biology and of human nature with

[1]Kant argues that whoever thinks an issue through, using the faculty of 'pure reason' or 'pure practical reason', should reach a univocal conclusion. As I argued before, in line with "postmodern" philosophy, I consider this to be a fundamental error.

their creative, chaotic and evolutionary components provides the stage. This raises the question of the method to be followed, in particular, how our present understanding of nature, and, in particular, biology, impacts our philosophical considerations. Philosophy is not an exercise in formal thinking like mathematics is. From the start we have posited it as the investigation into Socrates' ethics question. It is also not an exercise in biology, which develops its own methods of investigation and verification (which we have discussed already). The question of what 'reduces' thinking to philosophy has occupied many philosophers in the past, and in particular the existentialists like Husserl, Sartre, Merleau-Ponty and Heidegger, who developed a methodology to approach the issue called 'phenomenology', seen as the analysis of consciousness in relation to existence. The approach I propose is along the same lines, but I shall not put a great emphasis on the 'philosophical reduction' as most existentialists do. The only 'reduction' I shall adhere to is systemic consistency within the framework chosen, which is the one given by modern biology and neuroscience. I do not claim any validity beyond that framework. I shall, in addition, make a number of choices that amount to the construction of a specific and hence more questionable ethical framework and an evaluation system (a meta-ethics) based on humanistic choices. This approach may be criticised further at yet another level of evaluation pegging one framework against another. Whatever may be the case, our philosophical consistency will not allow for an ultimate truth.

The question of how to lead one's life is firstly one of personal consciousness (consciousness as discussed previously, namely the faculty of the human brain to observe its own functioning and to derive behavioral controls from these observations, a sophisticated faculty only humans appear to have). Most of our daily reactions result from learned behavior and are mostly automatic when they happen. However, we do give unforced discretionary directions to our actions, especially in moments of decision making, when we make choices based on pondering possibilities and weighing their consequences. This may relate to important decisions like establishing a family, choosing a course of study, deciding on the development of a skill, having a baby, joining a company, or moving to another country. The concrete execution is then left to what we have acquired or are acquiring as skills or abilities and we may have to modify our goals as we go along depending on contingencies. The issue of freedom of choice definitely comes up. The limitation of choice can be internal (e.g., lack of skills) or external (lack of possibilities offered by the environment), and we may have to make radical changes in direction to achieve what we are conceiving as our life program, if we have one (not having one may be considered one as well where just drifting along is a possible strategy, sometimes even the 'best' one). Our efforts may yield success (to be defined by whom?) or not and we may correct our course accordingly, diminishing or increasing our ambitions or even changing them altogether.

How a person might set up a concept for dealing with the potentialities available to her in what we would perceive and evaluate as a 'good' way is the topic of what is called 'personal ethics'. This area is in contrast to 'societal ethics', defined as how societies conceive their own 'life' program, to be discussed in a further chapter. Ethics is not primarily a question of specific behavior (e.g., in extreme cases as it is in morals), but about continuous life management, including taking account of contingencies, possibilities and weaknesses. This is a much larger subject than morals and it is a shame that the two have often been confused in human history[2], which is probably due to the erroneous belief that they both derive from a universal or divine law and hence are basically the same (God or Reason decreeing how one should lead one's life).

The view we adopt here is the opposite: ethics is how persons conceive their lives in all actuality. A philosophical discussion of ethics then consists of a critical analysis of how such a "concept of living" or "theory of living" comes into being, what its role is in living practice and how it affects the world in turn (and vice-versa). It is important to make the distinction between the theory and the actual behavior at any given time. The theory is what we conceive, express and communicate, but whether or how this view then translates into life practice is a different matter. That involves ability, skill, honesty, (self-)knowledge etc... I already indicated the similarity between ethics and aesthetics as practiced in the arts, and in the latter case the same phenomenon appears. Even within a given aesthetic tradition different artists interpret the 'principles' differently, and then, many different traditions are possible as well, all with their own notion of 'beauty' (the aesthetic analog of 'good' in ethics).

Just like in the realm of aesthetics, there is nothing absolute about ethical 'principles'. Many systems are possible, which all may have equal claims to validity or adequacy. There shall hence be a need for "meta-ethics", namely, how to evaluate ethical systems—see later[3]. Systems also differ in sophistication and in developmental stage. Even more importantly, there are vast personal differences, depending on external circumstances, personal abilities, tastes and talents. People do not live as isolated individuals, they influence each other in many ways, through contacts and other

[2]Perhaps more in the West than in the Far East.

[3]At this point let me mention that I use the term 'meta' only in a relative sense, relative to the topic under discussion. A 'meta' level with respect to an ethical system under discussion will itself be an ethical system at a different level of consideration, and 'stacks' of several such systems will have to be considered.

means of communication like written transmission. Ethics will therefore have strong cultural and evolutionary components. But then, various cultures also influence each other through movements of people, sharing of ideas and discoveries, tourism and cultural exchanges. Ethical consciousness is not static. It evolves dynamically and may oppose former assumptions or beliefs. Various ethical systems may either merge or clash. That equally valid ethical perspectives may contradict each other is obvious when one surveys how issues like poverty, the environment, education and health care are dealt with in different cultures. But also in the personal sphere, many non-compatible ways of living a Socratic good life are possible. A delicate analysis is therefore called for, in particular regarding the dialectic that leads from intentions to actual behavior.

Our first issue is how to handle the distinction between actual and theoretical ethics, which requires differentiating between 'actual behavior' and 'actual ethics'. Ethics is by definition conceptual, which translates to practical 'intent'. Actual personal ethics, then, is the collection of concepts and intentions that lead a person to actual action. A critical and continual analysis of the relation between intentions and behavior will therefore be an important part of one's personal ethics. The question of the effectiveness of these intentions is not an issue here, although effectiveness plays a role in their adaptation and subsequent evolution. It may or may not be that intentions correspond to a conscious 'theory', i.e., a formal ethics. Often there is a discrepancy, which itself may be conscious or not. At stake here is that the distance between abstract or formal thinking and concrete action is potentially so large that it cannot be bridged in most daily cases. Many of our intentions will, out of necessity, be purely practical and hence not part of our conscious ethical set up. One could say that what we leave out of our conscious ethical considerations is equally part of our ethical 'gestalt', but given the limited scope of personal control, many intentions are generated 'on the fly' based on conditioning. Nonetheless, many people develop or adopt formal ethics as the basis for how they conceive their life management. Whether they live up to these concepts, i.e., whether they are able to translate their theoretical constructs into practice, is another issue, but one that belongs more to the area of psychology than to philosophy. The inability to translate ethical considerations into practice may either be due to intrinsic physical or psychological limitations, or may amount to what I shall call an 'ethical illness', in which case the advertised ethics hides the actual intention[4].

[4]The difficulty is the inherent imprecision of the notion 'intention', which reflects the 'morphism' between the concepts we harbor in our brains and how the corresponding reality presents itself to us. To any act many intentions, both implicit and explicit may correspond. Conversely, each intention may be attached to various sequences of acts that

A theory is necessarily built on a (potentially unconscious[5]) conceptual framework in which basic notions are posited, prime contentions (principles or axioms) are accepted at face value and ways (methods) for further derivation and evaluation of consequences are adopted. Starting from those, the theory then develops complex constructs thought to be compatible with the basic principles, often by expanding the scope, adding new notions and principles and most often than not, refining or redefining the original. All this may happen consistently, but most often than not the original construction gets modified and overall consistency gets lost in the process.

What distinguishes an ethical or an aesthetic theory from many others is the presence of evaluation principles that define the notion of 'good', commonly identified with what may be called 'quality'. A single system may contain a variety of evaluation methods. For example, an ethics of economy could use a framework in which terms such as richness, costs, gains, and investments are accepted as basic notions and the theory then elaborates the way a company handles its investment policies, pays its employees, decides on goods to produce, production locations, how to handle competition, and many more such constructs. The theory would then contain evaluation principles, for example share-holder value, long term prospects or market expansion prospects, and each company in a given sector of the economy might receive a figure of merit describing how good it is for each characteristic. An alternative and potentially contradictory system could deal with notions like sustainability, societal usefulness, expectancy of long term success or what have you. Needless to say, such evaluation principles may clash with each other even within a single system, and how one then deals with the clash generates the actual ethics[6].

The life environment of a person is perhaps more complex than that of a business in an economic environment, but as the person experiences it, it will also be made up of a number of entities, basic relational assumptions, principles, ways of applying them and evaluating the results. The entities might be 'parents', 'children', 'friends', 'work relations', 'education', the relations would be various abstractions from the actual biological connections, the principles would consist of various modes of desirable situ-

may reflect the intention to some degree. The analysis of how our psychological states translate to actions is the domain of psychology and goes far beyond what philosophical considerations can achieve.

[5]I remember having discussions with my father on his ethical 'principles' when I was a young man. Although at first they would not be clear in his mind, with some pertinent questioning he would gradually be able to formulate them fairly precisely, although he would not question their validity, which he would consider self-evident.

[6]These examples show that none of these principles can be universally applied à la Kant. The best candidate is 'sustainability', but what is meant by the term may differ from one concrete system to another, and may evolve in any given system as well.

ations, results and quality assessments from which one's concrete behavior towards others could be derived. Evaluations would then be in terms of a conception of happiness, future prospects, health or personal fulfillment, or downright 'gut feelings', which are nothing else than the result of prior, perhaps conscious, conditioning.

The important point I want to make, and which may be absolutely obvious to some, is that the ethical framework is a mental (neurological) construct that defines quality, superimposed on an abstracted personal world view anchored in peoples' brains. The resulting framework can be shared with other people or be commonly accepted, but it is not an a priori given "natural" property. Only the *possibility* of making such a construct is preprogrammed in human nature, namely, by the structure of the brain that allows for learning and conditioning[7].

Additionally, the evaluation principles are defined within the personal abstractive framework and hence have no existence outside of it. As with all theories or conceptual frameworks, hopefully there exists a relation, mathematicians would say a "morphism", between what we observe as reality and the structures in the brain. But nothing more can be assumed. Many theories and their morphisms (comparisons with perceived reality) propounded in the past have turned out to be highly questionable or even downright biologically incorrect, such as, e.g., supremacy of certain human races.

It follows that actual situations or evolutions are first interpreted by our mental framework and next evaluated by it, based on what it considers reality. The same occurrence might get high quality marks in one framework and low ones in another, not only because the evaluation principles are different, but also because the situations are interpreted differently. A child forced to leave their family to work abroad can be interpreted as heartless in one framework and parental love in another [26]. To condemn the act may just be a symptom of framework confusion. The use of condoms to prevent infection with AIDS is in one system a sign of essential responsibility and in another a despicable sin against the presumed holiness of life. This latter example brings up the (meta-) question of the relative value of different ethical systems, a point we may now be ready to discuss, at least in the personal context of this chapter.

However desirable it might be, it is often impossible to be completely explicit about the conceptual framework one is using and the precise functioning of the evaluation within it—life is just too complex for that. Nonetheless, when one has to explain or motivate one's actions, decisions or con-

[7]and which also differs from person to person, although the extra layer of intelligence involved is a shared property.

cepts, much of the motivational work consists in clarifying one's framework *as well as* one's perception of reality. The evaluation process is implicitly, or even sometimes explicitly, defined in one's ethical framework and allows a judgement on the value of one decision with respect to another, relative to that framework[8].

A different issue is how one may evaluate one ethical framework with respect to another. While simple evaluation of a single decision may seem pretty transparent (although there is still the question of what evaluation principle to use), the full evaluation of an ethical framework appears to be much more difficult and a topic of eminent philosophical interest. Relativism has been criticized by moral authorities as allowing any type of liberty in the definition of an ethical framework. This is a severe misconception. In fact, the opposite is the case. Systemic relativism is needed to support the assessment of various possible systems with respect to each other.

How can one then evaluate different ethical systems against each other? Would there be a general principle that makes them comparable? Of course not! Without a generally applicable super theory, how can one decide? Is there not an unsurmountable contradiction between the non-existence of an absolute "good" and the ability to judge an ethical system? Although this seems like an impossible dilemma, there is a (relatively simple and obvious) solution, but it does not provide for a unique criterium. We now understand that no conceptual system can be comprehensive; if so, it would inevitably run into contradictions that are both of a logical and just simply of a human nature, for no conceptual frame can possibly cover most, let alone all, real world experiences. *Evaluating ethical systems has to be an ethical construct in itself.* It needs in turn an appropriate conceptual framework, consisting of at the very least defining principles (in particular quality criteria) and methods to reach conclusions. To cut the story short, we actually have a lot of experience with conflicting evaluations. Often one big principle is hedged against another: presumed evolutionary advantage against short term economic gain; profit against sustainability; security against liberty; power against respect; and many combinations of the previous. The search for evaluation principles and the weights given them is bound to be endlessly open, but the search itself and the construction of the motivational framework around it is the essence of the ethical work, with the understanding that the protagonists realize that their beautiful

[8]Compare this with how design engineers evaluate the quality of their designs. They represent the 'reality' of their designs in some ways (diagrams, specifications) and then evaluate their performance using a 'model' for the presumed behavior of the object they have designed. The construction of this model follows from the morphism I mentioned before.

construction may be questioned at any moment.

In any event, a final universal solution, if it existed, would not only make the world horribly unattractive (as are the "solutions" presented by some established religions or ideologies), it would also prevent further evolution. As humans we have very limited power over how the universe evolves, but our behavior, individually and collectively, may have great consequences for our future existence as a species. The evaluation of consequences within a more comprehensive, hence meta-ethical, framework in which various theories can be weighed against each other, is therefore not a luxury, it is a matter of survival.

Let us not make the mistake that we can foresee forever what constitutes good ethics. Our future is hardly predictable, although we can at least make some reasonable estimates within a limited time and space horizon. Worse, many ethical systems are based on evaluations that have not considered their effects[9]. Some even advocate the enforcement of precepts with pure force, just for the sake of a principle: the will of the king, the dogma of the church or even the excellence of the "superhuman". A little better (we are already doing some meta-ethics here!) is the authority of ancestors, because that may be based on experience, commonly taken as wisdom. The "word of God" is of this kind, being transmitted and venerated from generation to generation and hence having acquired historical authority. Many philosophers both in the Western and in the Eastern traditions have also contributed ethical principles and precepts[10], sometimes even leading to explicit conceptual frameworks that codify and justify the judgements made, so that at least a coherent theory is obtained. But coherence, although often necessary, is not sufficient in and of itself. It has to be backed up by a deepening insight into 'goodness' based on anticipated consequences.

All this diversity makes a permanently critical approach necessary. As

[9] 'Consequentialism' evaluates the significance of a principle by the effects it has. This corresponds to the semantic theory that defines the 'meaning' of a statement by the effects it implies in the worlds in which it applies. Although this is an important component in settling the actual semantic content, consequentialism is a one-sided view that only considers the future. It has to be complemented by a cultural component that takes history (genealogy) into account, in particular how the concept has arisen and how it relates to other concepts in the environment in which it is used, thereby defining its usage. Although consequences are extremely important in establishing the meaning of terms in general and the value of ethical principles in particular, the way they have originated and are applied in relation to others is equally important, because the assignment of meaning does not come out of the blue without implicit, often learned, definition. This view is consistent with the contention that an abstraction derives its meaning from the domains it represents.

[10] Think e.g., of Aristotle, the Stoics, Marcus Aurelius, Spinoza, Kant, Rawls in the West, and Lao Tzu, Confucius, Buddha, Krishnamurti in the East.

there is no single notion of ‘good’, there will be a variety of ways to achieve solutions that may be perceived as optimal from a specific outlook. In other words, the issue has the nature of a ‘multi-objective optimization problem’. This observation leads us to optimization theory whose ramifications we now consider in its most simple appearance, in order to obtain some insight into the complexity of the evaluation problem, already apparent in the simplest possible cases. In very simplified situations, different optimization objectives lead to what are called ‘Pareto curves’ (in the case of two parameters) or ‘Pareto manifolds’ (when more than two are involved). The name was chosen in honor of the economist and mathematician Pareto, who was the first to draw attention to the issue. An example may illustrate the concept best.

Suppose our family wants to move to a new environment closer to the city where work and education is readily available. The houses in the city are too small for our family; the farther we go from downtown, the nicer the neighborhoods become and the bigger the houses for the price we are willing or able to pay. We have to exchange distance for housing comfort. There is not a single optimum: close to the city distance is at a premium, farther away there is more comfort. Suppose that we can measure comfort by size of the lot, we could draw housing locations on a two dimensional diagram with two parameters x and y, with x distance from center of town and y the size of the plot. All possible locations would be represented by a point in the diagram, corresponding to their x and y values. They would form what optimization people call a ‘feasible region’, i.e., the region in the diagram where solutions can be found. A ‘Pareto point’ is located at the edge of the feasible region and is optimal in either one of the two parameters, when one fixes the other. Together, the Pareto points form a curve that bounds the feasible region at its optimal side. In theory, any such Pareto point is as good as any other. Our ultimate choice will be a compromise between distance and comfort, induced by some other consideration, maybe the beauty of the plot or the pleasantness of the future neighbors (thereby introducing a new “ethical” principle to resolve the issue). When a third parameter is added, we have a Pareto surface and, in even higher dimensions, it will be what is called a ‘Pareto manifold’. The point is that even in very simple cases there are many optimal choices, which from the point of view of the going “ethics” are all equally good.

In many respects, the situation described in the Pareto theory is ideal. It occurs when there is a clear and smooth relation between the available parameters and the situation one wishes to optimize. However, this is rarely the case. In our example, the distance to the center of town is usually not proportional to the travel time needed to get there from home, at least not with public transport. There may be a bus stop right at the edge of the property or one may have to walk half an hour to get to the nearest one. Just a slight displacement in distance creates a large incremental travel time. The optimization landscape has become chaotic wherein slight changes make big differences. When more parameters are involved the chaos may become unmanageable and prevent any smooth optimization method—it is like finding the deepest crevasse in a glacier. Resourceful as humans are, we then follow a different strategy. Instead of keeping to the detailed model that may or may not have an optimal solution, which anyway is impossible to find, we let a new conceptual world emerge in which the "well-being" we are striving for is defined by different or more global characteristics. In the case of the choice of neighborhood, suddenly the style of the houses may become more important than the travel time or the plot size—we have moved to a new ethical principle, which bypasses the previous unworkable considerations[11].

We learn to live with the evolution of our situation and use resourcefulness in adapting to it. This means that often we must revise our conceptual framework and adjust our evaluation criteria correspondingly. This adjusting process may be seen as the development of novel meta-ethics, necessary to guide us through the subsequent modifications of our conceptual framework. This meta-ethics is based on some gradually discovered more general evaluation criteria, like a more comprehensive world-view, or the inclusion of further novel ethical concepts. It is necessarily more schematic, because it is more general than what we would use in the actual decision making. As it is less conditioned by a concrete situation, it is also more applicable to other people with more or less the same predicament. The refinement of quality assessment and hence ethical insight can be observed in how children learn to evaluate the quality of their behavior from parents, how students learn to be critical of their own work from teachers and even colleagues learn management wisdom from each other.

To critics of such an approach to ethics, all this variability amounts to lack of consistency, or to what they would call no ethics at all. Let us not fall into the looming trap of absolutism where by not having a total solution, we opt for no solution at all, thereby finding the concept of ethics unfeasible[12]. The idea of universally applicable ethics cannot be sustained, but neither is the absence of ethics in normal human behavior reasonable, since all human behavior finds a motivation in some ways. We have to live with conceptual frameworks we carry in our brains, their potentiality and their limitations. Moreover, each ethical system will entail choices, which on the one hand may be largely arbitrary, but on the other will not be

[11] And gives a good example of 'emergent behavior'.

[12] As Wittgenstein does in [65].

equally good, the ‘good’ being conditioned by a more elaborate but never totally overarching evaluation system. This is ethics as a living process!

One might then be tempted to hope that at a sufficiently lofty level universal agreement on a few very basic principles would become possible. Unfortunately, this cannot be the case and for very fundamental reasons. Our music analogy helps us to understand the difficulty. At the top level of aesthetic abstraction one might strive for “beauty”. My teacher would tell me, “You play this phrase beautifully”, but all he would mean is that I have mastered the idiosyncrasies of the musical style to which that piece belongs together with the technique of playing my instrument. The concept “beauty” bounces me back to the lower level as it says no more than that beauty derives from styling that is consistent with the given aesthetic tradition in that theory—clearly a meta-aesthetic choice. Different musicians may advocate a modern approach to older forms of musical composition in contrast to those who favor a historically informed approach. Or, alternatively, others may reinterpret older styles in a modern setting, creating something new in the process, like combining Gregorian melodies with Jazz rhythms.

The rarified higher abstraction “good behavior” conveys no information concerning the corresponding concrete behavior. One has to dive into an underlying conceptual framework to say anything more specific and there may be many such underlying frameworks, which in themselves are abstractive with respect to further specifics. This does not mean that such frameworks are arbitrary or that they are all equally valid. Quite to the contrary, the art or science of ethics is precisely the construction of such conceptual frameworks, including their respective evaluations, through increasingly refined insights. The results of all such efforts will not be univocal. As with all multi objective optimization problems, the number of possibilities are infinite, not so much at the highest levels of abstraction, which does not dispose of a large variety of concepts, but in the exponentially increasing possibilities the lower levels offer, and those are the ones that really matter, because they connect to concrete behavior.

Ethics, whether personal or societal, is therefore permanently under construction as we evolve and our societies change. The conceptual frameworks we use evolve with us, we encounter other frameworks and evaluations that may clash with our own, we aim at conjunctions or disjunctions[13], discard old frames and adopt new ones. To deal with the complexity of the situation, we do as design engineers do. We subdivide the overall environment into levels. We develop ethics at the level of personal hygiene, the

[13]‘Conjunction’ is e.g., ‘good in every frame’, ‘disjunction’ means ‘good in at least one frame’, and there may be anything in between. The number of possibilities becomes exponential with the number of potential frames, perhaps a different one for each person!

level of interpersonal contacts, how we handle our parents, children, relatives and friends. The level of work and work relations comes next. We may integrate those into a more comprehensive level of personal development, overseeing the situation from our various roles and deciding how we want to continue the different relationships. Next, we may feel responsible for how society develops and we become interested in various societal models, trying to integrate them or to promote some of them, become active as administrators or pursue a political career. How we then deal with other people, other ideas, other ideologies (other frameworks) are ensuing topics for ethical development. These we may share with other people or go against what other people propose. It would be very hard to develop a unifying ethical construct for all these various endeavors, in fact I would immediately argue that such a unifying model is impossible.

What a philosophical treatise on ethics ought to do, and what we mean by ethics, is to develop the building blocks needed to construct various conceptual frameworks and evaluations, show examples, and discuss the various relations possible between different frameworks and operations that could be done on them such as completions, refinements, partial disjunctions or conjunctions. Some generic concepts would definitely play a major role, but they would belong more to the class of logic and system modeling than to ethics *proprio dictu*. Likely the most important is the role of consequences and effects on oneself, on others, on society and even on nature, and how these are considered with respect to each other. One could look at these effects from a short term or a long term perspective. Effects might not be very predictable and then stochastic evaluation might come into the picture.

Important notions connected to such efforts are trustworthiness and honesty. These are notions that do have a more precise meaning in the context of systemic relativism, like the notion of 'truth'. Systemic relativism is dependent on consistency within a framework of thought. We have argued that ethics is based on the human ability to foresee consequences of one's behavior and develop quality evaluations for them. This leaves the door open for discrepancy between actual and formal ethics. The actual behavior may be derived from different motives than those advertised. This may be intentional or not. In the intentional case, the discrepancy is to be characterized as dishonesty, which then turns out to be a systemic breach of trustworthiness. Although this systemic breach of ethics is very common and despicable, the discrepancy between almost any actual behavior and intentions is an unavoidable consequence of the fact that our human perception of what we call reality is always limited and colored. At the lofty level of evaluation of ethical frameworks, honesty is definitely a great goodness criterion to strive at, but it does not yet ensure trustworthiness, which is dependent on the quality of the framework as well. We shall consider these issues further in the chapter on Ethical Diseases.

One aspect of personal ethics that we have not considered so far, is the interpersonal dimension. Much of what we do is directed to our relations with other people, wether we need them or they need us, or even both at the same time. How we relate to our relatives, our neighbors, people we happen to meet or who are forced on us, our social behavior, how we relate to society, what we do or what we do not do, all of these are fertile grounds for the development of personal ethics. Given our unavoidably extreme limitations in time and space, we necessarily make extremely selective choices (one may not be conscious of this, but think of all the possibilities!), which define to a certain extent our ethics. But other components of ethics have to do with the quality of our interactions. Honesty is a kind of ground rule in this area. Without consistency between our goals and how we communicate our intentions, effective interpersonal ethics seems to be next to impossible.

But, sad to say, honesty is a frequent casualty of human relations. The personal domain is perhaps the least affected by dishonesty, but in the public domain it may be hard to find pure intentions. Because of misleading information our children become obese, our money is badly invested, we are induced to watch worthless movies, young persons are forced into inadequate career decisions and an artificial world is created around us in which war, greed and opportunism are viewed as desirable. This is almost the triumph of dishonesty as the prevailing ethical principle, so long as it achieves profit—which appears as the actual but undeclared aim of the going ethics. Truth, as well, is a common casualty of authorities, in particular religious ones. What the Christian Church teaches as "The Truth" is mostly based on an accumulation of non-truths. Consider, among other notions, resurrections, assumptions to heaven, miracles, the immaculate conception, hell, the atonement of sins. At the same token, it took the Catholic Church four hundred years to accept Galilei's planetary system and one hundred fifty to accept Darwin's evolutionary theory. Often the better truth is like the message of the prophet shouting in the desert.

Defining a proper ethical frame of thought is both necessary and problematic. Conceptual frames suited for ethics are not arbitrary. They have to be, at the very least, consistent in a logical sense and make biological sense (in particular be sustainable and healthy). As we discussed in the chapter on Truth, they require a relation—a morphism—between the concepts in the frame and experienced reality. The quality of the frame depends on whether such a reasonably accurate map does indeed exist and is 'beneficial' (where the notion must be further developed as part of the ethics). For example, when I want to develop ethics for my personal health, the health model I am using should reflect the known health effects of the measures I am taking[14]. This will, of course, depend on the state of current science concerning health issues. I would not expect the frame to be accurate in all respects, it may even be very much off the mark, but at least I am using the information I have to the best of my abilities.

Honesty and trustworthiness are important ‘general principles’ but they need further elaboration in the meta-ethics (the ethical layer) in which their meaning is being produced. One can, for example, state (as we did) that there is a difference between conceptual and actual personal ethics and define honesty as how well the two correspond. Purists would say that honesty only occurs when they coincide. But the situation is not that simple. All principles and terms used are in need of semantics and an important part of semantics consists in defining how they work out in the morphism with ‘reality’, which is understood as my perception or that of scientifically controlled observation. In the advertisement of some product, the information given by the producer can be correct and yet mislead the buyer into believing in qualities that are not there. This may be intentional (like stating ‘based on fructose’ and making the buyer think that adding fructose is like adding fresh fruits) or just the result of a mismatch between semantic domains (as often happens in communication). The philosophical issue is whether such confusions contaminate the notion of honesty itself. In a relativistic approach, one does not accept an overreaching or universal theory in which ideals acquire meaning. The whole process of providing meaning has to be part of a specific theory or framework, and hence, what shall be understood by ’honesty’ has to be made explicit within it. This shall of course more or less correspond to the intuitive notion we have of it, but how well that works out will be an issue of common acceptance between the parties involved, depending on how compatible or well-aligned their respective semantics are. What it means for a producer to advertise his goods honestly has to be determined in an ethical framework that aligns the semantic domains of both producer and consumer, a complex issue with which law makers, consumers *and* producers struggle without ever resolving it completely.

I cannot define concrete (relativistic) ethics without contradicting myself. Concrete ethics has to be a personal affair. It defines from day to day how I conceive my personality. My personal ethics can only serve as a singular example of what I mean, not as a specific list of do’s and don’t’s. What I have tried to do in this chapter is to clarify the notion of ethics as it can be seen in a systemic relativistic philosophy. It has been an exercise in semantics, not in the elaboration of an ethical system, claimed to be funda-

[14]Consider the various dietary models!

mental or essential, or even a potential ethical blueprint. The question of ethics connects to 'what is conscious living?'. Answers can only be given by one's life process itself, and how one integrates relations, information, ideas and experiences. This is the key tenet of a humanistic ethics motivated on the one hand by the acceptance of human intelligent individuality as the main driving force of evolution and on the other by the impossibility of a universally valid ethics. One becomes conscious of potential answers, analyzes them, communicates one's findings with others, identifies principles, gives meaning to statements, and develops frameworks. The process contains its own dynamics, it cannot be framed from outside and certainly not by an abstracted set of ill defined rules. What philosophy can do is develop insight into the ever deepening properties of the dynamics of life, in particular the human factor in it, participating in it and yet able to observe it as well, necessarily limited by human capabilities. Such insights may lead to principles and rules of behavior, which will have impact on life but remain part of a mental construct, potentially valuable, but remaining open to questioning[15].

Many inspiring personalities have developed ethical frameworks with a variety of resonance. One of my favorites is clearly Lao Tzu, but there are many others ranging from Socrates to Mahatma Gandhi, including (and of course not limited to) Christ and Buddha. They have influenced my conduct in many ways and I am grateful to have known them as a part of our human legacy (the value of education!). Their views on life are sometimes elaborately justified, or just intuitive, resonating with what a person may instinctively feel as being 'right' (which is known to depend quite a bit on experiences in infancy). Yet there are ethical systems which I find unsuitable or even evil. I discussed Nazism earlier, but even very honorable systems may produce unpalatable ethics with dramatic effects (for example monks immolating themselves, or the ethics based on the Christian 'original sin' and its required atonement). I have raised the question of evaluating ethical systems with respect to each other based on an analysis of their consequences. This is an important issue that we have to consider further within the context of societal ethics (our next chapter). Also our intuitive reaction to what feels like a good system as opposed to a mediocre or even evil one, needs careful consideration. For this purpose and in a further chapter, I shall develop an argument connecting health in a broad sense with ethics. This will lead to some explicit properties that an ethical system may, or, often more easy to motivate, *should not*, have, given our present

[15]This way of looking at ethical constructs could be construed as being a universal ethical construct in itself, or at least a claim to that effect. However, that would be a mistaken interpretation. I claim the statements to be no more than the clarification of what is meant by ethics in relation to other relevant notions.

understanding of health.

An important point which I still need to consider because of its strong relation to ethics is the issue of the "meaning of life". Atheists and relativists have both been accused of producing philosophies that make life meaningless. The connotation is that one needs a central authority (e.g., an indisputable or godly ordained code of conduct against which the goodness of behavior can be gauged) to make life meaningful. Good behavior according to the code leads to ultimate reward, bad behavior to punishment. The connection with ethics should be immediately clear when one takes consequences as the key to defining meaning. But the derivation is erroneous. It is not because the fear of breaking the code produces good behavior (assume it is that way!) that it is necessary for ethics. The opposite is actually the case. Doing good because it is ordained induces people into believing that goodness is not worth striving at because of intrinsic qualities. The punishment for people who do not adhere to the commandments is thought necessary to make goodness more attractive as a choice—a distortion of the very notion of ethics.

As Socrates already argued, the development of rich personal ethics, in close association with fellow humans and the environment in which they live, coincides with the meaning persons convey to their life. This endeavor is not only highly personal, it is also dependent on a large number of factors and contingencies including the hazardous connection mind abstractions have with reality. That we can easily stray is a fact of life that has motivated quite a bit of outside interference with the personal ethical process, notably by political and religious authorities. That our personal power is limited, that we are all much dependent on others and that others need to realize their "meaning of life" as well as we do, are facts of life that necessitate compromise and the development of much more in-depth comprehension and alignment than would appear at first when simple rules with little practical meaning are posited. During a person's life, ethics has to keep abreast of developments and involve the best of abilities to comprehend and continuously provide meaning to what each of us conceives as a "good world".

Let me end up this chapter with a quote from Lao Tzu, not as a recommendation for an ethical system, but as an example of precepts that have a strong emotional appeal and can be used as a guide to personal ethics.

Elements of personal ethics according to Lao Tzu

> Man at his best, like water,
> Serves as he goes along:
> Like water he seeks his own level,

> The common level of life,
> Loves living close to the earth,
> Living clear down in his heart,
> Loves kinship with his neighbors,
> The pick of words that tell the truth,
> The even tenor of a well-run state,
> The fair profit of able dealing,
> The right timing of useful deeds,
> And for blocking no one's way
> No one blames him.

(Lao Tzu, The Way of Life, nr. 8 in the translation of Witter Bynner [8].)

Mural of the painting *Guernica* by Pablo Picasso in Guernica.

Chapter 13

Societal ethics and the exercise of power

Societal ethics is dedicated to the "design of society" much as personal ethics to the "design of one's life". Beyond similarities in their individual need for design and quality, persons and societies are intimately intertwined and in need of alignment of their ethical efforts. The interacting between persons necessarily involves the exercise of power, mostly in the form of 'leverage', a particularly efficient and intelligent method as testified by the fact that the weak animal 'human' has outclassed the most powerful other species on earth. The chapter starts out with a criticism on Spinoza's view on power and then brings in Nietzsche's "Genealogy of Morals" for an ethically opposite but equally absolutist and questionable viewpoint. Power, in particular leveraging intelligence, is necessary for efficacy but its usage and the balance between competing agents requires ethics. The development of any ethical system is bound to encounter new issues due to the perpetual creation of ever new possibilities, which makes ethics a dramatic necessity in our permanently changing world.

Harro sur le bedot! (La Fontaine)

Does power drive ethics? The thesis that it does has been powerfully worked out by Spinoza in his final work *A Political Treatise*, in which he argues that "every citizen depends not on himself, but on the commonwealth, all whose commands he is bound to execute, and has no right to decide, what is equitable or iniquitous, just or unjust [14]". Spinoza's views are based partly on an optimistic view on the status, functions, and relations of the 'natural order' of supreme authorities, and partly on a logic from which the division of authority over many agents is seen to lead to contradictions, in particular when the agents are driven by emotion rather than reason[1].

[1] According to Spinoza (and later Kant), if they were driven by reason, all participating

That power drives justice is argued by Thrasymachus against Socrates in the first book of Plato's *Republic* and the theme was further considered by Nietzsche in his *Genealogy of Morals* [43]. In recent times, confidence in the 'reason' deployed by authorities has been badly shaken by the horrible wars of the 20th century, often conditioned by suspicious ethical theories that propounded monstrous neglect of elementary respect for humanity and human life (not to mention nature). Even today, you just have to read the newspaper for current examples of authoritative blunders. Obviously, there are many kinds of societal ethics, all reasonable in certain directions, but such that many of them cannot pass even elementary standards of quality. In most cases they were enforced by the reigning power, and often even sanctioned by society.

The development of ethics, whether in the personal or societal context, involves making choices and taking action, and hence makes the exercise of adequate power by the "ethical agent" necessary. Very quickly, the power of one agent meets that of another and a critical situation arises. Either one or the other prevails, or an uneasy and unstable equilibrium lingers. Needless to say, in most cases the instability is resolved in favor of the most powerful party. This is somewhat mitigated by the fact that the ability to exercise power by any agent is limited in time, space and ability. There is what physicists would call a "power cross section". But there is also an "algebra of power". When three more or less equal parties are involved, two may join their power to overcome the third one. Other resolutions are possible, like two parties fighting, wasting their energy and allowing the third to impose its interests. The number of possibilities increases exponentially with the number of parties present and very soon a sort of majority rule becomes the most common way of resolution[2]. A different, especially dangerous type of resolution is when a transfer of power occurs, namely, when a large number of people agree (or are forced) to transfer their power to a single party, as happened in Nazi Germany, communist states, or in general, happens in states in which a strong ideology or religion prevails. Through such concentrations, majorities can drastically curtail the freedom of most of the population, thereby abolishing the idea of a participatory democracy (as has been forcefully described by Alexis de Tocqueville in [15]).

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agents would arrive at the same conclusion. Conversely, if they do not arrive at the same conclusion, some or all of them must not have followed reason.

[2] A motivation for this statement is statistical. Suppose all divisions between two opposite parties are equally probable and a majority prevails. Since Pascal developed his magic triangle, we know that many more majorities are made with the number of people on each side near the median, than with a small number in one of the parties and the rest in the other. E.g., with 10 people involved, 9 against 1 has 10 possibilities, while 6 against 4, 210.

So then, is there a solution to the contention of ethics vs. power? Or is ethics to be a perennial casualty of usurped power? Let us analyze the situation in more detail. Power will always be needed if anything is to be achieved, but, for ethical purposes, it has to be properly directed and properly curtailed in order to achieve the goals intended. A first and important observation is that a controller can often suffice with little power, if only it has the right leverage. That is the principle of control or, more generally, emergent behavior, which by definition creates order on an underlying system. The challenge for any meta-ethics controlling the societal layer is to find adequate leverage.

Leveraging is ubiquitous in nature. What is needed for control of a system is a weakness that can be exploited with little effort, often a different "dimension" than the one in which force is exercised[3]. Intelligence may be able to detect the weakness, and perhaps develop a controlling actuator using technology, but nature has used different methods in the past, such as trial-and-error, reinforced by natural selection. The science of discovery and the technology of actuation have to go hand in hand. To understand a system is to understand what its main constituents are, how they interact, and how they can be controlled. There is a reductionist element in this activity that will concentrate on the main effects, neglecting less influential details when possible[4]. To find the right balance will determine success, but is often a major challenge in need of experimentation.

All exercise of power goes into certain dimensions and certain directions within those, leaving others for potential control. Humankind succeeded in subjugating horsepower early in our history. Our ancestors have figured out ways to control a horse's impressive physical power by exploiting some vulnerable elements in its anatomy (like using a bit and bridle), and then have disciplined the horse's psychology for domestication. As a result, a scarily powerful animal is pulling a plow and helping to provide food both for himself and his human masters. The complementarity in the exercise of power is very striking in this example, and also how much less power is needed for control, if only it uses a subsidiary, leveraging dimension. When you turn a corner with your car, you use the car's own power to effectuate the turn. To change the direction requires little power from yourself

[3]Force, power and direction are related. In a typical mechanical system, power equals force times velocity in the direction of the force.

[4]'Emergent behavior' as discussed in the chapter on chaos may play an important role. To use the example of the elephant, in directing its muscular power, the physiology of its muscle cells plays no role (assuming they are in good condition), only how the elephant's psychology activates them and the effect they have, and then not even the activation mechanism itself is significant, only the translation of signals emitted by the mahout in response to the action of the animal, a purely "behavioral" issue.

(even in non-assisted steering), mainly because your steering system makes intelligent use of the relation between the available dimensions. You make the wheel turn around a vertical axis while the motor power is applied via a horizontal axis and the conversion of force from one axis to the other is achieved by friction on the road (indeed, the mechanism does not work very well on ice!). Leveraging is also the gist of many economic activities, an economic agent can easily exploit "what you do not know" as a leveraging dimension.

The dimensionality of the world we live in is extraordinarily large, providing lots of possibilities for control in almost any circumstance. The limitations of any agent are usually determined by its own potential, physical or intellectual. Worse even, by its limited perception of potential. All social interaction is not only based on mutual influencing, but on the fact that the influencing is directed towards achieving (at least some) control. When you tell your friend "Go get me a bottle of beer", you are steering his next actions with very little power and a lot of result. The control generates not only results, but also pleasure in both the controlling and the controlled organism. The search for pleasure is, on top of all this, a powerful motive behind the quest for control, or, conversely, pleasure acts as a very effective controlling proxy[5]. It is even the driving force behind dictatorship and corruption, and therefore also an important component of (actual) ethics.

As we know, power corrupts and absolute power corrupts absolutely. This is true for persons, but also for societies and for our whole world order. Humanity has recently exercised extraordinary power over our environment, extracting fossil fuels with our massive technological know-how, and then burning it for our needs and pleasures (carmaker BMW's "Freude am Fahren"!), thinking very little about the consequences. We remain very motivated to continue pleasurable practices, as long as the process brings enough immediate satisfaction, huge gains for some companies and a few pleasures for individuals—a so called win-win situation, the basis for much economic activity. The lack of consciousness of the dimensions involved is pretty clear in this example. In our foolhardiness we are (almost) completely neglecting the future of our planet, including that of our children, another "dimension" that will soon impose itself.

The consequences for the development of ethics become pretty clear. A good deal of societal ethics has to be directed towards curbing excessive power when and where it produces obviously harmful effects, and it

[5]One might be tempted to say it is the only one as far as the effectiveness of human intelligence is concerned, but we know also that there is a whole collection of neurotransmitters that exploit different effects for control, e.g., adrenaline, which triggers alertness, serotonin that regulates the mood or dopamine that affects motor control.

is a task for our ethical intelligence to figure out (1) what are effective controls and (2) how they can produce a more satisfactory direction to potentially noxious activities (including their abolishment when necessary). The corresponding danger is, of course, that the effective controls become uncontrollable themselves. The analysis of the power-control situation is a fundamental component in achieving results that meet 'quality' criteria. Let us analyze a couple of concrete examples before reaching more general conclusions.

As a first example, consider CO_2 emission rights. There is a fairly general consensus among climate scientists that CO_2 emissions are primarily responsible for the inordinate increase of overall temperature in the earth's biosphere (often inaccurately termed as temperature increase of the earth). Although there has been some contestation of this view, mostly by reactionary conservatives, their objections have been conclusively demonstrated as false, and we can at the moment safely accept as true what the climate scientists claim. The power of the oil-pumping and energy-producing companies, not to mention large sectors of the economy that thrive on the burning of fuel, may seem formidable as compared to the leverage a small community of climate scientists may have. What is finally happening is that a large segment of the international community is gradually if not reluctantly agreeing to act as a proxy for the rights of the environment and may succeed in forcing polluters to at least pay for the damage, e.g., by setting up a market for emission rights and by requesting prepayment for exploitation rights that account for the clean-up of the resulting pollution (we also know that such funds are largely insufficient.).

Whether this is functioning satisfactorily we shall consider in a moment. Let us first make an analysis of the mechanisms used. To find an adequate proxy, a number of conditions have to be fulfilled, from general concept to implementation practicalities. Since the issue is world global, the world community has to be mobilized and general understanding of the issues groomed. The science community has generally done a good job at this. It can combine its global presence with the respect for its trustworthiness it generally enjoys (although there have been attacks on the integrity of the scientific community, but these turned out flimsy and easily refuted). But then, the main issue has been to develop the proxy that will at the same time be effective and somehow attractive to the economic community, in particular the companies that have misused our atmosphere as a cheap and easy dump for their wastes. The simple principe that 'the polluter must pay' has to be backed up by a notion of profit for companies that forgo pollution by beter practice and/or new technology. Making pollution unprofitable and the opposite profitable is the key. The proxy ends up to be a simple device: emission rights that can be bought and sold—a simple piece of paper (or an entry in a computer, but the system has to be backed up by law enforcement on a world scale.).

But is the leverage and its ensuing power strong enough? Unfortunately, the results have been disappointing so far. Personally, I think that a much stronger development will force the issue, and that it will have little to do with ethical considerations. The worst that can happen is that the earth's atmosphere gradually suffocates under excess carbon dioxide and heats up beyond control. Not such an unlikely development given humanity's notorious stupidity where it concerns environmental affairs. What will really bring the situation under control, is, in my view, a development in a totally different direction that will make present day practices economically obsolete. A candidate for this is new technology from electrical engineering (solar cells, storage of energy, sustainable harvesting), which will undercut energy prices while being highly profitable at the same time (again an example where a kind of 'pleasure' in the form of high profits wins out).

Humanity is fortunate that it receives energy from the sun without practical limits, so that the clean energy problem may get solved automatically by new profitable technology. But the story does not end there. One problem solved (perhaps) and many more neglected but even more important problems arise. Some essential resources, such as clean air, contamination-free water and healthy food have become critically compromised by pollution due to generalized ill practices. This is where the next environmental frontiers will likely lie[6]. So much for "good societal ethics based on intelligence"!

As another totally different example consider how parents deal with the education of their children from infancy to adulthood. There is hardly a better topic to illustrate the strive between agents endowed with intelligence trying to control the situation using proxies. Parents use the physical and psychological powers they have to force their children to behave in ways they consider favorable, citing the children's welfare as the motivation. Parents have most control when their children are young, although babies quickly learn, by trial and error, how to leverage the proxies available to them. Babies control their parents by crying and other signals. Toddlers begin to experiment with their own power and control when they enter the "terrible two's", during which they discover the magical word 'no'. One could speak of naturally induced ethics here, namely, a Pavlov-like self-reinforcing behavioral schema resulting from obtaining a desired result (this is in a nutshell what one calls 'learning'.). But even with the most adept parents, children very soon start testing the boundaries of parental

[6]Do I have to enumerate the long list of environmental problems we are facing? Micro-particles in the air, islands of plastic debris on the oceans, antibiotics in our meat, noxious chemicals suffusing our land, and so on.

authority with whatever leverage their developing intelligence figures out.

During children's adolescence the desire for or even the necessity of autonomy grows gradually and parents are well advised to try to direct their children's energy and intelligence in directions that *both* parties find productive and pleasurable, thereby respecting their children's natural desire for freedom and experimentation. The mutual tactics have to become more refined. Parental influence is diminishing as peer relationships develop, and other means to influence each other have to be put in place, in particular material rewards and eventually even sanctions. This proces moves gradually into the adult mode of what we might call 'contractual agreements' (perhaps implicit). Conversely, adolescent children start developing considerable autonomy, generate their own worlds through the various contacts they have outside the home (greatly enhanced by modern telecommunication), and gradually feel the need to break out of parental constraints, without necessarily having the (financial) means to do so. A conflict between autonomies is in the making unless something like a common meta-ethics is developed that would keep the parties from drifting apart. If not checked in some ways, power will simply be exercised in available directions by the parties involved and undesirable effects are bound to result. An uneasy and unsatisfactory accommodation might result dictated more by remedying immediate needs than by opening future perspectives.

The way out of such a situation, short of unfortunate total separation between parents and their grown up children, is the joint exploration of a new level of ethics. That is, the autonomous parties start agreeing on some mutually accepted practices, which minimally generate an interiorized community of purpose. This ranges from providing sufficient breathing space to creating a symbiosis, i.e., collaborating on issues experienced as shared. Seasoned negotiators between conflicting parties know that a good start can often be made by first concentrating on a minimal solution, namely the accommodation of the *essential needs* of both parties [23]. From the point of view of the exercise of power, this means that parties refrain from applying power beyond their essential needs as a first step towards resolution. Parties who have already garnered excessive power as a means to their ends may view this first minimal step as unattractive and the only alternative for the other side is to derail the imposition (if possible) and make its application of force ineffective. An alternative would be to bringi the powerful party to acknowledge that its exercise of power does not lead to a resolution.

Nonetheless, when parties succeed in the initial minimal negotiations, often a capital of trust has been built up sufficiently to initiate the next step, the definition of some common goals and the charting of a partially common future. This is the point where the new ethics really surges in, the idea being that parties cooperate to define a common outlook and merge their available power towards that purpose. This may be to the detriment of a third party, as when father and son conspire to steal from someone else and split the profit; but, it may also be based on some loftier principles, such as increasing skills, creating new activities or contributing one's potential to the good of the country.

History is littered with the failures of ill-conceived ethical systems, call them "isms": nazism, communism, liberalism, capitalism, consumerism, imperialism, where each ideally conceived system seems eventually heading towards the graveyard. What principle plays the role of the ax here? One could simply say, life is stronger, or, more to the point, the way the world evolves selects them out, often with excruciating pain and millions of casualties. With all its evolutionary potential, intelligence has its patent weaknesses, compounded by the "nature of things" in which power may win the day but not earn the future. Let us investigate a bit further. We have already discussed the importance of chaos in almost any biological system. It creates new possibilities perpetually, which initially may be enhanced by favorable evolutionary conditions. Intelligence, as a product of evolution, plays a strongly enhancing role, as it is capable of using past experience and the imagination of future scenarios to steer further developments. Intelligence propagates and multiplies via communication. The only inhibiting factors are conservative power structures that set constraints and limit experimentation, but we have also seen that the collateral building of structures and constraints are a necessary ingredient to consolidate the novelties as well. The balance between innovation and consolidation is an important element of evolutionary success, of course besides multiplication, necessary for any property to propagate.

Ethics may then be understood as an intelligent process that attempts to balance creativity with constraining conditions in order to achieve healthy personal and societal development. As much as possible, it takes consequences of the chosen principles of behavior into account, including evolutionary effects and the role innovations play in producing new avenues (occasionally just thanks to chaos). A bad strategy would be to squelch all new developments (as systems based on "universal ethics" unwittingly do) and aim at a preconceived ideal world, but meta-principles are necessary as a guide for how to deal with the unexpected, although these need re-evaluation in the light of progressing insights. In other words, the ethics has to remain adaptive. Many new societal developments are only indirectly due to chaos. They could have been foreseen from the start. Take the enormous increase in world population and the results of cloistering people in national enclaves called "countries". Only a gradual, or even speedy, opening of borders and a massive investment in cooperation and education might ease a situation that is bound to head for disaster, but all that creates its own challenges. Our present societal ethics seems to lack the intelligence needed to chart a future that at least has a chance to survive, let alone be evolutionarily productive. Natural selection (including the strong regulatory incidence of intelligence) will necessarily be the ultimate judge of whatever we conceive nowadays, if nothing else and better prevails.

Some biologists [40] have made a case against "representationalism" as a basic constituent of cognition, pleading instead for cognition as a structural, self-adapting mechanism of identity in a biological system. At a basic level, elementary cognition plays that role. It is the activity of neural cells in a primitive organism, in which sensory devices are directly connected to actuators, leading to a primitive kind of 'cognition'. Also, in advanced, multicellular organisms, similar subsystems are in place, allowing actuators such as muscles to react directly on sensory inputs without the intervention of a separate interpretative cognition system. The neural systems of more complex organisms have multilayered architectures that allow for adaptation at several levels. However, to be able to extend control beyond direct sensing or observation, a representation of the system to be controlled appears to be needed. Surprisingly, major improvements in the theory of control have been made in the second half of the 20th century through the idea of 'model based control' [32], in which the controller first establishes a model of the system to be controlled (this phase is called 'identification'), and then bases the design of the controller on a combination of the estimated state, the historical conditioning and the direct observations. This method of control is now ubiquitous in all our more sophisticated systems like modern airplanes, helicopters, industrial processes, power plants, wireless networks, you name it, and there are good reasons to believe that our brains also function this way as neuroscientists are increasingly able to identify the modeling regions in the brain.

The multiple layers at which control is exerted, combined with the multiple layers of representation needed to understand or model these subsystems, makes multilayered ethics unavoidable as well. This simple remark has significant consequences. Each new system environment needs its own definitions, axioms, structural development and semantics. In addition, the co-existence of various systems requires interfaces between them. Although a discussion of these intricacies goes beyond our field of inquiry, a simple example may illustrate the situation. Every modern government has departments of education, social affairs, and finances. Each of these will be structured distinctly with vastly different operational principles, stakeholders, and societal impact. Yet they need to cooperate intimately because one is highly dependent on the other (and not all just on finances!).

Let us look at the relation between education, politics and finances, for the purpose of discussion. A country's educational system often has a hierarchical structure, while the finance department might be much 'flatter'. On top of this, politics will decide on budget and overall structure. Which department will control what and how? What will be the influence of teachers, parents and/or students and how shall it be exercised? How shall the system be allowed to evolve? Which educational goals will be set and how shall the various agencies try to achieve them? Many of these questions may be thought to be of a purely managerial nature, but the answer given to each of them will change the system and affect the people concerned. Nor will there be an ideal solution. One might recognize a number of 'constitutive autonomously acting agents' in the system at various levels of aggregation (schools, student bodies, individual students, parents, ministries, organizing entities like school boards, teachers, teacher associations, parliaments, parliamentary commissions and many more). Each of these will be managed in some ways, have power structures, have interfaces with others, define its own ethics and be influenced by the ethics of the other parties.

How all these constitutive agents treat each other as well as their constituents will be a major part of the going overall societal ethics, only poorly steered at the political level, which, itself, has its own ethics. How all this works out in a given society will have a big impact, not only on the quality of life the society is able to generate for its citizens, but also on its human environment, how people communicate with each other, respect each other and work towards what they see as the common good. And moreover, as the world is becoming one big village, no such system operates in isolation. Each is a subsystem in a larger one with, again, its own ethics, mainly consisting of how the subsystems deal with each other and probably imposing its own views as well. How all this ethical activity and in particular the balance of powers fuses into the global society is crucially important both for the continuous well-being of humanity, its evolution and, in particular, the creative management of potential major conflicts.

To allow for an orderly deepening of these ideas on the relation between power and ethics, a new chapter is necessary where we explore the multilayered character of societal ethics in its variety, possibilities, and limitations. We cannot overcome Spinoza's pessimism as to the real chances of an idealistic ethics not based on destructive power games. Our goal is much more modest, namely, to understand the possibilities modern insights in representational theory offer for ethics. Ethics, in particular societal ethics, are not evolutionarily neutral. Ethics as the interplay between many societal layers harbors both great dangers and great opportunities and it is solely up to human intelligence to devise the leveraging power needed for what it perceives or defines as the 'good' direction, because no other known faculty is able to conceive adequate quality criteria and devise the required strategy.

Chapter 14

Multilayered ethics

The previous two chapters point to the necessity of ethics in multiple 'layers', whereby each subsequent layer provides for 'quality control' on the previous. Again, experience with design engineering acts as a guide for development of this multiple layer theory. The chapter starts out with some examples of multilayered representations where one layer may serve as a 'semantic layer' to another, yet all of them are formalized and adorned with formal interfaces between them. The chapter describes next how such multi-layered constructions are feasible and even necessary both in the realm of personal ethics and *in societal ethics. It will appear that the term 'layers' is not really appropriate. A society is not so much layered as constituted of a network of interacting agents, each with their own layers of ethics and a variety of interactions between them, which may be hierarchical but can just as well be competitive or complementary. This in turn produces the necessity to define meta-ethical layers that provide 'quality control' on the conjunction or disjunction of other ethical constructs. The analogy between ethical networks and semantic constructs in the brain is then worked out to some extent and the chapter ends with a note on the plasticity (changeability) of these constructs.*

Language is the most common and powerful multipurpose instrument we use to represent how we view events, structures, experiences, ideas and scenarios. It is not the only one. It is known that our brains produce representations as two dimensional maps of visual, auditive and sequential information and even maps that represent relations between all these. Multilayered representations are also common in some engineering environments, where various modes of schematic and graphical representations are used. When we speak about multilevel ethics, we would need such multilayered representations as well. Important is not only the definition of each layer, with its premisses and procedures (e.g., methods of derivation) but also the relations between the various layers. These need definitions and proceedings as well. Let us consider, in the beginning of this chapter, how such multilayered representations may function. By way of introduction and illustration, we start out with a short discussion of a presently very popular multi-layered system, the internet.

The famous OSI[1] stack of models for telecommunications is a good example of a set of multilayered representations, essential to the proper functioning of the internet. It consists of a set of representations of the internet viewed from various angles, depending on the perspective of the different stakeholders: system designers, telecommunication operators, program developers and users. To model the various aspects of the internet, a variety of media, understandable to the respective type of stakeholders are used: diagrams, circuits, logical frameworks, drawings and textual descriptions. Most standardization organizations for telecommunications have agreed on the OSI stack, but practice does not quite follow the standard. Actually, and after much discussion, the internet has adopted the TCP/IP standard as its lingua franca, which is not quite orthodox OSI, but seemingly close enough[2]—such details should not concern us here, except for the observation that the principles may be beautiful, but the reality our minds create will always be a compromise.

The multilayered organization of the internet has many advantages, not to say that it made the internet possible in the first place. Each layer in the OSI stack represents a specific type of structures and dynamics. It also has its layer specific type of descriptions, understandable to people who are active in that environment. For example, circuit specialists handle

[1] 'OSI' stands for 'Open Systems Interconnection' and defines a stack of representation standards adopted by 'ISO', the International Organization for Standardization, an independent international body, of which most national standardization bodies are members. The lowest OSI level is the 'physical' level, that takes care of the transmission and reception of bit streams representing internet messages. Next comes the 'data link' layer, that defines how the transmitted/received data is framed for transmission between nodes (this layer knows about 'data' while the transmission layer knows 'bits'). Then come the two layers that are of direct importance to programmers and users, the 'network layer' for structuring and managing the internet network of nodes, followed by the 'transport' layer for assuring reliable transmission of data segments between nodes in the internet. Other layers (not to be named here) take care of further needs of the communities of users and programmers. Each of these layers has its own terminology, basic assumptions and rules of expression, including methods that translate requirements from one layer into requests to another.

[2] 'TCP' stands for 'Transmission Control Protocol' and hence takes place at the OSI 'transport' layer, while 'IP' stands for 'Internet Protocol' and defines structuring and addressing of messages at the OSI transport layer. TCP/IP existed at the origin of the internet (funded by the American DARPA agency in the 1960s/70s) and predates the OSI stack, which it has greatly influenced. Internet programmers and users can forget about the two lower layers of the OSI stack, much as we forget about how sound is produced by our vocal cords and transmitted through the air when we speak.

circuit diagrams, software engineers use computer code and users utilize 'applications' (apps). How the various OSI layers relate to each other is specifically described in each layer. This mode of organization allows each layer to develop its own methods (sometimes called 'paradigms') but also allows each layer to evolve in its own specific way. The way the internet is implemented has changed considerably over the years without the basic layered structure having to change. Everything has become much faster and more massive, actually orders of magnitude, but the basic methods have remained the same, although they have become much more sophisticated. It makes one think of the evolution from simple houses to skyscrapers.

All this works well as people who use the internet know without being conscious of it, but with the evolution of electronics and computer science the existing modeling standards appear to be insufficient. There is an ongoing battle to adapt TCP/IP to circumstances for which it is not well suited. In particular, and with the progressing electronic miniaturization, so called "body area networks" are being introduced. These are mini wireless internet connecting devices attached to your body for which the classical internet standards are just inappropriate. So how do we cater to the new situation? A new layer? A new stack of standards? And then lots of new questions arise, among them, how to relate to the existing systems? A similar novel development is called "internet of things", where many devices of daily use (your fridge, washing machine, car, door bell, watch, TV set, even the walls in your house or the road on which you drive...) communicate with each other and with you. As things go, the current situation on these issues is purely chaotic with innovations creating new problems and companies or engineers coming up with their own solutions independently. Such an evolutionary state is on the one hand fascinating, but on the other not all that productive because the lack of compatibility between the various systems directs efforts towards solving frustrating incompatibilities rather than to further creative development, consolidation and improvement.

The situation on the societal ethical scene is often synonymous. There is no natural division between the various layers we may need to develop our ethics. Each layer that one may distinguish will handle its need for power and its information management in its own ways, but the layer boundaries are not well defined and there will be confusions between layers. When our ethical considerations start defining their domain of validity (their layer), they will make more or less random choices and create boundaries that are not there in reality, but are necessitated by the multi-layered approach, which itself is induced by the need to handle power and information in manageable entities. For example, we traditionally distinguish between the family, the school and the civic environment, and use ethical concepts for each of them. There have to be interactions between these environments, although they are structured in very different ways.

In every culture we witness what could be described as transgressions of one environment on the territory of the other: teachers telling parents what language or religion they should adopt with their children, families creating political dynasties, politicians telling teachers what they should and should not teach, etc... Similar interactions happen between cities and states, states and regions, and states and companies. It would be a mistake to try to order these various layers hierarchically as if the city government is the boss of the teachers who then are the bosses of the parents who in turn boss their children. There are multiple hierarchies involved, but their relations will have to be carefully monitored and considered part of the ethics as well. The philosophy we are developing here should also be considered itself as a new ethical layer. Trying to set up principles about how various ethical layers might best interact with each other is an ethical activity in itself and hence in turn subject to systemic relativity as well as evolution.

Is at least some order possible? Ethics burgeons where a community of stakeholders is capable of mustering sufficient power to direct developments in directions that it assesses as desirable. For this to happen certain conditions have to be satisfied: (1) the existence of the community with common needs and interests in the given domain, (2) the ability to generate sufficient information to make assessments, (3) mutual trust enabling agreement on principles and their consequences, and (4) adequate leveraging power. Communities of stakeholders can be very varied as the needs of individuals are very varied as well. Telecommunications, for example, thrives on the need of people all over the world to interact, so no wonder worldwide standards for it have developed in a fairly natural way. It is interesting to study how this has actually happened. Other basic needs of the human community are food, safety, autonomy, and a clean environment, but these have not yet found a sufficient basis of need and interest for a strong development of globally shared ethics, although impressive and valid attempts have been made.

Communities form in a certain direction or with a certain purpose by bonds that exploit one or the other shared mode of operation, or, if you accept a physical term, degrees of freedom in a shared direction. Different networks can form in different modes, for example, as political parties, professional organizations, unions of countries, sports associations, *Facebook* or *Whatsapp* clubs. Each of these exploit the degrees of freedom in which they can control their structure and evolution, what can be called their 'modus' of operation. This variety of potential modes will only be possible to the extent that they dispose of freedom in the directions necessary for their goals. Conflicts may develop not only between different communities in one mode (like teachers, politicians and parents on educational goals), but also between modes that decide on conflicting principles (like the ministry of finances deciding to curtail some programs of the ministry of education). The religious modus may conflict with the political and vice versa. The "give to Caesar what belongs to Caesar and to God what belongs to God" often works only in one direction, and one may easily guess which!

We have gotten far beyond the simple, some would say simplistic, ethics of former times. Rather than throw our arms up in despair about the present day complexity, let us consider that the diversity we are encountering is what allows for creativity and provides meaning to our strive for a "better" world. Thanks to our abilities to think, to communicate, and hence to cooperate, we are, as far as our society is concerned, endowed with the ability to correct what we experience as wrong and hence to evolve. How quickly our world has changed in the last fifty years, is testimony to this evolutionary proficiency! Perhaps people do not change much psychologically over generations, but the environment they create does change considerably and people keep adapting it and themselves. The psychology cannot be divorced from the environment. To change or to perish[3]!).

We have come to realize that the relations between the various ethical domains are not of a hierarchical nature. Rather, they are of what we would call "of a network type", meaning that they are connected and related to each other in various non-hierarchical ways so that the subsequent set up of meta-domains for 'good' interactions between these domains is necessary. For example, between the educational and the political domain, how one is allowed to influence the other, how they communicate, what rights and responsibilities each possesses. What is important is how such processes are actualized and allowed to evolve. In common practice, people will choose the most urgent cases instinctively where urgency may be determined by factors such as immediate needs, the danger of conflicts, power plays, or overbearing interests. This does not often produce the most desirable arrangements. As human intelligence also plays a role in overseeing the situation, there will be efforts to overcome the chaos, but these will in turn need information gathering, assessments, and the use and exercise of adequate power. This is a process without end, subject to perpetual innovation and 'emergent behavior', creative, chaotic, *and* open ended.

It is both the curse and the advantage of meta-ethics that the power it needs for effectiveness has to be derived from the domains it is supposed to harmonize. Students learn from teachers only as much as they put effort in the learning themselves. The imposition of outside force without internal

[3]There is a famous saying, probably due to the Shell strategist Arie De Geus, "Shell does not exist to pump oil, it pumps oil to exist", and, indeed, in recent times Shell is moving away from oil, albeit half-heartedly.

compliance mostly bears no productive results, quite the contrary. From the viewpoint of the party imposing its ethics, suppressing creativity might be considered desirable, but the general experience is that the collateral damage is so big that it overwhelms the so-called good intentions. The imposition of ethics by the use of force is experienced as dictatorship and hence invites resistance from the subjected party. This is often due to the unstable balance of power between the parties. As soon as one party becomes more successful it often attempts to annihilate the other, sometimes by sheer success (nothing succeeds so well as success, it is said, in particular when it destroys the competitor, but remember what the old teacher Lao Tzu said: "Success and failure are equal ailments".).

A network of largely independent ethical agents, complex as it is, has some unexpected advantages. Every mode of thinking will necessarily suffer from unilateralism. As it abstracts situations and derives strategies based on generalizations, it will neglect or overlook other approaches and force the system in a given direction. Often that may be desired. When you choose a profession, you cannot simultaneously become a doctor and a circus artist (with some exceptions!), and when you choose to be a doctor, you settle for a speciality, etc. But, when one considers a societal system, too rigid a choice will be stifling[4]. The neighborhood of competing ethical systems takes care of the necessary relativity.

I was recently following an intense discussion about "end-terms" for the Belgian high school system, a discussion between pedagogues, teachers, parents, students, and politicians about what should be the end result reached in secondary school, how it should be defined, and which agency should monitor compliance (with loss of subsidy as the imposed sanction). A list of ten 'abilities' that should be acquired by the students was drawn up and the politicians were to write the obligation for schools to reach them in most or all of their students into law. Needless to say, an example of top-down thinking from ill-defined abstract principles and hence very questionable! But even more questionable is the unilateral emphasis on 'abilities'. Different approaches might emphasize attitudes, culture, development, discovery, and then, why should any of these be imposed by authority? And then there is the unquestioned choice for legal enforcement (can 'maturity' be written into law? or creativity? or culture?). Obviously, the community pushed itself in a direction dictated by reward (subsidy) for performance (end-terms reached)—not a very attractive kind of ethics because of its narrow aims and the potential collateral damage (e.g., many failures). Interestingly, the ethics implicitly chosen was not even questioned in the discussion. All the participating educators and administrators patently knew exactly what an

[4]As happens when high school programs or university programs are fixed by law.

educational system has to achieve[5]. The definition of results belongs to the competence of specific educational institutions and in particular teachers *and students* themselves. Learning to set goals for oneself seems to me an eminently important educational activity, including the development of personal ethics. The financing authority may evaluate as impartially as possible the value of what is proposed by educators, but cannot put itself in the driving educational seat. The minister of education is primarily a politician, not an educator, hence somebody whose ethical outlook is to oversee from a societal point of view whether the educational system functions properly according to the ethics developed by the latter. The minister of sports (if such exists) should not tell the players how to play football nor the minister of culture the members of the orchestra how to play violin[6].

Unavoidably, the meta-ethics will have to reduce the power play between the parties by integrating power at a higher, shared level. At this level, the quality evaluation principles of the meta-ethics have to kick in. These may be, and often are, very primitive (e.g., by rule of force or by law), but the better tuned the global principles are on the genuine needs of the various parties, the more desirable the resulting arrangements will be. In many systems the harmonization of principles has to create a jigsaw puzzle of pieces contributed by the various parties involved, most obviously visible in systems that have a longstanding co-ethical history, such as the relation between the various actors in education. One just has to study the situation in this area in a number of countries to see the differences, the opportunities, and the dangers for things going awry. Obviously, there is no unique good solution except for a permanent "dialectics" based on ever improving modes of evaluation, confrontations, mutual influencing, and exercise of restrained power in various ways. At some point, the whole set up may hopelessly run into a snag and has to be fully rethought. At that point there will be a re-haul of the going meta-ethics, a reordering of the executing powers, and the cycle can start anew.

[5]It is of course easy to criticize such processes. There is also not a single 'good' solution, one has to foster diversity, and hence encourage initiatives and a variety of viewpoints, which is done better in some countries/systems than in others. The need the state has to control good use of finances has to be catered for in a different way. The state may require 'results' for its money, but it should abstain from defining narrow goals, thereby steering the whole system in an undesirable uniformity with many side effects (like an unnecessarily large number of failures or a loss of cultural awareness in the young generation).

[6]I have heard of a proposal to pay the violinists by the running meter, the trombonists by the cubic meter and the paukenists by the number of beats. Similarly, one could pay language teachers by the average number of words their students have learned. Such 'output financing' has definite disadvantages and hence limits, but it is the common mode in commercial exchange. This produces a good example of how directive the going ethics can be.

After a number of ethical concepts have been adopted and integrated into a system, there is the question of evaluating systems for their quality as a whole. What makes one system 'better' than another? The approach I advocate is putting our best human faculty in line, intelligence. This means: evaluating future effects based on representative scenarios that are conceived as well as possible given scientifically justified historical experience. Although the ultimate criterium of a strategy's goodness is evolutionary, a few guiding principles follow directly from this observation.

The very first is the *analysis of potential scenarios and consequences*. It amazes me how often this simple guideline is overlooked in public discussions. In the example of the 'end-terms' for education mentioned before, a single teleology—in the present example acquisition of skills—is simply posited as the goal of education without further consideration of consequences for that specific choice[7].

Next in line is then *shared teleology*. This is the sharing of goals and aspirations of all the parties involved, respecting each and using shared creativity to maximize results (rather than unfettered exploitation of resources, be they human or from nature). We shall explore this theme further in the chapter on the "meaning of life". Although teleology is important, it should not be rigid or unilateral, and should be shared.

The third property of the system needed is *adaptability to changing needs, circumstances, and constraints*. This means that as parties change, so do their teleology and their aptitudes. But the environment changes even more unpredictably, necessitating the regular updating of the analysis of effects and the consequences of whatever course one adopts. A network of independently functioning agents resembles a living organism, be it a relatively simple one when compared to true biological organisms. It consists of interacting parts with a common history, shared potential and a teleology that is commonly generated and transcends the individual participants.

Finally, the fourth, and perhaps the most important one is *respect for life, its potentiality, and creativity*. This last may seem the most difficult to justify since life in its great diversity contains both constructive and destructive elements, as well as intricate mixtures of both. We shall have to reconsider this topic in some detail when considering humanism as our chosen ethics.

The network structure, or perhaps lack of structure, offers great possi-

[7] An educational system would likely be 'better' if it were more holistic by integrating more elements important for the development of young people, while searching for a balance between them (e.g., a balance between art, science, physical, social and philosophical education). But even so, 'solutions' claimed to be uniformly valid would remain questionable, because the grooming of creativity has to be a major goal of education, requiring access to a kaleidoscope of possibilities. A fertile ground for participatory ethics!

bilities for adaptive development but also for straying. The precise location of the various ethical driving forces are not well defined. Bad effects are indicative for wrong locations. This is already true for hierarchical structures, in which the agent that defines the ethics is often usurped by the top, with disastrous consequences for the overall ethical health of the system. Examples abound: ethical or religious police in authoritarian states, ideological brain washing in educational systems, nationalistic intolerance induced by political leaders.

Wherever formally independent agents interact, there shall be behavioral influencing and conditioning. This is almost the essence of 'interacting'. It can be for the good or for the bad. Even in purely randomly connected systems, some ethical hierarchies will eventually appear. In human brains, consciousness appears as a central regulating agent, usually keeping the personal system well directed as it evolves in time. The dynamics of consciousness is only partially understood at present, but it should be obvious that consciousness achieves an equilibrium between intelligence and conditioning. Using its ability to learn from the past, evaluate circumstances and project into the future, intelligence is in some cases able to transcend the reigning conditioning. Such a learning process is most effective in younger persons for whom the plasticity of the brain is most pronounced, but people do retain the faculty to some extent their whole life, although a relapse into more primitive habits is never excluded.

In a network (and even in a hierarchy, which is a special form of a network), ethics as 'quality control' can be imposed by some agents on others, or it can be shared. Both mechanisms can be good or bad and have to be evaluated, creating the need for a meta-ethical layer, which, again can be imposed or shared. In an appendix of this chapter, I show how such mechanisms can be formalized. They may seem horrendously complex, but in our daily life we are continuously using them. We accept the imposition of certain ethical rules when they appear constructive to us (e.g., rules for driving our car or for paying taxes, principles of honesty, responsibility for our families etc...) and, on the other hand, we want to have the freedom to conduct our behavior ourselves with no interference from other agents. We participate in political systems which do set rules for others (like what teachers should do with our kids), but we are also reluctant to accept control on actions that interfere with what we desire as liberties. Ethics is more about choices than about rules, but rules may very well interfere with the directions we envisage. And our viewpoints differ from person to person and from society to society, producing culture and dynamism, necessary ingredients of a healthy societal network. Just like in our brains, the overall feasibility and sustainability of a networked system will need to strike a balance between all the ethically active agents present, whereby the actual ethics of each agent has to adapt dynamically to the agent's needs, abilities and possibilities. How a network can achieve this adaptivity is a major ethical problem in itself that shall require our further attention, and lead to the necessity of choosing some guiding principles for the in-bread development of multilayered ethics.

The case of Republicanism

A classical example of an ethical principle for society is 'republicanism', defined by Kant in [36] as a political system in which there is a strict division of power between the executive, the legislative and the judiciary[8]. Each of these three constitutive bodies has its own goals, structure, rules of operation and ethics. The relations between these entities must be well defined as well—a potential source for controversy. One may speak of a meta-ethics that governs the relationship and, in many societies, a fourth, supreme political body is created to oversee that relationship, or, alternatively, one body plays the role to oversee the relation between the other two. For example, a king or president, together with a 'council of state' may have a watchdog task and may have the power to make key appointments allowing for smooth transitions in either of the other bodies, or, for an alternative example, a special branch of the judiciary may oversee the correct functioning of the relation between the executive and the legislative. In a democracy such proceedings then have to be sanctioned, in turn, by majority (direct or indirect). There would be careful check-and-balances at each level, but occasions for disruption may easily arrise, e.g., by individuals not understanding the system or not playing by the ethical construction.

Although the three bodies (executive, legislative and judiciary) are largely independent in their constitution, they do have close connections. They are jointly responsible, in particular, to cater for a well-functioning society (i.e., concrete answers to the question "what well-functioning means"), and hence require extensive, carefully-defined interfaces. In most modern republican systems (adhering to Kant's definition), the executive proposes ways to deal with societal issues; the legislative has the right to establish the budget, to set laws and to control the actions of the executive; and the judiciary is an independent body for resolution of conflicts between all entities concerned; and many more institutional arrangements, which can vastly differ from one system to another. The three bodies share the need

[8] Kant does not call such a system 'democratic'. Rule by majority is not seen by him as giving sufficient guarantees for sensible politics, in particular for avoiding war, providing justice and respecting civil rights. Whether a republican system intrinsically avoids war, as Kant was thinking, is debatable given recent experience with the Vietnam and the Irak wars.

for trustworthy information and measures for continuous self-evaluation, allowing them to evolve together, amend their failures and charter a future that is globally sustainable and broadly supported by society (one such measure is regular elections, but other ways are equally conceivable such as referenda, international oversight or regular analysis by an independent agency.).

Of philosophical interest is not only the autonomy vs. dependance of these entities, but also the fact that in our republican systems they are historically concentrated in three abstractive clusters, while public live involves many more players not fitting in any of them. For example: teachers take care of the societal task to educate our youth but are typically not part of the executive branch (in some countries they are, but it turns out to be a better idea when they are largely independent, because the development of critical thinking and creativity will normally be a central goal of education.). The clustering is no more than one view on possible arrangements for practical societal ethics. I have argued all along that a comprehensive view is neither possible nor desirable, but the fact that our societies harbor the republican subdivision and separation of powers is a major component of their ethics.

The value of the republican system as defined by Kant is apparent when compared with systems in which a distinction between autonomies and a balance of power is not so clearly established. Respect for the autonomy and creativity of agents acting in different directions is an obvious necessity in any large scale system, power has to be restrained and no subsystem may be allowed to overrun the whole, although the system as a whole must be allowed to evolve and hence change. New dimensions may appear for which no provisions had been foreseen, for example, in our present world system, generalized communication between humans and the need for global respect, largely surpassing national boundaries, or, in another direction, the incidence of human economic activity on the well-being of our shared planet earth. That excessive power of national states needs regulation is obvious to whom follows international affairs.

In view of these modern developments, the classical subdivision in executive, legislative and judiciary bodies may be questioned as well. It is based on a philosophical perspective according to which the ideal world order and division of authority in society is fixed *ab initio* and, also according to Kant, only has to be discovered. Spinoza thought all societal order is derived from divine authority, an idea that has governed political thinking for centuries. The disadvantages of vesting all authority and hence all power in a single agent became very apparent at the end of the *Ancient Regime*, and the move towards republicanism can be seen as a major step forward for societal evolution. Notwithstanding its advantages, the republican system has, in my view, one major disadvantage, namely the lack of provisions for teleology. It is permanently in danger of being submerged by creativity and developments that cannot be foreseen. Although the topic would warrant a full treatise, let me just observe the, in my view, excessive reliance on laws. The basis of the system is the creation of a legal framework by the legislative that sets the frame of operations for the executive and is overseen by the judiciary. The creativity is limited to the creation of laws, which are supposed to clearly define how society must be structured and what freedom and obligations remain for the manifold of agents active in society. Clearly that is not the way society functions in actuality. Most of societie's activities are devoted to creative developments, sometimes initiated by the executive and sanctioned by the legislative (like investments in infrastructure or scientific research), but creativity is largely left to agents for whom legal frameworks are actually irrelevant, except perhaps incidentally. The societal tendency, based on the republican outlook, will then be to regulate such activities when they seem to threaten societal order, seen as the order set by laws. That may be necessary in some cases, but misses the mainstream of creativity that drives the most active forces in society. How society deals with its teleology is not explicitly foreseen in the republican system. How society 'should' evolve is equally a wrong question, induced by the belief that there is such a 'should'. The development of teleology is not a legalistic or moralistic issue. It is an issue of support and integration of the many agents active in society, who are invited to create societal ethics as life proceeds in unpredictable and unexpected directions.

At every point in time the value of the various personal and institutional elements dealt with in the societal system have to be reevaluated. Since there are no immovable and universal principles against which such a quality evaluation can be made, the ethics itself has to be continuously redefined within the newly evolving context, including the elaboration of ever changing, but hopefully well conceived, quality criteria and their consequences for the various stakeholders, who become more and more global the more humankind progresses towards integration. The fact that life provides for this perpetual renewal all the way up to our most lofty endeavors is what makes life so meaningful, a theme that I want to pursue in the next chapter.

I cannot resist quoting the old Chinese teacher again, who so aptly formulated his best ethics for the relation between leaders and subjects (or even teachers and pupils).

> A leader is best
> When people barely know that he exists,
> Not so good when people obey and acclaim him,

Worst when they despise him.
'Fail to honor people,
They fail to honor you;'
But of a good leader,
who talks little,
When his work is done,
his aim fulfilled,
They will all say,
'We did this ourselves.'

(Lao Tzu, The Way of Life, nr. 17 in the Witter Bynner translation [8].)

Appendix: an attempt at formalization

As an appendix to this chapter, let us consider how an "algebra of meta-ethics" would look like. Algebra is not, in the first place, about quantification. Etymologically, one would call it "the art of putting things together (New Oxford Dictionary)". It is a way in which (at least some) ethics can be formally implemented. This has been done in some special cases, for example, in the worldwide system of telecommunications we currently know and which I described in the beginning of this chapter.

Let us make a necessarily sketchy attempt at illustrating how a formalization can be done, using knowledge and experience from computer science, just to demonstrate the possibility. An 'object oriented' modeling framework as originally proposed by Adèle Goldberg and David Robson of Xerox research, provides for an adequate formal specification method. It is the most widely accepted modeling method in informatics, originally dubbed 'Smalltalk' by its inventors [28]. As a programming language, it allows for the formal definition of the constitutive entities, the procedures these entities are able to engage in, and the various modes of communication between them. The basic entities to be defined are *ethical domains*, so we would define what is called a 'class' for them. Each ethical domain would then be an 'instance' of that class[9]. An ethical domain (class) has a number of attributes (each an instance of another related class), in the first place *stakeholders*, namely the people defining the ethical principles and the people subjected to them (perhaps the same, but there are many very real examples where that is not the case, think about the medical establishment), but also their state (e.g., the state of a patient could be a combination of diagnostic entities, besides personal data like age and gender). Attached to each class there are 'methods' that can be evoked and acted on by members of the class, making the system evolve (some

[9]This being the terminology used by the Object-Oriented community

methods create new entities, even new classes, others modify characteristics and states, act on interrupts, force actions, manage memory etc.). Then there are the ethical principles, for example, which method applies where and when, and how the principles, including quality criteria, are being evaluated in the more concrete situations to which the methods apply and what are the consequences on the state of the objects. We need a separate class to define those, and their intrinsic relationships. Specific methods can also create new principles, learning processes, and new ways of evolution. Then, there are the relationships with other ethical domains, possibly implemented as interaction methods. We have seen that we need to identify minimally which ethical domains can influence which others and what their relations are. We have also seen that we need "super-domains" where mergers, conflicts, and evolutionary changes are resolved.

All this may seem very complex to accomplish and people may even object to the technical or deterministic characteristics of the whole process (although even that can be taken care of), but it has been done in the examples I used already such as design methodology or the OSI model, and it is used in modeling complex organizations. The exercise of drafting a setup for a concrete case (such as the relation between politics and education) helps to clarify issues, very much to the benefit of all parties involved. It forces a measure of understanding (we know already that there will never be full understanding). In telecommunications and design technology, the formalization has helped greatly to make the arrangements understandable for the parties involved and insure their quality (think e.g., of the safety of an airplane). This does not solve all, nor even most, ethical problems connected to them, but it does take care of problems that can be anticipated. Recently, telecommunications is beset with privacy and security problems, for which good solutions (good ethics) does not exist yet, and these, when proposed, will have to be formalized to be effective in a world in which there are billions of transactions every second. Formalization is not a luxury, it is going to be bitter necessity!

Zen Garden in Hoko-ji (Hamamatsu)..

Chapter 15

Ethics and the meaning of life

The evolutionary power of ethics stays central in this chapter. We explore the argument that the continuous construction of ethics produces new dimensions in human development. The quest for the meaning of life has come rather late in the progress of evolution and correlates strongly with the emergence of 'higher intelligence' as the ability to design scenarios, evaluate consequences and develop appropriate, leveraging action. From this point of view the quest for the meaning of life becomes a new ethical and hence evolutionary dimension aiming at increasing the quality of the human environment (and perhaps the environment in general). The chapter then continues with analyzing the connection between creativity and authority with the conclusion that 'meaning of life' cannot be produced by authority. The chapter ends with the sobering thought that although ethics and the production of meaning are open-ended, they are strongly limited by the evolutionary development of human ability, even though empathy and love can be seen as attempts to break down such barriers. The meaning of life can be acquired but can also be lost. The creation of meaning is at the heart of ethics.

> Voir ou périr (Teilhard de Chardin in the introduction of *Le Phénomène humain* [13]).

Nature has conceived life by creating organic molecules, cells, plants, insects, vertebrae, and mammals involving a great variety of processes continuously trying out new directions and generating novel structures. Some of these can propagate exponentially from generation to generation, but are kept in check through quality selection (fitness in their environment, but also effectiveness and scope of control). But why all this activity? Does this perpetual struggle for new and maybe better make any sense?

Searching for 'meaning' is an ability that has arisen very late in the evolution towards homo sapiens. Even very intelligent animal species do not seem very much concerned about the meaning of their existence, at least from what we know about them. Elephants spend most of the day and their life chewing plants, and it may seem that the sole purpose of an elephant on this earth is to continue its kind just by eating and reproducing[1]. They do develop a kind of community life, groom, and even love their offspring, have some nice times cuddling each other, respect their elders and are sad when one of them dies. But we have not found a treatise on Elephant Ethics so far, they follow a fairly specific mode of behavior (which is likely learned from generation to generation as most behavior is, on the basis of their brains' abilities), and they do communicate a kind of non-verbal ethics among their kin, which even we, humans, seem to understand[2]. Although they are very powerful (I understand they have no natural enemies, except viruses, bacteria and humans), their power is also their weakness. Their species might be considered a dead end of evolution, they do not seem to be able to go beyond their present state, e.g., by finding ways to free themselves from the curse of perpetual eating and reproducing.[3]

Viewed from the perspective of the elephant predicament, the quest for the meaning of life suddenly acquires a very real, new dimension. We already discussed the evolutionary potential of intelligence at length and how the ability to imagine developments, construct scenarios, and evaluate their

[1] An alternative viewpoint is what could be called the 'biblical'. The purpose of the creation of all the species and all of nature is for enjoyment of humanity, who receives the task of ruling over it. Although the statement fairly accurately describes present day ethics with respect to nature, if humanity continues its present ruling practices, it will almost certainly cause the destruction of nature as we know it. More recently, the naturalistic 'ecosystem' viewpoint has arisen, according to which all species are needed for mutual balance and support. Ecosystems describe the global, integrated situation more accurately than previous, less system-oriented attempts and hence lead to a more refined and potentially more evolutionarily effective ethics.

[2] And vice-versa, elephants are capable of developing understanding with their caretakers when in captivity.

[3] I am indebted to my editor, Ms. Melitta Konradi, for the following remark on this point, to which I can fully subscribe: "I'm not sure humanity is any different in this respect. If we stop reproducing, our species will eventually die out, as is already a concern in regard to certain populations. Is the evolution of humanity so wonderful in comparison with elephants? Or indeed any other animal species? All we seem to have done is escalate our war making tendencies to the point of creating weapons of mass destruction, deploying them once, and living in the perpetual danger that we may deploy them again with dire results for all life on earth. This combined with many other heinous activities that other animals do not engage in. I don't see that humanity is better than most animal species or that our ethics have resulted in a better world. Our arrogance that we are superior to other living species is astounding and also baseless. The roaming/eating/reproducing/companionship of elephants seems much superior to me."

effectiveness has been the strongest selective criterium in natural selection so far, to the benefit of ever "higher" forms of life, even when combined with less force, power and other obvious weaknesses. Organisms that can exploit the freedom available to them by gauging the effect of their actions to their own benefit have an immense advantage over those that only exercise force in a given direction without much regard for the consequences.

To give away the conclusion of this chapter, I want to argue that "giving meaning to life" and the development of ethics are strongly correlated and constitute together a new dimension in human evolution. By this I do not mean that the results of our efforts are necessarily beneficial—we have known quite a few destructive ethical systems—only that they provide for new ways that may very well improve the fitness of humanity in an evolutionary sense when properly directed. The important and evolutionarily effective new component that ethics brings to evolution, is its potential for anticipated structural quality enhancement. Ethics goes beyond the direct, operational effectiveness of specific actions or attitudes and may enhance their contribution as building blocks in a more comprehensive scheme of high quality personal and societal development, which then can be seen as providing the main ingredient for "meaning of life". The issue is worth further analysis.

The 'good' in the Socratic sense is "what life is worth living for" or "what gives quality to life", thereby equating 'worth' and 'quality', or, with another paraphrase, "what is valuable in life". From this vantage point, life is a perpetual process of creation, and although people are limited by the state they are in and the possibilities offered to them, they are in a position to condition their decisions towards improvement of whatever they set their minds on. Admittedly, the process may be very limited for certain or even many persons, but the availability of at least some creative potential will, in most cases, be there, at least in interpersonal relationships, if not in societal influence.

The situation then appears as follows:

- nature, including our own intelligence, will always try new and unexpected avenues (thanks to the incidence of chaos wherever it is active);

- advanced intelligence is capable of imagining scenarios of future development, ways to realize these by use of proxies, but also ways to control them (often also by proxies, even in several layers);

- using what they can imagine, the protagonists will enounce principles defining what they consider desirable and evaluate situations or actions for conformity to those principles, calling the ones that are considered to conform 'good' and those that are not 'bad';

- the process of innovation and "quality control" is limited (1) by the ability to assess consequences, (2) by the power of the individual or community to achieve results (mostly by intelligent leverage and proxies) and (3) by interference from competing agents;

- besides competing, intelligence can be shared (will therefore be shared) and can be transmitted (will therefore be transmitted) from generation to generation (a necessary condition for evolutionary effectiveness).

The fact that any domain of endeavor, however well conceived, cannot be isolated as a closed system and will always be subjected to competition from other domains and attempts at innovation, necessitates, by the logic of intelligence, ever newly conceived ethical efforts.

The meaning of life arises from the potential of innovation given by nature and the shaping abilities offered by intelligence, which, in themselves, can also be seen as a major achievement of nature. In other words, nature is engaged in a perpetual act of creation at all levels, inviting its constituents to shape their life (we could also say 'existence') towards communicable and inheritable new levels of quality. This is an intrinsic process of evolution like any other natural process. Quality is not fixed a priori, the notion invites experiment and the results may be disastrous, in which case they will end up in the graveyard of history and evolution, but they can just as well be highly rewarding. The attempt to foresee and influence the outcome, given our always limited abilities, is what gives humans a unique perspective on what may be considered the "value" of our lives. This value has no fixed limits. It can be communicated among humans and transmitted to future generations. It is also in danger of being ill-conceived, necessitating permanent alertness from its living participants and providing motivation for it.

The desire for "meaning of life" hence appears to be a uniquely new feature in the process of evolution. It cannot be anything other than a faculty of a new layer of intelligence, characterized by what I have presumptiously called "advanced intelligence". It seems that only humans are bothered by the desire to shape the world according to their thinking (and tinkering), with, as a corollary, the loss of "meaning of life" when they fail to do so, at least according to their perspective since one can only fail when one has set goals. To understand that human actions are not qualitatively neutral is a singular ability of intelligence and the realization of failure is bound to produce loss of meaning and hence anxiety[4].

Anxiety can already be observed in higher order mammals (perhaps also in lower order organisms, we do not know) as a result of powerlessness given a threatening situation. Research has established that there is a clear connection between powerlessness and anxiety. In humans it may lead to a more global assessment because humans can react not only to a given, actual situation, but to the imaginings of systematic occurrences given a "world view" or narrative. Such a generalized anxiety, consisting of despair and impotence, has been called *angst*. It leads to a situation whereby a human (or maybe even a whole community) loses perspective on the evolution of their lives, or at least on its perceived quality. Loss of meaning is loss of faith in the value of one's life.

It is worth analyzing the process of ethical development and meta-ethics further as they relate to the value of the 'meaning of life' concept itself. When Socrates was forced to take the cup of hemlock, he did not consider that act as meaningless, although it would lead immediately to his personal destruction. His faith in his ideas was unshaken, including the fact that he had to accept death. One might say Socrates "made it". Whether he lived or died did not matter any more to him. I presume that his conviction was 'death is a necessary process in the renewal of life' and even in the way one dies there is a quality, hence ethical, component, which he eminently displayed. As we know, his legacy endures to this day[5].

At this point, one may start wondering what *is* 'meaning of life' actually? Or, who is providing meaning to whom (or what)? Is the self-immolation of Socrates meaningful? In the case of Socrates, the best one can say is that the manner of his death highlights his philosophy and, in particular, what he means by a 'good life', which includes a 'good death'. Some people may see a categorical statement in this: "this is how one should lead one's life and one's death, according to the Socratic ethical principles". Such a statement posits a presumed set of ethical principles as the authority that provides meaning to Socrates' behavior, and the same would be true for whoever follows them as well, e.g., the Stoics. The temptation then looms high to formalize 'quality of life' into a set of principles that can be applied to people's lives, so that ethics becomes morals dictating

[4]Since human intelligence has the capacity to observe and evaluate natural processes, it can observe and evaluate its own performance. Whether one's intelligence assesses one's life to have meaning or not appears to be an intrinsic property of what we term 'consciousness'.

[5] The Stoic point of view on this matter is well developed by Marcus Aurelius in his *Meditations* [2]. He states that death has no import. It does not influence the past, which is gone already. The future also has no importance, since you do not own the future yet, so taking it away is of no concern to you (Book 2, 14). The only thing you lose is the moment, which is ephemeral anyway.

what people should do to lead a meaningful life.

From our previous developments we know where the misconception lies, namely in a combination of believing in universal principles and their application to concrete situations. But is there an alternative? Or can the concept 'meaning of life' be saved in a philosophy in which no, necessarily abstract, authority can decide on it? Before attempting to answer these very pertinent questions in a way that may seem contrived or conditioned by the equally abstract relativistic system of thought I have been developing, let me bring up the music analogy once more to guide us with the example of a less contentious context. Let us look at the situation of a music performer.

In this musical context, the question is, "How shall I, as a performer, decide that my playing music is meaningful, and what does it mean to be meaningful (notice the confusing double use of 'to mean', first as a quest for semantics and next as a reference to the value of my playing)?" I may have a host of motivations to play music: to please myself, to make a living, to be successful with an audience, to express my feelings, to meditate, or to enjoy the interaction with an instrument (including all of the above). Rephrasing the question, I could ask "When is the music I am playing meaningful either to myself or to an audience?" This transfers the quality I attach to my playing, to appreciation either by myself or by an audience. My life as a musician will be 'good' when it combines the quality I am able to muster with the intentions I have as a performer.

However one looks at it, there are lots of authorities on all sorts of musical topics (many contradicting each other), but no authority on what it means *for me* to be a good musician. In the case of my personal musical life, there is only one instance that can decide, and that is me. What gives meaning to my personal life as a musician is that I lead my musical life in what I consider a 'good' way, given all the contingencies I am in, whether I am seeking pleasure in music or mastery, whether I am a starting musician or a professional, an instrument player or a singer, or whatever other consideration I may have. Besides contingencies there are also possibilities and constraints. Hence, my ethics will consist in managing all of these based on what I consider their value to my personal life as a musician. The situation might of course take into account my social position. If I were a member of an orchestra, a similar kind of ethical challenge would be a common issue for all members of the orchestra with the added difficulty of making orchestral goals and individual goals harmonize. These, in any event, would have to be internalized, since the orchestra does not have a conscious identity beyond the collection of its constitutive members, except when the conductor, director of the concert house or any other agency capable of consciousness takes over the identity role by proxy, thereby causing a displacement of the ethical agent to another location[6].

A negative way to reformulate the question, remaining with the musical analogy is, "When is there failure and hence loss of meaning?" That musicians often place their goals too high is, of course, a common occurrence accompanied by the resulting disappointment. The healthy response to that predicament is actually very simple: reduce your goals to what you can master. Setting ambitious goals remains an eminently meaningful way to lead one's musical life, but it offers only one possibility. All sorts of other actions like searching for expertise (a music teacher), changing one's practice strategy, simply being happy with a 'lesser' performance, or even stopping music-making altogether and just enjoying other people's performances might be just as effective for one's musical development. The last option mentioned should not be interpreted as a defeat; what is defeated are only unreasonable expectations. Winning musical competitions is not the same thing as the development of a sensitive musical life. At some point it may be one's strategy: losing a (self-)competition may be just as meaningful as winning one since one does not learn as much from one's successes as from one's failures. The 'meaning of life' is not a question of success or failure, but of *conscious participation* both rational and emotional, inducing pleasure and contentment, but not limited to those aspects, given the unavoidable constitutive role such feelings play in conditioning our brains. Life is in a sense a Garden of Eden: it allows, even forces us to seek pleasure to shape our ethics, which may be of eminent use to others as well.

Does music have any meaning? To keep the analogy clean, the question should be considered within the realm of music itself. This is hard to do because music has a strong impact on people in various ways, emotionally, but also as a constituent of their experienced 'quality of life', and these aspects have turned the music industry into a major economic force. Hence, from the point of view of musical performers, the meaning of music can be sought outside music itself and, from the point of view of listeners, it may be considered pure pleasure seeking with no further ethical content. The question whether there exists something like "intrinsic music" may seem academic, but it is, nonetheless, one that drives musical evolution. Our best composers are continually searching for new musical idioms and/or improving existing ones. That this evolutionary drive may give them pleasure (very likely it will) is beside the point. Pleasure cannot be isolated from all the intricate biological mechanisms that make people (and mammals in general) function (it is an abstraction that singles out just one potential viewpoint). It is, on the contrary, the innovation process that provides meaning to the act of composing as recognized by the composers

[6] An issue we discussed somewhat in the chapter on Multilayered Ethics.

and (hopefully) by their listeners.

From a qualitative point of view, real life ethics and musical aesthetics have many similarities. The main difference is one of scope. Our real life is composed of many components radiating in a large variety of directions, relating to each other but also offering a manifold of potential modi induced by the many ways we are able to interact with our environment. Nature has created each of us with some degrees of freedom and a number of aptitudes, and each of us is a dynamic piece of nature participating in its great act of continuous creation as well. Our degrees of freedom are really there, but what they are and how they work out for each of us is not given beforehand and depends on many factors, namely all the chaotic interactions each of us has with our fellow humans and our environment and the aptitudes we happen to have at any juncture of time. Like in the music example, there is no fixed program set out for each of us, the situation is actually the opposite: what we do and how we behave create our individual lives. I discussed the issue of freedom in a separate chapter. We do dispose of degrees of freedom, and we are able to influence the course of our lives accordingly, but these are not univocally given, are dependent on evolving circumstances for each of us, and are exploited by our abilities to integrate our desires and our goals.

This being said, our individual degrees of freedom meet those of other participants and those generally active in nature. A massive and permanently changing kaleidoscope of activities driven by an equally massive number of relatively independent agents ensues. Many of these agents exercise their power in directions that cannot be influenced and have to be considered as setting dynamic constraints. On other agents we can exercise some influence (often through proxies). Conscious agents can be influenced by communication and we can be influenced by them. It should be clear that at any moment an immense number of possibilities arise. This is the environment the human mind has to function in, as the most effective faculty humans have.

Correspondingly, the stakes for ethics are much higher than those for aesthetics: “To be or not to be, that is the question!” Logically, I would consider “loosing the meaning of life” to be a failure of ethics seen as our ability to set valuable goals *individually*, not that formal ethics can be an authority on the issue, but the process of developing ethical consciousness is what produces meaning to our lives, and the fact that this process lives in each of us individually is what makes it so pertinent. The two notions, ‘ethical consciousness’ and ‘meaning of life’ are so closely related because ethics consists of the actual set of principles persons use to lead their lives and attachment of ‘quality’ to them is what gives value and hence meaning. The meaning of life is produced by the many conscious agents, who use their own independent capabilities and intuition: it is what they do in all actuality what counts, and not what they are supposed to do according to some externally or internally imposed rules, commandments, theories, or whatever (although people are perfectly entitled to be influenced by all sorts of contacts.).

The creation of 'meaning', in the sense of the 'meaning of life', is then seen as a process that drives humankind's evolution, for better or worse, because what is considered 'good' at a certain juncture (by myself, other people, or society) is a momentary assessment of evolutionary potential. It may not be good at all later on or when circumstances change. The only thing we know for sure is that there is no absolute good. Each notion of good has to be subjected to further criticism and further evaluation in an endless process of building ethics and hence the meaning of life. It is driven by the unique potential life continuously provides to each of us as long as we are alive.

The idea that providing the meaning of life is the driving force of human evolution may be satisfying from a theoretical perspective, but does it help to alleviate the personal despair inherent in losing confidence in the ability to participate? It seems to be the price humanity has to pay for the new faculty of consciousness evolution has created. It is true that many people will not care most of the time about the looming abyss of despair as long as they lead an unproblematic life, but it is also true that most will have to face the question at some juncture of their lives and some may experience it even all the time. There is, in my view, no straight solution to this issue. The psychological reality of impotence, suffering, unfulfilled hopes, or other causes of despair and anxiety is just there. It helps somewhat to acknowledge this and the negative thoughts may be relativized by considering alternatives or a more global perspective (what emergence can do to chaos), but one is also forced to accept it as a necessary complement of the ability of shaping ethics as 'meaning of life', as was demonstrated by Socrates, or, in the context of Christianity, by Jesus Christ's acceptance of his death on the cross (Christ's existential struggle and his acceptance of "God's will" is a central tenet of Christianity[7].).

Every ethical endeavor is necessarily limited by semantic, linguistic, historical, and practical contingencies. The question arises whether, given all its limitations, there is some constancy in which the creation of novel ethics grafted on the development of nature and human circumstances is possible. Why would one ethical approach be or become preferable to another? How to evaluate the quality of ethical developments? What is the ethics of ethics if such exists? There are two possible way outs of such seemingly

[7]Poignantly rendered in music by J.S. Bach in his Passions.

impossible questions. One is by considering the evaluation of ethics as a non-ethical endeavor belonging to another realm of considerations than ethics itself (metaphysics? ontology? theology? sociology? biology?). The other is by accepting that the building of an ethical framework is a creative process, itself subjected to chaotic development, just as is the case with all observable processes of life so far. I am very much inclined to that second position, given experience with similar issues concerning other ideals such as 'truth' or 'beauty'. It is our predicament, but also our opportunity, that there will never be an ultimate ethics. Each trial in that direction will have to be subjected to new quality evaluations, which in turn require assessment, and so on.

Although it may seem a gratifying thought that "there is always a beyond", mainly induced by the ever re-emerging creativity of nature in all its aspects (including intelligence and hence ethics), the driving power of what we consider human "advanced intelligence" (advanced with respect to other mammals) has to be assumed limited, mostly by its own capacities. Even though we seem to have a capacity for limitless imagining of new circumstances and structures, and we possess a capacity to construct ever more powerful exploratory and investigatory instruments, our capacity to know and to foresee necessarily has limits—the more we know the more we experience our deficiencies (much of the philosophy we have been developing in these pages has been an exploration of our deficiencies). Observing the relatively limited intelligence of non-human mammals, we immediately see their boundaries, and we see also how they are not capable of being aware of their boundaries themselves. The idea that the advanced intelligence or consciousness of humans is the ultimate type of intelligence, has to be relegated to the realm of unlikely or even preposterous beliefs. But, just as is the case with animal intelligence, we are not capable of seeing 'beyond' our own knowledge, although we can certainly experience our limitations, suffice to mention the seemingly near impossibility of political ethics to move beyond the narrow interests of the concerned as an example.

The consequence is: there is a limit to what we can imagine as ultimate ethical behavior just because there is a limit nature has arrived at with the development of our species. As humans, we have the ability to be grateful for what we have got because we can imagine what it may lead to, in particular, what kind of future humanity might create for the world (or maybe another planet we might have to move to when the situation on planet earth has become unlivable, if it becomes at all possible to move out) and how it could improve the human condition in many directions. But our ability to project into the future ends more or less there as well. We accept our humanity as the best we have and our efforts to let it blossom allows us to live the full potential of life given to us. This leaves open *how* to deal with new circumstances, but it does provide for criteria to determine the quality of our actions. That appears to be the important innovation our species has reached in its evolution. For example, any class of actions that demonstrably leads to a foreseeable destruction of our earth's eco-system would be "bad" and hence should be avoided. Natural selection as we conceive it puts a harsh limit on the quality of our actions[8].

Humanity's advanced intelligence has invented a number of notions that at the present time we consider "good" from the broader perspective of meta-ethics, i.e., the evaluation and comparison of competing ethical systems. Possibly the most central of such notions is "love" as the attitude of unconditional appreciation of life and nature. As a meta-ethical principle, love between persons does not consist of a concrete recipe for action. It serves as a guideline for the qualitative evaluation of certain attitudes within an ethical concept (be it personal or societal), e.g., how a physician deals with his patients or in an educational system, how a teacher conceives their relation with their students[9]. A related notion is that of "respect", for example, respect for the patient, the student, or nature. The same holds true for the notions of "honesty" and "beauty". These notions have no universal applicability (e.g., the exercise of what is conceived as "love" can easily go astray as happened with the burning of heretics for their own good in the Middle Ages). They have to be re-interpreted in every specific ethical framework. But they indicate, nonetheless, qualities that our extended intelligence is able to recognize in a more general context of competing ethical considerations.

The application of such overarching quality criteria has great emotional effects. This is an indication of their evolutionary importance[10]. Thanks to them, humanity has been able to figure out ways to overcome many, in hindsight obviously failed, attempts at organizing our world in at least some acceptable—say evolutionarily productive—ways. General concepts of love or beauty do not tell you (or society) how to behave, only whether the behavior matches your instincts for a valuable life in the direction they

[8]From a cosmic point of view it might be that our earth is just infected by humanity and has to be destroyed for a healthy universe.

[9]In the limit one could even talk of love embedded in medical practice or in the educational system, in as much it is designed to cater for the well-being of the recipients. This is not at all evident, medical or educational practice may for example be aiming primarily at optimizing profit of the organizing institutions. Like power, profit may be a necessary ingredient, but the chosen ethics will have to balance goals and means. In many present day arrangements the balance has often been lost to favor profit.

[10]To be clear, I do not want to make a distinction between emotional and brain processes in humans. It is known that they are based more or less on similar neurological mechanisms. In the same vein, I do not subscribe to the traditional distinction between emotions and reason.

indicate (the well-being of others or the aesthetic tradition). The comparison with aesthetics—say music—may indeed help to understand how this functions. There is no such thing as "good" music by itself.

Love primarily refers to relations between persons[11]. It considers the quality of the behavior of one person with respect to the well-being of the other, e.g., care for the mutual well-being as a quality of the relationship, or, extended to nature, the behavior of a person towards nature's well-being. It induces one person into a considerate evaluation of the effects their behavior has on another. Just as with the creation of beauty in music, love has a creative component to it, producing a new type of interpersonal relationship that develops its own innovative and integrative dynamics while considering, generating and evaluating the induced behavior. One may say that the act of love is successful as measured by the beneficial results for the parties involved. However, the mere effort to benefit another may already be considered love, be it as an initial step.

The emotional impact of love contributes greatly to the "meaning of life". It contains all the ingredients that serve life's evolutionary tendency: creativity and quality selection. It also works in two directions, from giver to receiver and vice-versa. The giver becomes the recipient of the appreciation of the receiver. Love inspires love, not always, but, from a broader perspective, in most cases. The love of caretakers towards totally incapacitated persons may not be reciprocated by the recipients themselves, but certainly elicits a high societal appreciation. In addition, love fits well the evolutionary need for cooperation and related empathy. However, notwithstanding its evolutionary qualities, love's emergence has had a long and difficult history and still has a long way to go before the leveraging power of its qualities becomes fully acknowledged by ethical agents.

Many of these highly abstracted idealistic categories (love, beauty, honesty, modesty) have common characteristics with differing nuances. They may, to some extent, be contradictory as well. This is because each nuance may tend or direct towards different results when considered in a concrete situation. However, the notions do have a potential for communication and sharing, although one that requires making their affects explicit. In this respect, the meaning given to these qualities rejoins semantics as the meaning given to words within a semantic context. Then again, semantics is based on effects and consequences whose intelligent evaluation may provide for a common basis of assessment between persons or agents who are developing their ethics.

A final connection ties "meaning of life" to psychological health. When

[11]There are many derived or secondary uses of the notion, mostly just indicating a state of mind.

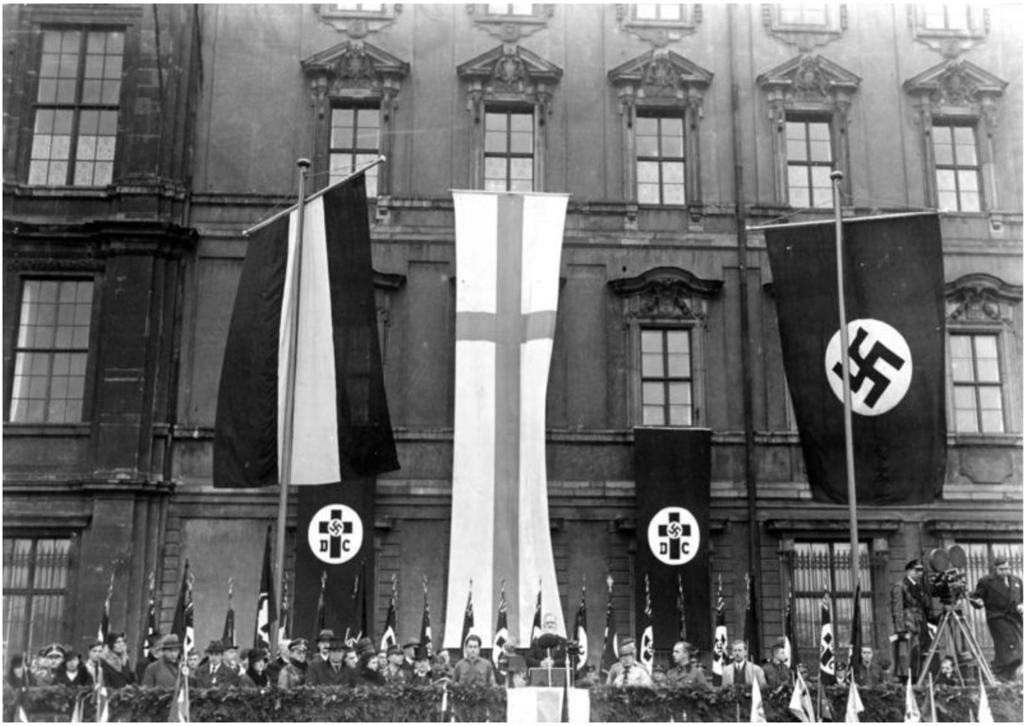
a person produces for themselves the qualities that they view as the main components of their ethical outlook, they engage in a cognitive process that involves their top layer of intelligence, namely consciousness. It is the layer of cognition that is capable of positioning the person in relation to others and to nature, viewing and accepting themselves as an intrinsic constitutive element of the global 'existence' of the world. Having this openness towards oneself, others, and nature not only produces "meaning of life" but also constitutes our best characterization of psychological health (as viewed by modern cognitive psychology).

One may wonder if all this philosophizing is of any help in producing 'meaning of life' to a given person. It may provide a number of perspectives and be of help in understanding the notions used, but life turns out to be much more involved, confronting a person's predicaments with the person's individual psychology. As many experience it, the meaning in their life is often conveyed by outside parties. This may go to great extremes. A community may decide that sick or elderly people are not productive any more, their 'meaning of life' being associated with their perceived usefulness as defined by that community. Although the person herself is the only agent capable of providing meaning to her life in the final analysis, persons might do so by internalizing the value society has generated for them. What such a person may not be aware of is that a societally imposed valuation is just one possibility available to herself. An incapacitated grandmother may have been written off by society, but may feel interest in her children and grandchildren, who return the attention with love. It is really up to her to focus the meaning of her life on this endeavor, to the benefit of herself as an integral part of nature and the quality of life of all concerned. This is a mere example of a more general psychological principle active in this instance. Psychological problems like depression[12], despair, and even 'angst' may find a resolution in what is termed 'changed cognition', a process explored in the impressive work of David Burns and described in his book *feeling good: the new mood therapy* [7]. The cognition system works by changing a person's perspectives to a more realistic, or at least more beneficial, outlook.

I certainly do not want to exaggerate the power of philosophy in helping to provide meaning to people's lives, but there is one thing philosophy can do and that is to analyze in considerable depth what ethics is and how it may affect the human condition. Even when it does this in a negative way,

[12]Some psychologists claim that depressed people see things as they really are, but in our analysis of reality we have concluded that the notion of reality and the representation of reality have to be considered brain processes, which have some relation or morphism with what happens in a person's environment, but are heavily tainted by the person's perception and conditioning.

namely understanding what may be considered ‘bad’ ethics, it contributes significantly to the human condition. We saw already that it is much easier to prove negative qualities than positive ones and our analysis would not be complete if we did not try to do that systematically. This is what we are now about to do, in the following chapter.



German Christian organizations celebrating Luther Day in Berlin, 1933.

Chapter 16

Diseases of ethics and derived principles

Ethics is not viewed here as an ideal system to be striven for, but as the actual efforts people and societies make to design their lives. Ethics strives at generating a 'good' life, but since the notion of 'good' as an abstract, context-dependent entity is not well defined, many avenues leading towards the presumed 'good' can be followed, including many that stray. It is like striving for 'good health'. What may be considered 'good' evolves with evolving knowledge, in particular knowledge of effects and consequences. Although ethics cannot be based solely on consequences, these constitute an important element in the evaluation. But there are more fallacies in the development of ethics besides lack of knowledge that may be considered 'diseases of ethics', much as certain habits may be considered diseases for the realm of physical health. The chapter therefore moves to the issue of 'healthy evolutionary development' and defines three main guiding principles, admittedly based on a humanist view of personal, societal and environmental 'well-being'. The negation of those allows the assessment of what may be classified as ethical diseases.

> It is rare that people give. Most people guard and keep: they suppose that it is they themselves that they are guarding and keeping, whereas what they are actually guarding and keeping is their system of reality and what they assume themselves to be (from James Baldwin, *The fire next time* [3], p. 86).

History has not been kind to bad ethical systems! In recent times it has discarded both Nazism and Communism resulting in a massive amount of self-generated destruction and collateral human suffering. These systems, which tried to force certain types of belief and behavior on people, failed miserably from their own un-naturalness. Either they generated a massive and destructive amount of external opposition (as Nazism did) and/or were diseased from within and died out at the hands of their own perversions (as happened both with Nazism and Communism). Surely, there must be a way to analyze what can go awry in ethical systems in order for people and society to learn for the future and make sensible assessments of present systems.

The consideration of some specific cases may help us understand how an ethical system can be criticized and, in the process, how a meta-ethical system can be developed. To approach the issue, I propose to relate the notions of 'goodness' and 'health' closely, thereby putting the topic in the context of natural selection, which, in turn, forces (at least) sustainability and hence defines what one would mean by health. In this approach, 'bad ethics' generates an ethical disease and how medicine treats 'health' provides us with both a special case and a good metaphor. In previous chapters we defined (following Socrates) ethics as the 'design of our lives' and in this respect bad ethics would lead to a bad design, understood as one that does not satisfy the stated purposes or, in particular, the expected quality criteria. Design engineering will provide us with another special case and metaphor as well. Let us consider these two examples first (they are also related, since 'generating health' may be considered a design problem for medicine.).

It has taken a long time for medicine to develop into some measure of trustworthy practice. The main driving force of this development is the increasing incidence of scientific evidence used by medical practitioners. Physicians need of course many other abilities, in particular psychological, which have been essential (but also often neglected) from the beginning of the art of medicine. But the systematic use of science ranging from physics to psychology and the development of medical disciplines for their own systematics have fundamentally changed medical practice. Science may be described as the art of discovering and validating structural relationships between phenomena. The validation is based on prediction of consequences followed by verification of their occurrence. Therefore, a scientific endeavor has to determine both its scope or field of view and the method of verification it adopts within that field. In the development of medicine, many supposed relationships, e.g., between cause and effect, have turned out to be spurious, based on false beliefs or bad verification techniques (in particular dubious statistical methods), unwarranted generalizations or skewed analogies. The determination of scientific truth in medicine is a perennial struggle, which has known some great successes, but had to deal with a lot of uncertainty as well.

Therefore, 'good' medicine will take both the known and the unknown in stride, to the benefit of the patient (we must leave it up to the art of medicine to figure out how to provide patients with good treatments in case of uncertainty; that is a component in its actual ethics.). The important point is that medical practice remains focussed on its goal of providing "comprehensive health care" given the state of consolidated knowledge available. Medical practice will change with increasing knowledge (and luckily so), but the quality goal, i.e., the ethical goal of providing best possible health care will remain a constant endeavor, providing meaning and motivation for all the efforts. As life and death are natural processes, best possible health care does not mean the avoidance of death at any price. How to deal with death is a very substantial component of medical ethics in which a number of factors have to be balanced against each other, the well-being of the patient being primordial, as this is the central goal of medicine. Presumably this is a multi-objective optimization problem requiring continuous interaction between practitioners and the general population, and hence a balanced relation between medical ethics and societal meta-ethics.

However, what we want to consider at this point is the health of a medical system itself. From the discussion so far, we may distinguish two directions where things go awry. One is the ineffective use of knowledge (the scientific aspect) and the other, loss of sight of the main goal of medicine, namely, the provision of comprehensive health to patients (a teleological aspect). In short, we can identify potential sickness of means and potential sickness of goals. Both types of systemic diseases may have a whole slew of sub-types as they get specialized to specific instances. Let me give a couple of examples.

As an example of sickness of means, it took Western medicine a few thousand years from its inception as a codified discipline to finally discover the exact anatomy of the human body. Up to the time of Vesalius, human anatomy was only inferred from experience with animals and further guesses. Interestingly enough, the first anatomists had to dig up dead bodies surreptitiously at night because checking on dead bodies was considered morally despicable, preventing them to resurrect at the last ordeal (an unexpected connection between healthy scientific practice and the obvious ethical disease of "preventing knowledge"). In recent times, many bad statistical inferences in medicine have been exposed, although they belonged for a long time to accepted medical 'knowledge'.

For sickness of goals, medicine can easily go astray when very expensive treatments with little prospect of success are offered to patients whereby expected benefits tend towards economic profit for the producers of medical treatments rather than well considered overall well-being of the patients, including a respectful and humanly acceptable process of dying. The indiscriminate application of the principle "saving life at all costs" is an example of an ethical illness of the teleological kind, not necessarily motivated by profit but certainly a consequence of the unconscionable application of a general principle.

'Wrong means' and 'false goals' are obvious ethical diseases because they influence the quality of the chosen procedures directly. However, there are more possibilities for disease. Ethics as the quest for "good" behavioral choices plays at many levels: personal, familial, professional, societal, and within each of these there may be subdivisions as well. These levels are intertwined and influence each other in either conciliatory or contradicting ways. How a person behaves as a politician or as a professional may be conditioned by or contradictory to the person's ethical choices. A Nazi criminal may be a loving father and a passionately dedicated surgeon a lousy citizen. When various 'layers' or 'levels' interact destructively is another source of potential disease (cancer cell biology has some excellent natural examples of this phenomenon!).

Engineers (in particular electronic engineers) encounter similar issues when they design a novel system (say an electronic device like a smartphone). A well designed electronic circuit may have an inadequate function and, vice versa, a very attractive function may have a lousy implementation as an electronic circuit. Even when each individual level has been designed according to the best possible practice there may still be undesirable effects due to (1) lack of compatibility between levels or (2) improper interfacing between components of the system. In the first case the goals of one description level do not correspond to those of the other i.e. there is no coherence of goals (or purpose). In the second case, the transmission of information from one part of the system to the other is defective, the means at the system level are inadequate, in particular the communication between components[1].

A globally healthy ethics has to harmonize its various levels and its various constituents. One could speak about 'vertical compatibility' or 'semantic compatibility' between levels of abstraction and 'horizontal or structural compatibility' between components. In a complex system like a society these subdivisions intertwine of course. This does not mean that one level or one component should have preponderance over another, but that both have defined their semantics and interfaces coherently. Society cannot replace personal ethics nor can a single person be held responsible for societal ethical health. On the other hand, society has to create the means for healthy personal development, while individual persons must influence society towards global health and sustainability. We may speak of ill health when there are conflicts of means and goals between layers

[1] The reader who is interested how these questions are handled in technical systems might consult the already mentioned OSI model or the definition of the 'Smart Grid framework' by the NIST.

or agents in the social network and, in particular, when their individual quality criteria are not compatible.

The situation is not that different from how a successful biological organism functions. Our body is dependent on the health of almost all of its constituents, brain, lungs, heart, kidneys, etc... All of them are capable of functioning according to their own healthy modi, but all are also dependent on the correct interfacing with the other constituents. Muscles must receive oxygen-rich blood and axons must transfer well-formed neural signals. The heart cannot replace the brain nor the kidneys, yet their interfacing happens mediated through sometimes simple, but essential, mechanisms (often selective communication between cells, a recent very active topic of scientific research). Unfortunately, and this is the danger inherent in any complex organism, as soon as one of the constituents starts failing, the whole organism is in danger of failing as well, because its overall healthy functioning is conditioned on the healthy functioning of each subsystem (in various degrees).

In many non-biological systems, the connections and interfaces are not as tight as in an organic body and the analogy stops there. Tightness prevents adaptivity. On the other hand, tight interfacing is often needed to achieve higher functions. In a complex society like ours, connectivity problems abound in one sense (too tight) or another (not tight enough). For healthy ethical development, methods have to be put in place between interacting agents to harmonize their connectivity (not too little, not too much!), often mediated by a third agent acting at the level of joint interests. For example, society has an interest in public health and may mediate between the providers of medical services and the patients, e.g., by creating public health insurance, or special services like newborn care and home care assistance to needy persons. That this is clearly an ethical choice is exemplified by the fact that such services differ widely between various countries and communities.

The assessment of a given society's general state of health is in itself an ethical issue that cannot be resolved in a universal and univocal way. Many choices at various levels are possible, but they all are subject to what I would call the "discipline of natural selection" or, more precisely, the "discipline of sustainability" (in analogy with but also in contrast to the "discipline of the market" beloved by economics and which may turn out to produce a sickness of means when market strength is pegged against the societal value of a product.). Natural selection is not a predictive criterion, although in quite a few cases disaster can be predicted (an interesting case is whether one could have predicted the demise of the from the start clearly ethically unhealthy system of Nazism: in 1933? in 1940? or in 1943? Prediction by hindsight is extremely easy!) Failure is often only patent *post mortem.*

The criterion of natural selection is an *a posteriori* criterion since the quality assessment it provides comes much after the occurrence. Only "advanced intelligence", with its ability to imagine scenarios and evaluate consequences, provides for a predictive analysis, albeit it an uncertain one, because of (1) the incidence of chaos and (2) lack of knowledge. We, humans, have no other choice than to apply our intelligence and make our decisions as best we can, using the partial knowledge or even just beliefs we have on how nature and society function at their various levels, while keeping in mind that a minimal first goal is the healthy, sustainable existence of our earth and our species. To achieve this will entail careful consideration of our various intrinsic levels of endeavor, which allow us, personally, as well as our societies and their manifold components, to function healthily and, in particular, to harmonize their interfaces (semantic and structural) with the goal of achieving shared enduring health.

There is no overarching solution to the manifold of ethical dilemmas the competition of individual ethical agents poses. The only thing that we can argue is that we, as consciously intelligent agents, are singularly able to assess where an ethical construction shows weaknesses and disorder, and we can only do this based on our actual knowledge, and of course limited by our intelligence. To begin with, and in contrast to humans, human society itself is not, as far as we know and experience, the seat of intelligent creativity, which is the main motor behind the present state of biological evolution on earth. There is no single authority that has the intrinsic, biologically incorporated, task to declare what the purpose of society is (although there certainly are many competing authorities with various types of claims and relative degrees of power). In terms of present day evolutionary effectiveness, what I have called individual 'advanced intelligence' is the only prime mover known to us, and, in any event, it is the one at our disposal. It is a fact that time and again it has been able to overcome its competitors creatively. As such, its ability to establish continuous evolutionary health for itself will be its prime asset against all other authorities that are not capable of doing so, because their energy is directed towards the safeguard of their authority instead of being adaptive to changing circumstances (as mentioned before in the discussion on intelligence, there are always new dimensions to be discovered that can leverage against any type of force or authority.).

Although there are many both natural and societal predators that may try to establish themselves, such as some types of viruses or some types of organizations[2], there are none that can establish the knowledge (science)

[2] Think of the mafia, or, perhaps less immediately lethal, companies trying to acquire

and teleology (goal direction) humans can with their intelligence. After all, humankind has, so far, been able to control the onslaught of viruses thanks to our ability to generate knowledge and derive effective controlling measures. A serious competitor to guiding evolution would be some type of society that imposes behavior on humans towards its global aims. A number of attempts in this direction come to mind, for example, communism, extreme nationalism or even some types of raw capitalism, but they have failed so far, and for not so subtle reasons, namely their tendency to impose a rigid world order and their concomitant failure to recognize and nurture the creative potentials of the participating humans. The relation between individual creativity and the globalized needs of all members of a society is definitely a complex issue that needs careful grooming and subtle interactions. At this point of the discussion I want to make a carefully motivated but determining ethical choice on the relation society to individuals (the proposal is by no means generally accepted, and I shall have to defend it as well as I can!).

The prime choice of a global ethical principle or guideline for societal development that follows from the development of our arguments so far, is for what we may call *humanism* shorthand, by which I mean the *goal of creating integrative well-being for all humans.* By 'integrative' I mean not only irrespective of race, nation, age or other subdivisions of humanity, but also in harmony with nature, whose well-being is essential for longer term human well-being, as it provides the unique environment for human existence[3]. In a humanistic ethics, the aim of society is seen as the nurturing of the potential of its human constituents, within the limits of healthy sustainability and respect for each and every person. As it goes with principles in general, this does not tell us how it works out within the context of a given society, it only gives us semantic guidance whereby the analysis of the consequences of concrete provisions assisted by knowledge and experience plays a critical role. Human intelligence needs society. It needs the accumulation of knowledge and skills society provides, not to speak of the many societal provisions that allow humans to function comfortably and have the necessary freedom of movement and thought to exercise their creativity. Conversely, everything society has to offer has been, at least initially and conceptually, humanly generated and remains permanently dependent on human participation and creativity.

A further specification of the humanist principle states that the accord and interfacing between humans and society has to be the prime object or concern of societal ethics. Humans and society cannot develop healthily

economic power at the cost of people's or nature's health.

[3]As we, humans, understand 'existence' — see the chapter on this notion.

without some concordance of goals and the effective interfaces to leverage them whereby human creativity will necessarily be the prime mover. Ethics of society is a derived ethics, even though the overall health of its participants is very much dependent on how society functions. Personal and societal ethics must hence develop together, with 'advanced intelligence' as the necessary prime mover, which means the ability humans share to understand effects, assess consequences and derive quality criteria for them, none of which are fixed in time. The interface between persons and society must be the conduit of this intelligence while the common goal must be the healthy sustainability of our comprehensive world, including its creative dynamics[4].

Although the choice for humanism is an unproven premiss, it has been adopted by medical practice on a large scale as well. Humanism as defined here is also a tenet of major religions[5] and can be motivated extremely well by its benefits for individual humans and the humane society it helps to create. Nonetheless, practice may deviate considerably in several directions. Nations consider themselves only responsible for their own people, whose presumed rights they defend even at the detriment of other people. In many health care systems there are provisions that restrict access to only certain categories of people. And then there is the "Uebermensch" philosophy, which aims at guaranteeing the survival of the fittest by bestowing favors on presumably fit people at the expense of those who are considered less fit[6]. All these lead to practices that I consider unhealthy, mainly because of provable destructive effects on the human condition. The choices we make in concretizing our ethics following our chosen guidelines, have to be motivated carefully at each stage towards implementation. This need for motivation is not any different from the development of medical, aesthetic or design quality criteria.

In viewing the process of integrating personal intelligence into society, the term 'democracy' comes to mind, as presumably it is a system

[4]Not surprisingly, the analysis arrives at similar conclusions as those of Kant in his *Die Metaphysic der Sitten* [34] concerning the value of an individual person; however, our analysis uses a different approach, one not based on 'reason' as Kant's does, but on the evolutionary potential of 'intelligence', which requires participation and integration. The difference may seem subtle, but, in contrast to Kant's claim of an unavoidable univocal conclusion, no such claim can be made here. Reason is based on intelligence, but the latter is only a biological notion in which reason may find a place. Kant's conclusion requires preliminary axioms on the properties of 'reason', whose universal validity is questionable.

[5]Humanism has been seen historically as 'replacing God by humans' as the prime source of ethics, but most modern religions do not subscribe to that viewpoint and accept respect for humans as a central principle.

[6]Not much different is the idea, nurtured by some religions, that wealth is a sign of godly approval or moral superiority, which has to be safeguarded at all cost.

that makes society respect individual freedom and power. As a lofty aim, the term 'democracy' does not say much about its actual implementation. Moreover, the etymology of the term is somewhat tainted with the implicit reference to power ('-cracy'). Since Tocqueville [15] and thanks to much experience with subsequent 'democratic' revolutions, we know that the mere exercise of majority power does not provide the panacea for healthy development, it is only a first step which immediately has to be qualified by the necessary respect for minority point of views. What may seem to be the will of the people is potentially the ill conditioning of the people (as happened with Nazism and presently happens with 'populism'). A clever leader with charisma can easily mislead their people and claim that their dictatorship is actually democracy because 'the' majority chose them. The contrasting Platonic view of a healthy society's development, namely the replacement of individual initiatives by the wisdom of the all knowing philosopher [53], strangely rejoins the thesis that societal ethics has to be dictated rather than nurtured by sensible cooperation between all human participants.

What then would be healthy given such a bind? Clearly one has to suppress the forceful imposition of strict unchangeable rules, as these will always be stifling and defeat their purpose. As usual, the solution lies in turning the equation around: good health has to prove itself continuously. The intelligent anticipation of the effects of a chosen course of behavior is necessarily fraught with uncertainty, hence also the necessity to keep reevaluating these effects after the given course has been taken. In the most open circumstances one goes for the best possible option, whereby 'best' is seen as producing greater benefits than other imagined options, given actual insights. This necessitates a keen ethical quality theory. However, in most real cases some power structure will impose its views, which may or may not correspond to what is relatively preferable. A healthy system will therefore put in place structures of power control that allow for the best possible options to emerge continuously and adaptively, *and not extend the use of power beyond the goal of producing adequate benefit to society's members.*

As a necessary basis for good decision making, a healthy society will actively engage in the pursuance of knowledge, the continuing evaluation of consequences and effects of its exercise of power and the restraining of the latter where necessary. It will respect and reward critical independent expert opinion. Expert knowledge on many issues that are important for society such as finances, technology, demography, economics, law and the use of resources can be very intricate and complex, and a healthy society will take measures to make the information accessible to the public in ways that are both understandable and accurate (with reference to our discussion on semantics, we are speaking about a 'behavioral' level of description[7]).

The communication concerning effects of various measures on the healthy conduct of societal life is what an interface between societies' constitutive intelligent agents should provide. Understanding of effects can be communicated and shared, although the processes themselves may be much too difficult for general comprehension, even though they should be publicly available and verifiable as sources of knowledge. A central ethical property of this shared knowledge environment is *trust* because the interfacing will only work properly when the information communicated is trustworthy. That is: in accordance with current well-justified science. That we have to trust our experts is a good example of "leverage by proxies", but we need a basis for confidence. The scientific (and expert) community has to provide these elements of trust in turn, but must also be allowed to generate independent knowledge (in many societies the generation of independent knowledge is suppressed because of its cost or because of the economic value of knowledge.). The independence of and guaranteed access to knowledge has to be protected by society[8].

Intelligence, besides having great evolutionary power, may also be a formidable weapon in the hands of those who want to acquire power at the expense of parties with lesser capabilities. It may lead to unrestrained application of power in specific directions, like the unfeathered exploitation of resources or the conversion of large areas of land to monocultures. Intelligence is even dangerous when unconscious of its own power, as is happening with the present day elimination of many biological species due to massive exploitation of their habitat for other purposes. There is hardly a means to stop its deleterious effects other than the application of even more intelligence (and power) in a rectifying direction, or else the slow process of natural selection will end up punishing the whole of humanity causing collateral damage by attrition (as has happened in societies in the past [19]). The many chaotic effects to which our environment *and* our human

[7]This point requires perhaps some further explanation. The interaction between 'experts' and 'lay people' happens at what system theorists call a 'behavioral level'. This means that the precise mechanisms involved are not the prime topic of communication, only the well documented effects, comprehensible at the non-expert level. Such communication is, of course, dependent on the relative level of expertise of the parties involved. It is a standard feature of any complex design environment where experts of various disciplines have to work together.

[8]This is an issue of paramount importance for societal ethics. In many instances, information on critical items such as health of food, the environmental impact of mining, effects of the generation of nuclear energy, atmospheric pollution, etc... has been woefully contaminated by untrustworthy and ideologically contaminated sources. Without infringing on democratic principles society can set up systems to safeguard the best possible knowledge and information management. Whether it does so (and to what extent) is crucial for the future health of societies and their members.

societies are subjected to, do not only make new creative developments possible, they also threaten their stability and may cause catastrophic events that will move the balance of forces into totally unchartered terrain, in which no organism we know today might still exist.

A significant case is the ability of humanity to destroy itself by proxy. Nuclear explosives delivered by robots, or much less spectacular mechanisms, such as the gradual poisoning of the atmosphere by various uncontrolled interests, may achieve similar, if unintended, results. These examples show that, while intelligence is key to humanity's further healthy development, it is also a highly risky instrument in the hands of a human society that may not be able to set up adequate controls. All this makes an "ethics of intelligence" a first priority for our societies. Human intelligence has put quite a few potentially lethal systems to sensible use, from specific (poisonous) medicines to fertilizers, explosives, and airplanes, by harnessing their lethal properties into productive action. But humans also have an impressive history of disastrous misuse of power, from which we do not seem to have learned much. This lack of ethical expertise is our most lethal disease.

It would be preposterous if I claimed to have a solution to this key ethical health problem. Natural selection has one, but its ultimate verdict might not be very desirable from humanity's point of view! Experience with well understood and successful biological systems may provide some clues. The T-cells in our bodies recognize millions of undesirable invaders and mutations and are able to get rid of them. They form an impressive store of evolutionary acquired knowledge concerning agents whose bad actions have to be stopped on the spot. They are largely effective in preserving the body's integrity and they seem to have achieved a good equilibrium between preventing bad agents to act and allowing for growth and development. Following such a strategy, many societies might try to protect themselves by preventing malicious power structures to develop as soon as they are detected. Our traditional bodies of state do have such a function, but their ability to react timely and adequately given the potentially lightning development of in particular new technologies is questionable.

Guidelines for a humanist ethics: teleology

In the remainder of this chapter I propose guidelines (or equivalently, principles) that may assist ethical agents active in society (the elaboration of a set of principles may be seen as the attempt to define a meta-layer for the evaluation of societal ethics, never final, but in need of evaluation itself.).

The *respect for individual human beings* appears as the first guiding principle to define ethical goals. The *respect for life in general and nature* will be the close second, and we shall have to consider guiding principles concerning *means* as a third item. Consciousness shared between humans has to determine what 'respect' actually means in concrete situations, the question cannot be resolved *in abstracto*, it needs shared human experience, intelligence, and emotions, in particular love, to figure out "good ways". Sharing consciousness is a dynamic process with uncertain results and potential conflicts, and hence must be groomed carefully with openness to alternatives by all participants, methods to resolve conflicts, and, most of all, respect for individuality.

This principle of 'respect for individual human beings' entails respect for all human beings even in cases where we may think that they are not concretely productive, e.g., for people affected with debilitating diseases, incapacitated elderly people, or children affected with intelligence disorders. Again, this cannot be categorical. Respect for life can not be at all costs, as we shall discuss in the chapter on Morals. However, one person's life can not be saved at the cost of another (to give an example: trade in human organs taken from healthy people in poor countries, a testimony to both bad intelligence and bad ethics), but even this statement must be carefully interpreted in context, as people's lives depend heavily on each other, and mutual benefits may require some people to do dangerous or even unhealthy tasks. Respect in such instances means careful consideration of consequences for individual persons and honest appreciation of contributions (the difficult question of assuring fairness).

As humans we want to love our kin and provide them with the best possible care and attention even though they may not be productive from the reigning point of view of society. That is because we value them for what they are and how they are part of our own existence. This ethical principle is deeply ingrained in our psychology as testified by the strong emotions it generates. Some may think (and some cultures have thought) that this is irrational and even detrimental to overall health, but humans have discovered that loving care is not only psychologically healthy, but also a great contributor to a sustainable and hence healthy society—I work on this point further in the next paragraph. Human health means much more than physical health. It is, in the first place, health of human relationships.

Human intelligence is remarkable in that it is able to set proxies that will take care of individual well-being through collective action. It is no accident that we set up societal organization in such a way that it will provide care when we need it. The societal proxies we create are all sorts of institutions, e.g., pensions, insurances, possessions, legal protections, subsidies, medical and social services, educational institutions and many service provisions that take care of us when we are not able to do so ourselves, which is much of the time. Because of the overwhelming complexity of modern society, we all depend on each other and each other's talents in many ways, from clean water, education, security, and a clean environment to health care, economic stability and—last but not least—psychological stability. The existence of intricate institutions to provide support for all these is of course the result of human foresight. The structures should be human-tailored and dedicated to human needs. The resources they use, including human effort, have to be balanced with other, equally productive endeavors. Institutions that have acquired too much power or have become sclerotic may interfere with the further creative development of society, e.g., by putting burdens on future generations, sucking resources away for novel initiatives or restricting freedom of development by rigid societal or professional structures.

However, most societal services evidently serve useful purposes by nurturing knowledge and experience, inducing confidence in new generations regarding their longer term perspectives, and even by providing rewarding jobs and economic activity[9]. There are numerous examples of societies that function poorly or have eliminated themselves through insufficient generalized care for their human capital, and the danger remains even in our most developed societies. Every society needs a broad outlay of experience and expertise, to ensure its proper functioning—we should not have a myopic view on this issue!

The issue we are considering here merits a much larger treatment than possible in these few pages. I refer, for an excellent example of such a treatment, to the work of John Rawls [51]. However, the key question here is whether the emphasis put on the respect for individual existence as a first humanist guiding principle has evolutionary value (notice the use of the words 'existence' and 'value', which we have already discussed). To make the matter absolutely clear, an opposing viewpoint would state "the elimination of every person who is incapable of being productive is beneficial for the evolution of humanity. Not only would it increase the average health of the population at each moment, it would also create exponential improvement over the generations." The statement may seem overly crude, but daily or practical societal ethics has many elements of its spirit, even when not explicitly declared. The respect for individual human life in actual societies is often a tenuous affair. We send young man and women into war, reserve adequate medical treatment or good education for the richer part of societies' members, despise people in poverty or lower

[9]It is an economic mistake to think that money spent on care is wasted. It is only transferred to caretakers and economic agents who produce goods, services, and knowledge, which themselves transfer their rewards further. Whether a certain outlay of activities in a country makes evolutionary sense has to be accounted for in a different way, by evaluating longer term benefits, an exercise that requires deeper insight and political poise.

social classes (the two often correlate), neglect lonely elderly people, let immigrants drown, put minor offenders or even innocent people in prison for unreasonable long times and much more such.

The 'health' of the population at large is often not of very much concern in actual societal ethics (the acquisition of power by favored classes of people and their protection is the common modus.). What is of evolutionary importance here, is the meaning to be given to 'health'. It cannot be understood solely as reproductive success. That should be clear already from the mere fact that reproductive success does not translate into either a better or more sustainable humanity. Adequate reproduction is a necessary *means*, it cannot be a mere *goal*. It can also not be understood as the selective promotion of the more powerful part of the population (a self-destructive endeavor easily seen as producing major opposition because of the collateral necessity to impose extreme and unilateral force). I (strongly) believe that the best ethical goal humanity can set for itself is the respect of its most valuable asset, the uniqueness or individuality of *each* of its members. There is no super authority capable of judging the 'right to life' except life itself, or to quote our old Chinese teacher again (in the Witter Bynner translation [8], nr. 75):

> Death is no threat to people
> Who are not afraid to die;
> But even if these offenders feared death all day,
> Who should be rash enough
> To act as executioner?
> Nature is executioner.
> When man usurps the place,
> A carpenter's apprentice takes the place of the master:
> And 'an apprentice hacking with the master's axe
> May slice his own hand.'

Many societies are rash enough to act as executioners, to their own (evolutionary) detriment—in the process they slice their own humanity. Although we are reaching the limits of philosophy here, the issue provides great motivation for further deepening and better interaction between ethical thinking, societal practice and evolutionary biology.

As a second main guiding principle for healthy evolutionary development I advocate *respect for natural processes*, again, not a categorical notion as even what is to be considered "naturally healthy" is up for investigation and assessment. This principle is the "other side of the medal" of the first principle. No healthy human evolution will be sustainable without a continuously healthy nature. And it will need large scale involvement of human intelligence to achieve this. Long term evaluation of consequences of the relation between human actions and natural developments is mandatory. Given the sheer size of the issue and the difficulties to gauge and influence long term nature developments with any degree of trustworthiness, global human resources of intelligence will have to be mustered to provide both the necessary understanding and the necessary confidence in the leveraging measures proposed. This amounts to a tall order for both science and politics.

In consequence, a third main guiding principles is then the *grooming of intelligence* itself. The development of global intelligence has been spectacular in the last sixty years, thanks to the creation of a whole structure of worldwide proxies that aid and complement individual human intelligence, in particular, the internet with the world-wide-web, but also the many thriving scientific societies, international collaborations, institutions at all societal levels that enhance communication, exchange, and generalized education, not to speak of many individual initiatives to promote understanding and cooperation. All this is flanked by technological developments that are becoming much more refined and sustainable than they used to be when technology was considered mainly as a means to solve specific problems without consideration for environmental or societal systemic effects. Yet, the impressive development of science goes hand in hand with increasing awareness of our lacunas.

Guidelines for a humanist ethics: empowerment

Lofty goals are worthless without the means to achieve them. The issue of empowerment is tricky due to the fact that the establishment of power easily strays, mainly due to the following two effects:

- it becomes a goal in itself and hence destroys its original purpose;
- all power is necessarily directive (acting in specific dimensions and directions) and hence neglects other dimensions (and directions), which may turn out to be crucial either to its effectiveness or its evolution (or both).

Concerning the healthy development of political power in our present world, the situation is not very bright, although major (but much too limited) improvements have been made with respect to what was the case a hundred years ago. All power must be checked. This is, of course, patently evident, but often the necessary leverage for control is lacking. Nature supplies only long term control through natural selection, and intelligence can discover means of leverage but is limited and erratic. On the world political stage we are confronted daily with disastrous cases of unchecked power plays and lack of adequate leverage on them. Just waging war cannot be considered a constructive method, even when unavoidable for lack of a better solution (often the unwillingness of parties to find a better solution than the destruction of their enemy prevents progress, or the mostly erroneous belief that war solves problems). Justified leveraging of power at many societal levels is a prime topic for ethics.

A humanist program is, however one looks at it, fragile but, on the other hand, it is not any more fragile than the original *condition humaine*, since humans are perhaps the weakest organism produced in the whole chain of evolution. The only advantage humans have over much more robust organisms is their intelligence and any humanist program should excel on this count to have any chance of evolutionary success at all. This means that such a program has to set up the necessary leverages by proxies to sustain its goals, leverages because pure force will hardly help, and proxies because individual humans do not have sufficient individual power in most cases. Any humanist program is threatened by a host of factors, both primary and secondary. Here is a list of primary factors, which may play at either the personal or societal level:

- the desire for acquisition or preservation of personal benefits (or benefits of a selected group) at the cost of others;
- the lust for power and the imposition of one's own wishes or supremacy;
- the belief in one's own superiority, thereby diminishing the value of others and their right to respect;

and secondary (i.e., conditioning) factors such as

- lack of empathy for others;
- lack of foresight (intelligence) concerning the consequences of the methods used;
- lack of willingness to adjust when necessary.

It is clear that presently the necessary empowerment at various societal levels and/or leveraging to satisfy even the most elementary beneficial ethical principles is lacking:

- at the level of international relations, the ability to prevent (mostly unproductive) wars or acts of war (such as unilaterally decided bombings or attritions), to prevent mistreatment of citizens from another country, to prevent massive destruction of nature or pollution of air, water and soil, to help people who are victims of natural or human-made disasters, etc...

- at the level of national societies, the dedication to grooming of talent and education, to alleviate poverty, to care for disabled people, to ensure equal rights and opportunity, etc...

It does not take much intelligence to see how beneficial a solution to all these issues would be. The quest for empowerment and leveraging on them is sure to tax that same human intelligence to the maximum and for many years to come[10]!

There are, of course, many more guiding ethical principles for personal and societal use. My favorite collection on this matter is again Lao Tzu's *Way of Life* or *Tao te Ching* (in the poetic Witter Bynner translation [8]), which is simultaneously ancient and remarkably applicable to modern situations. The work provides pertinent thoughts on many ethical dilemmas, e.g., the relation between personal and societal interests, the use of power, the effects of altruism and respect for others, how to manage success and failure, and significantly, the wonder of nature, and this without ever becoming dogmatic or claiming absolute truths. Like Socrates, Lao Tzu is not telling us what to do, but showing potentials of being (the guidelines!), like his statement that the best teacher is the one about whom people will say "we did it ourselves". Lao Tzu discovered a very appealing answer to Socrates' ethical question, more or less during the same time period, but he would be the last one to tell you how to behave. That would have contradicted his respect of nature and creativity.

To conclude this chapter on the deployment of ethics I wish to add two critical remarks on the approach we have followed. First, the identification of 'goodness' and 'health', which is based on the critical role of evolution and natural selection, is a consequence of our original position that no categorical rule is available to determine what might be considered good or not. Or, to put it differently, evolution is all we have got as an ultimate discriminating principle, and we can only guess how it shall work out. This

[10] From the experience of the last sixty years or so, sufficient leverage might be found in an interplay between economics and technology. Economics is the modern, global societal variant of natural selection. Like natural selection, it works chaotically and favors (often short term) benefits in an exponential way until saturation. Evolving technology may provide new dimensions for economic profit and hence undercut ingrained but noxious economic powers and habits, although this is a rough and often painfully destructive process. Even though such processes may still appear to be primitive, they are much less so than the use of violence or outright war, although they may cause them as a fall back resort. Even so, both technological and political progress arise from different, more sophisticated and intelligent processes: politicians setting up new political institutions and behavioral rules, or scientists engaging in types of research that aim at discovering new, sustainable technology. These super structures carry the potential for a more intelligent and controlled evolution, but may also contain the seeds of sclerotic directivity and lack of adaptivity to real needs.

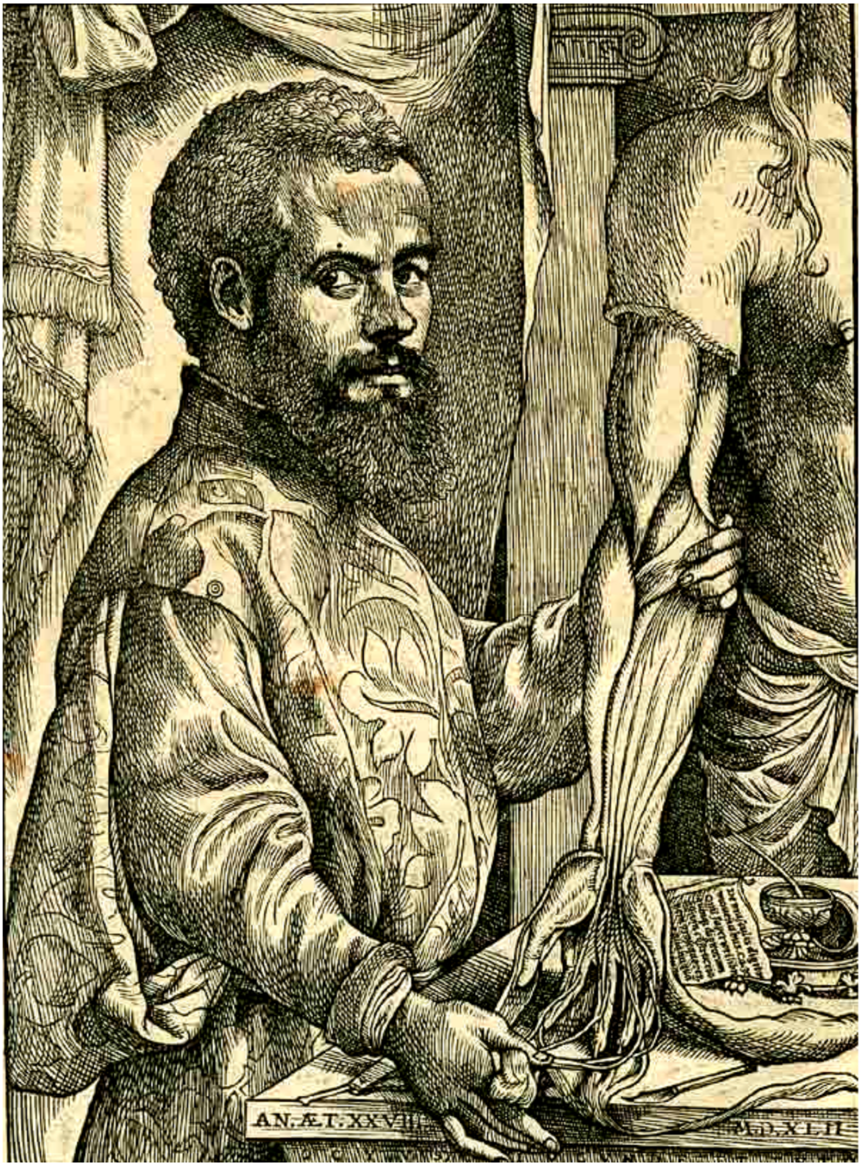
is certainly not the common choice by most ethics. We already encountered Kant's categorical imperative, but let me also mention Rawls choice for justice [51] or ethics based on social equality (remember the slogan of the French revolution: *Liberté, Egalité, Fraternité*). The approach we have followed is not contradictory to these efforts, but it adds a new element, which is the discretionary evolutionary potential of the principles offered. More precisely, unless a philosophical theory meshes with the unavoidable biological underpinnings it will prove a mere exercise in brain twisting, useful maybe for exercising the mind just like any mathematical theory is useful for a similar purpose, and one never knows what kind of mathematics, respectively ethics, one may need in the future. One has to stop somewhere in the upward chain of motivations or valuation of theories, and I have chosen to stop at the level of evolutionary potential (a biological level). It may be a difficult exercise to derive a principle of justice in an evolutionary context, but I believe this is necessary and possible. Assuming the latter, a further elaboration of a theory of justice becomes eminently relevant.

The program of ethical guidelines I presented has, certainly, already been proposed or adopted by many who have been inspired by humanism (social thinkers, politicians, philosophers, teachers, and religious leaders[11]). However, this way of thinking is by no means the most common one, historically nor geographically. There are other more widespread systems of practical ethics. One is based on 'cultural supremacy'. It often happens in the course of history that the culture developed by a community or a people shows traits that are much more advanced than that of their surrounding communities or peoples, with respect to military power, knowledge, technology, and social organization (often even all of them together), and the people concerned will then be tempted either to enthusiastically export their culture or else to try to enforce it or even to annihilate the competitors using the advantages gained. I do not want to expound such principles in detail here, let me suffice with a couple of examples. One is the ancient Roman empire, which for a while was fairly beneficial since it developed a system of political unification that often respected and incorporated the subjugated peoples to form a joint global entity that was, at the same time, more powerful and beneficial to all concerned due to the sharing of superior technology, *and* more productive because more stable (and hence in a sense evolutionarily effective). Another example is the imposition of culture in newly acquired Anglo-Saxon 'possessions' (like Australia, Canada or even the United States) in the 19th and early 20th centuries, whereby an attempt was made to eliminate indigenous culture by the new rulers.

[11]One could even gauge the ethical quality of a religion by how well it scores on this issue.

Although a long discussion on the ethical merits of cultural preservation and adaption is called for, let me simply say that, in the final analysis, cultural supremacy of one community only proves to be valuable to another when it can be adopted and interiorized by the latter, hence when it is able to diffuse to the personal level and becomes an effective addition to each 'local' culture.

And then, there have been many ethical systems of which one can say that they amount to ethical illness because the system of thought they induced led to destruction, often on a massive scale, even though their initial or sometimes even longer term success in whatever form (evolutionary, emotional appeal, the promise of well-being or whatever) seemed to confirm their validity. I necessarily leave this topic to social sciences. Actually, any system that keeps promoting its precepts for diverse illusory goals, or even just following its own inertia will become rigid and hence destructive. The chaotic creativity that is the hallmark of nature turns out to be its greatest strength, but all the new sprigs have to be carefully tended to avoid a messy outcome. Hopefully, humanity will learn to become a better gardener than it has been in the past.



Andreas Vesalius dissecting a corpse.

Chapter 17

Morals

Following the late Bernard Williams, we have made a strong distinction between ethics and morals. In this chapter we move to the treatment of morals as the question of the necessity of specific, obligatory behavior. Admittedly, this question is up for ethical assessment as well and may change from one system of ethical thought to another. It so becomes dependent on intelligent evaluation. Hence we see that morals has been defined specifically in the context of professional conduct where at some point a consensus may develop between practitioners, albeit influenced by societal needs and derived imperatives. A study of the history on these matters shows that the incidence of directive morals does change considerably over time and that what was considered a moral crime at one time may become practice at another. There is perhaps no area in which the necessity for the continuous development of ethics and derived morals is more obvious in the light of evolving insights, knowledge and intelligence.

In contrast to ethics—how one *wants* to conduct one's life—morals refers to how one *should* behave, either in situations where a critical decision has to be made, or, more generally, in order to satisfy some mandatory precepts, either dictated by an authority or presumably made necessary for societal order, like "proper behavior". There is a relation between the two notions, one could say that morals takes place at the edge of ethics, namely where the available freedom has to be curtailed. That the two notions often have been confused in the past is likely due to a traditional view on ethics as "what is dictated by a moral authority", in particular God or presumed divine representatives on earth. Distinguishing the two notions may even be considered as liberation from an ethical straightjacket. In our new (or actually very ancient) Socratic view on ethics, forcefully propounded by Bernard Williams, morals has to be strictly confined to specific situations where a critical decision is called for and precise regulations are mandatory. All the other decisions on "how to lead a good life" belong to the realm of ethics where a balance between personal freedom and a whole slew of alternatives can pull a person's (or a society's) behavior one way or the other, based on conscious or implicit considerations on quality.

Morals is an important topic because individual persons and societies occasionally have to make decisions that carry grave consequences, but it often has a highly professional character. The model we have developed for ethics applies here as well, but in a much more restricted setting as it has to be related to obviously constraining situations. What is precisely critical may not be clear in all contexts and this fine tuning must be considered in the context of a reigning ethical framework (e.g., some people would consider saving your soul from eternal damnation is a critical issue). Issues that relate to mores (morality), for example, how to deal with other people, with sexuality, social issues, economic inequality or the relation between cultures, I consider to belong to the realm of ethics. By this I mean that greater variability, choice and freedom are possible and desirable, but have to be dealt with sensibly, this being the central issue of ethics.

Morals then deals precisely when unambiguous behavior is called for. What could make a specific behavior obligatory? No doubt it has to be an authority as it entails curtailing freedom (if the behavior would just be forced by the environment, it would not been an issue of morals. Ethics and morals presuppose a relatively free agent[1].). The question then becomes "where can moral authority come from?" When we discussed ethics, we discovered the importance of the conceptual framework in which ethical choices are made. It follows that the construction of that ethics framework contains elements that become coercive. I have argued before that there cannot be any principle that would be universally applicable, and this for several reasons: logical (universals lead to contradiction), semantic (to acquire meaning requires a framework), and practical (we know of no example where a universal principle leads to universally correct application.). Since the issue of principle is fundamental to the healthy development of morals, I want to pause the development to discuss some examples first.

The question of euthanasia comes immediately to mind. We know of the universal injunction, "Thou shalt not kill", and hence, however you put it, euthanasia should never be allowed, if indeed such a universal injunction would hold. However, the reality of modern medicine forces euthanasia, explicitly or, more often than not, implicitly. In many cases, a doctor has to assist people to die comfortably. Not doing so (as has often happened with cancer patients in the beginning of the 20th century) would not only amount to what we now view as very bad medicine, but would often be extremely heartless and conflicting with the presumably categorical principle of "love

[1]See our discussion in the chapter on Freedom.

your neighbor as well as yourself". For people who accept the universality of the no-killing principle, there seems to be a semantic way out, which is simply to nominate the various palliative treatments that relieve pain but hasten death something other than euthanasia, for example, "ensure the quality of life of a dying person". I would be hard pressed to figure out an ethical framework in which such a philosophy would fit. The straighter way is the opposite. Let us be courageous and face that we are forced to assist people to die, just as we are forced to keep them alive, depending on the situation. The point is to know when and how to do what[2].

The mistake one could make next is to think that there would be a univocal way to handle this question. As usual, not only is there variability possible in the set up of the framework (there are many approaches to medical problems, which may lead to very different results), the choice will, within a given system, also lead to a compromise between different values (a multi-objective optimization perhaps). That all this adds up to a big ethical, and moral, issue should not be seen as a major problem, but as an invitation to further refinement and an eminent motivation for the value of ethics as a central endeavor, one that defines what we mean by being human.

'Good' medicine will take euthanasia in stride and develop theory and practice around it. A 'good' society, as it is faced with the problem of death, will do the same, as part of its societal ethics. The professional and the societal may (or even will) conflict, and one may have to resolve conflicts between competing ethical systems. I used the word 'good' in the previous. I do not have a universal notion of 'goodness', but, within my (or our) ethical considerations I surely have to face the circumscription of what I consider 'good'.

'Good' medicine then, would define its goals and how it would go about realizing them, and put those in the light of the best possible knowledge (science and experience). The 'preservation of life at any cost' would likely not lead to procedures that would survive most of the quality criteria doctors would develop for daily practice. If we wanted to be really sanguine about making everybody's life last as long as possible, then we would have to set up extremely severe procedures throughout each person's life, controlling all the food intake, number and type of exercises, etc... It would not only be highly impractical but also extremely annoying. The typical conceptual framework in medicine is very different, but also not univocal. One approach emphasizes the understanding and treatment of illnesses. It professionalizes the field in terms of understanding organs and the illnesses

[2] It is remarkable that some of the most vociferous opponents of euthanasia in the name of "thou shalt not kill" are at the same time equally vociferous proponents of the death penalty. This shows patently how ideology invites hypocrisy and distorts ethics.

that can develop in them. This is an approach that is more or less the rule in modern Western medicine. It has had great successes. Major illnesses that have haunted humanity have become well understood and treatments have been developed. But the approach, important as it is, is just one way of viewing the role of medicine. Another approach develops medicine from a holistic point of view, emphasizing the choice for a healthy life style and focussing on the relation between life habits and the potential development of illnesses. Variations and combinations on these themes are daily practice. Medicine can be either maximally or minimally interventionist, and here also there may be huge differences in practice. Each of these frameworks will necessarily have a euthanasia component. Helping people die can be very different from one system to another and equally justified within the ethical framework used.

Another example is the question of so called "sexual morals". It is a very interesting topic to consider, not only because almost everybody has to deal with it, often with a lot of emotional involvement, but also because it offers a combination of extreme and non-extreme issues. When a woman gets (willfully) pregnant, the consequences are much more life changing than many other happenings in her life, even in our modern society where many arrangements are made to diminish the ensuing constraints (not enough actually, given the emphasis our present ethics puts on the deployment of people's creative abilities). The highly personal dimension of pregnancy distinguishes it from ethically neutral natural happenings (ethics understood in the sense 'how to design one's life'). It may be that in some cases two people consider a sexual act as a purely occasional affair without consequences (and it can certainly be lived that way nowadays), but common experience also shows that this is rarely the case. The act is loaded with interpersonal issues, even when no pregnancy is considered and the necessary prevention measures are taken, because already the breaking of the intimacy barrier has strong emotional (or even physical) effects on our personal integrity and hence the basis of our ethical consciousness.

The consequence is that sexual ethics needs a built in moral component, one that forces a specific kind of behavior when a critical situation is occurring, namely a situation that leads to major consequences for any of the parties involved, in line with our choice for a humanistic ethics. Typically, such an ethics involves a mutual exploration of personal issues as they relate to the emotional load of the act[3]. Lots of variations in ethical outlook between people are likely, but it should be clear that the assessment of actions as critical for the parties involved is determined by effects that may drastically change the outlook on life of at least one of the parties

[3] No laxity allowed in systemic relativistic morals!

involved[4].

Morals implies the intervention of an external authority. The next question is who or what will provide it. It may or may not be built into the ethical frame each of the partners is using (partners may agree on it), but however one puts it, in our current society it cannot be anything other than societal (in less structured societies it might be parental or familial). Society has to set up a moral system to deal with what it views as critical situations in which the personal integrity of people is involved: obligations and prohibitions. How this is done needs, in turn, a meta-ethics concerning the relation between the public and the personal sphere, the methods used to define critical situations, and the set up of rules and their enforcement.

At this point of our discussion, I want to pause for a moment to consider the tricky relationship between morals imposed by society and personal (or even societal) ethics. In the previous paragraph I stated that morals (as 'should's) is needed in critical situations—and there are many of those of course. However, there is another use for morals as obligatory behavior and that is to force individuals (or groups of people) to behave in certain ways in order to accomplish goals a society has set for itself as if it were an autonomous entity. This happens when a society tries to define its singular 'destiny' and then forces people to adopt the stated goals. I consider this a highly dangerous development, when it occurs. The imposition of morals (obligatory behavior) for societal teleological reasons (hence not just in critical situations) is beset with major problems, from fundamentally impossible to practically disastrous. The fundamental impossibility is due (1) to the fact that concrete behavior cannot be deduced from abstract principles or abstract goals, and (2) that both the object and the subject of societal activity is not society itself but individual people. The imposition of concrete behavior will always be dictatorial, even in ethically justified critical cases, and in contradiction to individual initiative and intelligent evolution. As a derivative, the unjustified imposition of concrete behavior will squelch creative developments and lead to societal stiffening and ultimate self-destruction. These phenomena have been observed (and are still being observed) in societies that needlessly restrict personal freedom, be it for political, religious, ideological or social reasons. The state has the power to enforce whatever behavior it may want to impose, but it cannot profit from it itself, it is an organic non-entity. Those who profit from societal measures will always be individuals, and they might profit at the detriment of their fellow citizens. Such an ethical 'algebra' can only be considered qualitatively bad, both from a historical and a teleological point

[4]E.g., actions that drastically change a person's sense of safety, integrity or peace of mind.

of view. All societal ethics need methods to control unwieldy government power.

Nonetheless, critical issues arise all the time in societal commerce. The development of society, through any type of activity like production of goods and services, transportation, medicine, or security involves the use of technology and the taking of (very considerable) risks, and hence the creation of critical situations (just think about traffic). We discussed societal ethical frameworks in the chapter on Societal Ethics, let me suffice to state here that the reasons for constraining ethics to morals are extremely variable, even within a single ethical framework. Many systems might agree on the more extreme cases (e.g., "do not kill a newborn baby even when it shows an unpleasant defect"), but on the lesser ones, systems may differ considerably. The application of general principles does not help much. For example, a society might claim the primordial value of the family and then put many of its people in prison for minor offenses, thereby disrupting families and creating more crime. Only such systems that consistently aim at insuring high quality interpersonal relations will produce morals that are seen as generally beneficial.

The creation of the conceptual frame that defines critical situations is the key to moral philosophy. Such a frame will necessarily contain some basic principles (axioms) and a modeling of the relevant world with definitions, relations and dynamics (necessarily limited, as is always the case with abstractions). The principles may somehow be derived from an even more abstract frame (like Kant's 'categorical imperative'), but they will only find their justification from the environment in which they are put to action. So, medicine that assists people to die needs an explanation of what "people who are dying" and "assistance in dying" actually mean (given the state of modern medicine, it is not enough to say "that they cannot sustain life unassisted."). Such an explanation may have to invoke other principles within the system such as "all assistance has to be based on the explicit wish of the patient", including how one might discover this wish when the patient is not able to react or improper external influences are to be avoided.

An important authority in the generation of morals is often held by what people call 'general principles'. To avoid further misunderstandings on their role, I continue the development with this point. I purposely avoided using the term because we already had the discussion on universality—simply put there is none such—but there is a more subtle issue, and that is the quality of the moral frameworks that people (or society) develop and how these can be evaluated. One framework might be called better than another, which might be directly revealed when comparing them using some obvious criteria. To give a trivial criterium, if one framework benefits a larger number of people, while providing the same benefits to the lucky group that benefits from the other, it could of course be called better, or if the deleterious effects of one would be uniformly larger than another, it would certainly be termed worse. When one considers consequences of a moral rule-setting, the notion of better or worse develops almost automatically, but is again dependent on the criteria used[5]. No wonder we have such notions built in into our psychology (by nature and nurture). Of course, we need to understand what is meant by 'benefit' in a given framework, and the whole difficulty of the concept of goodness becomes immediately clear.

Obviously, the notion of 'goodness' itself needs a framework. Inevitably, there will be the need to deal with multi-objective situations, e.g., one could go for a somewhat longer life and less quality or vice versa in the case of the critical treatment of a life-threatening disease. The issue then moves to the level of 'who or what may decide', a meta-ethical level with respect to the previous, because it involves considerations from an another realm, like personal freedom or societal effects. Even so, meta-criteria may change with the development of the situation and with evolving insights, and these would entail an evolution of the original frame as well. For example, in some cancer treatments, the level of forbearance may be very different from patient to patient, the results hard to gauge and the long time prospects highly uncertain. The only meta-principle that makes sense in such a situation is submission to the patients' freedom to define their own ethical frame.

The quality exercised in the handling of a moral framework itself becomes very important. The dedication to specifying various quality criteria is in itself an effort in framework quality management. The question arises whether there is an overarching framework in which the issue of quality assessment of various possible frameworks could be resolved. When there would be agreement about such a frame among a group of people, a society, or a culture, we could start talking about a 'general principle' of goodness. At this level, the framework would determine how one 'should' handle moral issues from a structural point of view. From it, one would not be able to derive concrete behavior (such considerations are located at a lower level), but only how a moral framework should be developed for various critical situations and, in particular, how one should go about setting up quality

[5]Often the particularities of the selected 'test cases' considered play an important role unwittingly. It is known from engineering that proving the validity of a property of a system for *all* cases or even for *most* cases is generally next to impossible. One has to suffice with *typical* cases, but the real test comes with practice. E.g., we now know that the metallurgic quality of wings used in large airplanes is sufficient, given the fact that there have not been cases of failure with present practice.

criteria in it. The 'should's' just mentioned are then to be interpreted as a last resort in the mounting hierarchy of meta-frames. It will be the result of growing insights and would therefore remain open to criticism as time progresses.

All this may seem horribly abstract or complicated, but luckily it is not. It quickly becomes very concrete when done for a specific class of situations where constraints are deemed necessary. All our universities organize courses in medical ethics. Such courses largely determine how future doctors will develop their ethical, and critically, their moral frameworks. Medical students have to be taught, not only how they should conceivably act in a morally justified way (e.g., when facing a patient with a critical illness), but also how they should judge the quality of the morals they are taught and adhere to. The definition of 'goodness' could arise from a consensus between teachers of medical ethics, but it is clear that even at this level there is plenty of room for insight building, disagreements and restraint in the face of competing ethical viewpoints (in particular those of of patients).

Clearly one has to stop evaluating frameworks at some level of consideration. The semantic uncertainty about the last level is inherent to our condition, dependent as we are on the necessity to formulate and deduce from stated 'first' principles, which by their nature are left unjustified and hence will only evolve by progressive insights (e.g., medical ethics today compared with hundred years ago). This does not make the quality of a system arbitrary, but it does not make it univocal either. In all things human, and even in all things natural, there is built in uncertainty because of the dialectics between a higher semantic level (for the meaning of the terms used) and a lower one (for the use of the basic principles or axioms). This built in dependence (which we have called 'systemic relativism') does not make the concepts and principles less important, quite the contrary. Systemic relativism requires more work than what a classical system based on 'universal principles' would entail. No wonder relativists judge the work of the fundamentalists as being poorly motivated ethically.

It follows that relativistic morals are devolved at (at least) three levels: (1) the basic level of rules for critical situations; (2) the quality level at which conflicting injunctions are being resolved and motivation provided; and (3) a meta-level at which conflicting moral systems can be assessed. Level (2) consists of the ethical context from which morals can be derived. In a non-relativistic frame, level (3) would consist of "moral imperatives", such as "do unto your neighbor as you do to yourself" or Kant's categorical imperative and would be thought as absolute and unassailable, very much like *modus ponendo ponens* is in logic[6]. For a relativistic philosophy, such a position is untenable. As we already saw, any categorical statement can be understood in very different ways dependent on the contextual frame in which it is active, and hence is in need of interpretation within such a frame, which actually means that yet another interpretation (semantic) frame is involved. This accumulation of frames obviously has to stop somewhere, which means that moral agents are forced to depend on an agreed upon interpretation context that has nothing absolute in itself and will be subject to evolution and to changing insights, experience and hence 'knowledge'.

In the traditional context of a univocal semantic world, such a situation seems to be most unpleasant, hence the great aversion of traditionalists to relativistic reasoning. However, there is still something like 'reality', and ancient Greek, Indian or Chinese philosophers knew that, in reality, *panta rei*, everything changes, including the interpretation of categorical imperatives. The words are the same but the meaning moves on, thanks to the fact that our intelligence keeps developing. One could state that a relativistic approach requires one contextual level more than the traditional approach. The moral parties involved have to make an agreement about the quality principles to be applied on the level of their own ethical or moral thinking, knowing that those also will change and require updating in turn. How such evolutions can be gauged could in itself be part of this higher, of course again relativistic, level. To be a bit more concrete, here is how things play in medical morals. At level (1) concrete rules of how a medical doctor should behave in a critical case are stated. At level (2) these rules are motivated by present day medical knowledge, potential alternatives are presented and evaluated within the context of a given theory. At level (3), methods to assess the overall quality of competing medical systems would be derived and a critical evaluation of their properties established. Finally, at a further level (4), or the final relativistic level, the derivation of quality criteria used to evaluate the various potential systems are investigated and, in particular what the consequences are for their selection from broader viewpoints (personal or societal). That it happens in practice at these various levels is a fact, as demonstrated by how the medical assessment of euthanasia has changed considerably with evolving medical expertise and societal awareness over the last fifty years.

Although none of the levels mentioned have any claim to universality, their development is a very serious issue because of the enormous consequences wrong conceptions can have on people's life, in need of the best possible human intelligence and cooperation. Each additional framework forms a new abstraction layer that needs the underlying layers for structur-

[6]See the chapter on Gödel.

ing content, but in turn provides semantic services to them (notable are the evaluation of effects and the establishment of relationships in time, space and function.). Medical knowledge provides rules of behavior to the practitioner, science provides knowledge-based justification, and ethics quality criteria. These in turn have to be assessed for societal impact and acceptability. All these movements are in perpetual evaluation and subject to change due to the never closed process of human creative development, increasing knowledge and deepening insights.

To understand and consciously lead this development as best as possible is the task of ethics and, in its wake, morals, where and when necessary. It has to be a never ending and always highly necessary task given the shaky basis of all human assessment and endeavor. Creating valuable ethics and morals is a much more challenging, useful, and daunting task than accepting immovable and questionable categorical imperatives. Our next chapter, on 'Guild, Punishment and Responsibility', is an exercise in making this challenge more tangible.

Chapter 18

Guilt, blame and punishment

This chapter considers the question of 'free will' and Jan Verplaetse's treatment of 'responsibility devoid of free will' again, this time with an emphasis on consequences and whether guilt, blame and punishment make sense. The chapter on 'free will' made a case for its qualified 'existence', but what free will is thought to be has changed drastically in view of recent insights in neurobiology. The chapter picks up Verplaetse's analysis of a critical case, and then segues into an analysis of the issues (guilt, blame, punishment) from the various points of views of the agents involved (victim, perpetrator, society) to arrive at a specific but well-motivated choice for ethical principles that may differ considerably from common practice, but have a strong humanist flavor and may even be considered a 'Christian' position, although the inspiration for it goes back to antiquity, both in the East and in the West. The chapter provides a concrete example of the shifting of ethical principles in view of advances both in biology and in philosophical analysis forced by systemic relativity.

La vengeance est un plat qui se mange froid.

In view of the structure of 'free will', as nature/evolution put it together and I described in chapter 11, does the strong feeling of blame or even vengeance for inflicted suffering, crimes, or even simple mistakes make sense? Should there be punishment for failed responsibility? Can one be guilty for a deed that in almost any case was conditioned and hence not done out of (immediate) free will?

These questions are traditionally put in terms of necessary cause-effect relations, which posits that for each situation there should be an adequate and conclusive assessment of responsibility. Many societies have 'domesticated' the strong feelings of blame (or even vengeance), hopefully to minimize collateral damage without doing injustice to the concerned parties. For that purpose, guilt and punishment also have to be domesticated, to put them in proportion to the cause so that they form a more or less acceptable compensation[1]. The clearest situation arises when defaulting is foreseen contractually. When you fail to pay back your bank loan, you will be subjected to a punitive interest. Unfortunately, banks have a tendency to overstate their case and to force disproportionate punitive interests on your defaults, even forcing you into bankruptcy. The latter has become more or less regulated by our societies after unseemly punitive power was exercised by creditors. Often blame is just a facade for corruptive power.

The situation becomes more tricky when serious or irredeemable damage has been done. The compensation measures may be largely more noxious than the deed itself even though they may seem justified from the point of view of 'justice'. It is highly questionable that a quid-pro-quo for killing somebody would benefit society although some judicial systems require it. Invariably in such cases the question of 'free will' and responsibility arise. To what extent can responsibility be imposed on the guilty person, or, to formulate it differently, to what extent can retribution be requested from the person who caused the fatality? The degree of free will in the fatal action cannot be the answer, not only because the exercise of free will in the immediate finality is doubtful, but also because responsibility for a certain situation is often a question of assessment that cannot be resolved uniquely. That this is the case is often observed in court rooms. What for one party was an unavoidable action (e.g., self defense) is for the other totally irresponsible. Relativism does not come cheap!

I believe that the solution to the dilemma is, first, the de-coupling of responsibility from guilt and, next, palliative action on the mitigation of the feelings of vengeance and blame. A party makes another responsible for a certain deed, requires a sanction, and considers the result as supplying redeeming compensation. In other words, the case is not "I acted, thus I am responsible for what I am doing", but "I acted and, due to the consequences, I am being held responsible for them". Responsibility is not a state attached to an action, but the assessment of an obligation towards another party. And it may be that in the future I will breach this very obligation, whereupon a new cycle of assignment of responsibility will take place. But before working out the details of this change in perspective[2], let

[1] The 'domestication' or taming of societal wrath against offenders is done very differently in different societies. Sometimes the punishment is much harder than the offense. Sometimes there is no taming at all and vengeance is encouraged. The issue is of great importance for the quality of the society concerned.

[2] To be more specific: not whether I am a cause of an event is what counts, but on what basis I can be made responsible for the consequences. One can be made responsible

us consider a couple of cases.

Jan Verplaetse in his book *Without a Free Will* [60] discusses the case of a business woman who happens to pass by an accident and has to decide whether to stop and try to save a person who is bleeding to death or else rush to her next appointment where the potential of a big business contract looms. When she helps the wounded person, she most likely will loose the contract. When, on the contrary, she rushes to the appointment, she grossly neglects her obligation to provide first help (these being the only alternatives offered in the example). Suppose she decides to ignore the accident, rushes to the appointment and the accidental person bleeds indeed to death on the spot. Is she guilty of manslaughter (of course accidental and by neglect)? What is her responsibility? I do not want to criticize Jan Verplaetse's extensive discussion of this issue in this case (which I can largely subscribe to), I just want to indicate how I look at it in the light of our previous discussion on free will, ethics, and morals.

What makes the case delicate to decide in a first analysis are the competing interests and parties involved that may claim responsibility from the business lady. There is, in the first place, the bleeding person who may expect life saving help from bystanders. There is society, which imposes a set of behavioral rules in the public domain and requires its citizens to abide by them. And then, there is the business person herself for whom the acquisition of a new contract involves her responsibility as company manager towards her investors and employees. Each of these "stakeholders" can be viewed as holders of an explicit or implicit 'contract'. The responsibility with respect to the management tasks is explicit. As a professional manager, the lady promised to pursue the most promising opportunities and receives good rewards for doing so. The responsibility with respect to the bleeding person is more implicit, it is based on a moral obligation set by society. There may also be mitigating circumstances. The manager probably would not know at arrival, or even after she left the scene, that the victim is bleeding to death and she might have been moved by motives of fear, both of the bloody situation and of the surrounding people[3]. So what is involved is a potential breach (suppose she left the scene without giving assistance) of a moral obligation which she did not interiorize sufficiently so as to make the right decision on the spot, based on scant information. The conclusion so far is that there is a conflict of responsibilities and the question becomes how to resolve the conflict (a case typical for a situation where independent agents interact, each with their own ethics. What takes

without being the cause, as in the example of the business woman given in the text, or being a cause without being made responsible, because causes of any event are often manifold and diffuse. The assignment of responsibility is an ethics issue.

[3]The responsibility would have been much bigger if she had caused the accident.

priority when?)

Conflicting responsibilities are extremely common. When there is a breach of responsibility, there is a need for meaningful sanctions or, if you prefer, punishment, when a party fails to fulfill their responsibility. When there is a conflict of responsibilities, there has to be an order of priority so that the conflict can be resolved in a reasonable way. In daily business, we do not have too much difficulty handling this issue. We do not balk at paying punitive interests when we necessarily default on a loan, and traffic tickets when we park in the wrong place even if we have to because of an urgency, so long as the punishment is considered fair (what may be considered fair is an ethical, i.e., quality, question). The issue with the bleeding person is more serious. Can there be an adequate sanction for not helping out? To put it as clearly as possible, to what extent can the business woman be made responsible for the death of the victim of the accident, supposing that is what actually happened or might have happened?

Our present societal ethics puts value on life, but infinite value is not an option. This means that society is forced to develop a value system, even for such a delicate thing as human life, and, of course it does. The figures you hear sometimes are amazingly low, recently 60 000 Euros was a common value handled by some insurance companies (these are not known for generosity!). Most apartments have at least five times that value. This makes you wonder about the seriousness of societies' commitment to life. Given the lack of direct involvement in the accident in the case of the business lady, such a value is an upper limit to responsibility in monetary terms. Next, a mitigating consideration is the fact that the business woman is not the prime cause of death. She provides a "cause by default". If she had not accidentally been there, she would not have been involved at all. That certainly puts her responsibility at a fraction of the full value. (Since this is a clear case that may occasionally occur, there could be an agreed upon percentage value on it, actually shared between bystanders, somewhere between 10% and 30%?) A court may decide on a monetary penalty for our business woman to be paid to the family of the deceased and, assuming that the penalty is within her abilities to pay, that would clearly define the limits of responsibility for the business woman with respect to the victim, leaving the question of guilt, blame, and revenge still open (I'll come to that).

To finish the discussion on the case of the business woman, let me state that there is indeed reason for guilt here. In view of the premium society places on human life, there is a clear moral breach. However, moral responsibility must also be definable and redeemable. Life must be able to go on and punishment may not produce unnecessary harm. But the level of responsibility is considerably higher than when the breach can simply be redeemed by a straight transaction, because it transcends the concrete case. In view of our analysis of mental processes, what fails in the business woman's mind is proper conditioning to such a prime moral situation (in the context of present day society's ethics). Her failure (at least from the point of view of our society) should then be redeemable, and if possible, fixable, by a substantial effort to modify her moral conditioning. Hence, both personal and societal action to repair what is perceived as a mental defect is called for. Great care in how to do this is needed here (as would be in cases of professional misconduct as well.). The best one can do is to provide for additional education and coaching towards increased social skills, measures that would be beneficial to all, including the offender (a case for ethical 'goodness'!). We educate people for managerial skills, why not for ethical skills as well?

At this point new principles come into play defining the ethics a given society develops for moral breaches. At best, one would expect society to balance between the necessity of enforcement (e.g., exemplary punishment) and the societal consequences of that enforcement, in particular the value society, seen as the community of humans, gets from it. People do make mistakes or even commit crimes, but that does not make them undesirable and their contribution to society useless. People are flexible and are generally able to correct or recondition their attitudes, when given proper incitements. The feeling of guilt plays a definite role in developing co-operation towards betterment and is almost a *conditio sine qua non* for success. This is the positive role guilt plays. It is an intrinsic part of our conditioning-regulating system and forces us to allocate available freedom (i.e., time and effort) to a redeeming process. One could call this process "devoid of free will" as the feeling of guilt may force the person in a certain direction. We have discussed this issue extensively in chapter 11, in particular how the long term process of conditioning may be considered 'free' in the sense that it is capable of exploiting the dimensions of freedom available to a person. More problematic is the second requisite: does our society offer adequate means to educate people further, even when they are willing? Our legal systems are often out of tune with increasing insights and with the possibilities society offers. I believe that a novel and systematic effort is needed in this area.

More difficult are extreme cases. E.g., premeditated crimes with serious consequences like loss of life by innocent victims, organized crimes or gangsterism. I spare the reader the details of a specific case, but the important issue is that now there is a question of major and intentional criminality, the difficulty being how to handle the fate of the offenders. In other words, how do we deal with unmitigated and socially destructive evil? This is a much trickier issue than the case of the business woman because the quality of the actual societal ethics is now structurally and even dangerously involved. A central question that comes up in many cases and that I wish to discuss to some extent is "how does a person become a criminal and who can be made responsible for that?" At issue is the question of past responsibility for the mental set up of persons committing crimes. Typically there will have been a detectable sequence of "breaches of contract" in their history. The criminal person was perhaps a neglected child, maltreated, did not receive proper education, was forced to survive in poverty. There could even be an intrinsic psychological defect. Children turning bad happens even in excellent families and it may very well be that nobody can reasonably be made responsible.

But, however that may be, society has the responsibility to protect its members against criminals. This is part of the highly acclaimed "social contract" [54]. The question in societal ethics is what it means to handle this protective responsibility in a 'good' way. Society has a number of options here, based on experience and tradition on the one hand, and intelligence (foresight) on the other. The point is very much worth further exploration, following Rousseau's example.

Various societies have handled or are handling the question of protection from crime very differently. There is perhaps no issue that taxes a society's capacity to develop quality ethics more. People are infused with fear and diffidence of whoever behaves in uncontrollable, unfamiliar, or anti-social ways. In cases of extreme criminality, fear overwhelms society and the clash between (presumed) immediate self-preservation and societal optimization is easily decided in favor of the former. Nonetheless, the history of societal development shows timid and admittedly localized progress towards ethical quality. Credit may be given to some ancient philosophers such as Lao Tzu or Socrates for providing insights and ideas, but no religion has contributed more to developing ethics around the theme of sin and redemption than Christianity. The 'genius of Christianity' might be summarized in its infusing the human condition with godly elements, thereby bridging the impossible distance between God imposing behavioral rules and autonomous humans who try to set the world to their hand. Ethics becomes how God lives in people and the portentous contribution of Christianity has been the thesis that 'He' lives in all of us, including the most abject criminal, who, hence, must be treated with the same respect as any other person even though their actions cannot be condoned.

These considerations touch our ethical insights deeply. Although the mentioned insights are very ancient, they are not at all self-evident nor well implemented in most, if not all, of our societies, as they go against our most basic, sometimes poorly understood, self-preservation instincts. We clearly reach the limits of our social intelligence here because the value of respecting the humanity of an unrepentant criminal is not self-evident. Even some Christian societies cherish capital punishment as an adequate deterrent to crime, thereby blatantly infringing on their own principles.

Biology handles the issue of bad cells in an organism very radically—they have to be exterminated. Even good cells are subjected to apoptosis if and when they threaten to hamper further development or when their usefulness has waned. I already quoted Lao Tzu's observation on the issue ("Nature is executioner./ When man usurps the place,/ A carpenter's apprentice takes the place of the master:/ And 'an apprentice hacking with the master's axe/ May slice his own hand." —Lao Tzu, The Way of Life, nr. 75 in the Witter Bynner translation) but this very pertinent observation does not solve the ethical problem. Lao Tzu gives an indication where to search to beef up the argumentation in favor of a 'good' treatment of offenders (Lao Tzu, The Way of Life, nr. 49 in the Witter Bynner translation):

> A sound man's heart is not shut within itself
> But is open to other people's hearts:
> I find good people good,
> And I find bad people good
> If l am good enough;
> I trust men of their word,
> And I trust liars
> If I am true enough;
> I feel the heart-beats of others
> Above my own
> If I am enough of a father,
> Enough of a son.

Is this not a most astounding position? It may almost seem impossible or downright stupid. Can such a radical point of view become part of societal ethics? Let it be clear from the start of the discussion that the prevention of crime must be a moral priority for society along with all the necessary provisos concerning what is meant by 'crime' and by 'prevention'. But let it also be clear that 'punishment' is not an evident implement for prevention. Probably it is not a good one at all. The main reasons why a different ethical outlook is called for than the normal biological defense mechanisms are that (1) the well-being of society has to serve the well-being of individuals (we have argued in chapter 16 that this includes all humans without distinction), and (2) there is no reason for anything like apoptosis or the destruction of asocials given the versatility humans have in their potential teleology.

The upshot is that criminals have to be considered ethically sick or at least ethically unhealthy and treated with the same care and respect as we treat physically sick people. We are all capable of becoming criminals under bad circumstances. That this is true has been amply demonstrated, e.g., during periods of war, when our personal control, given the circumstances, is tenuous at best, or when conditioned by unreasonable fears. On the other hand, we all have within ourselves the potential to heal and change the direction of our efforts (to recondition) provided favorable circumstances are created. An ethically good society will create a manifold of opportunities for its people to groom their talents, deploy them, and exercise their creativity, thereby finding 'meaning of life' in their engagement. That is what Lao Tzu means when he says, 'I find bad people good'. The same potential that he finds in himself is there to be recognized and groomed in 'bad' people. But all this does not work without substantial societal effort and hence will define the concrete ethical quality of a society. It takes effort to become a 'good' society! The effort, in addition, generates a bonus: it provides ethical motivation to its members, employment for social workers, smoother social relations and a significant increase in 'quality of public life'.

We must distinguish 'contractual breaches' from ethical sickness as well. Although some contractual breaches have to be considered unhealthy, they can mostly be left to personal ethics, although they might lead to ethical sickness in the long run (who said that daily sins are much less healthy than an occasional deadly sin?). A good society will have the necessary checks and balances to deal with occasional, but not societally threatening, breaches (although a large occurrence of them may lead to unhealthy social effects, as would e.g., generalized tax evasion, or, conversely, unreasonable taxation). The principle of minimal intervention in personal affairs would likely be healthy, even when it leaves great latitudes to the citizens. All this belongs to normal societal commerce. Ethical sickness is a different matter and occurs when people commit actions that are seriously detrimental to others, or, with some qualification, to society or nature as a whole.

What hampers us at this point is that we lack a sturdy, scientifically motivated theory on 'ethical health' and its corollary, 'ethical sickness'. Horrors like 'morals police', 'religious police', or 'vice squads' come to mind where the whole issue of morals is reduced to a set of nonsensical rules for the public domain based on dubious traditions and enforced without respect for the many victims concerned. At the other end of the spectrum, criminology has developed as an autonomous discipline with a variety of theories and opinions on what causes crime, how it can be prevented, and how one can deal with criminals.

In contrast, the 'health' point of view I have been advocating requires the development of a theory analogous to (modern) medicine whereby, just as in medicine, the individual person plays a primordial role in its definition as the bearer and generator of both personal and societal teleology. Our present day handicap is that ethical theory for personal and societal health does not show a state of accomplishment similar to medicine, although there is room for further insights and improvements even in medicine.

A set of further observations can be made. When one adopts a societal ethics based on humanist principles, where society is seen to serve the healthy development of its members, the necessary outlook on how to deal with crime and criminals changes drastically. Admittedly, and as I have argued forcefully all along, principles do not determine content, but they do provide us with guidelines for sensible thinking together with a frame to judge the quality of our ethical thinking (i.e., a meta-ethical framework).

As compared to the view in which retribution and punishment for transgressions rules, the humanist viewpoint takes an opposite angle. Whatever must be done, must be done to optimize the benefit for the persons concerned, including the criminal. To subject criminals to inhuman treatment in jail or capital punishment helps neither society nor themselves. It may provide satisfaction to their victims or their families, but we all know that vengeance does not help the latter either, but, quite to the contrary, poisons their lives[4].

This means, for example, that imprisonment should not be used as punishment. It can only be used to protect society against harmful antisocial behavior and has to be administered with the utmost respect for the persons concerned as if they were bearers of a deadly disease[5] and have to be quarantined to protect society (and, perhaps, themselves). As a collateral, the redirection of the persons' teleology, creativity and activity, in short the healing of their sick personal ethics, has to be carefully dealt with and its cure groomed. This certainly is a delicate process requiring substantial intelligence and expertise, but it is not more or less difficult than society's need to groom the talents of its citizens in general or to provide the best possible healthcare to them, even in very critical circumstances.

This leaves one aspect of motivation for punishment untreated here, namely deterrence. Willful breach of a contract, be it between persons or between persons and society (and of course criminal behavior) can better be discouraged in the first place. Punishment can, to a certain extent, be an adequate means, as long as it remains within reasonable bounds, so that its potentially or even obviously noxious effects remain limited. People who endanger other people's lives, e.g., by drunken or reckless driving, should be strongly discouraged to do so in view of the damage their unconscionable behavior may cause. A similar argument can be made for tax evasion or cheating. In a humanistic ethics, 'good' punishment in this respect should

[4]Just count how much time and energy often goes in it, preventing other thoughts and activities.

[5]Which, *de facto*, they may be.

satisfy a number of properties, e.g., it should provide for effective prevention but also be appropriate with respect to the offense, and its noxious effects on the offender or society should be minimized (in particular it should be proportional to the abilities of the offender to sustain the punishment without impairing their human perspectives). In our modern societies, many systems of punishment for heavy offenses do not satisfy even the most elementary notions of quality, causing much more collateral damage than the offenses themselves. Punishment is difficult medicine to apply without bad side effects.

The ethical attitudes advocated here amount to a societal challenge, but, in view of their intrinsic value, it is a challenge that is very much worth meeting because of the substantial benefits it brings. Our present prison system is a very expensive affair and it is highly questionable whether all that money is really well-spent given the results. The gratification of individual feelings of vengeance cannot be counted as a great result considering that it does not repair the damage done and produces even more damage. All this does not mean that some type of retribution would not be called for. It has to be integrated into the healing teleology of the concerned offenders, but cannot be conceived in such a way that it stiffens their productive human creativity or hampers their healing. Human benefit of whatever action society takes should prevail, of course in the context of the overall health of the societies in which we live.

This requires the development of systematic societal ethics in the humanist direction I am advocating (and many ethicists with me) and the ensuing political leadership—a permanent adaptive process. As it goes with all the ethics considered so far, there are no a priori and immutable rules, no universal laws, no final solutions. A great sensitivity to concrete situations and the consequences of whatever actions are decided upon is generally called for, notwithstanding the general principles we are using, which can be interpreted in manifold ways, often influenced by habit or tradition, and hence subject to permanent evaluation.

> Existence is a sanctuary:
> It is a good man's purse,
> It is also a bad man's keep.
> Clever performances come dear or cheap,
> Goodness comes free;
> And how shall a man who acts better deny a man who acts worse
> This right to be.
> Rather, when an emperor is crowned, let the three
> Ministers whom he appoints to receive for him fine horses and

gifts of jade
Receive for him also the motionless gift of integrity,
The gift prized as highest by those ancients who said,
'Only pursue an offender to show him the way.'
What men in all the world could have more wealth than
they?

(Lao Tzu, The Way of Life, nr. 62 in the Witter Bynner translation.)

Chapter 19

On general notions and principles

We engage now in a further consideration of the role of 'notions' and 'principles' and whether some of them can be considered 'generally valid'. Our relativist argument has been that there will always be a 'next' layer necessary to provide a context for the one in which notions and principles (or definitions and axioms) are formulated. These notions therefore "dangle" when that context is not provided. Nonetheless, this last layer has to be interpreted inductively, the result of an intelligent abstraction process that integrates past experiences and utilizes the result to characterize and classify new experiences. Deeply ingrained in human psychology is then the idea that such abstracted knowledge is universally valid, particularly when it gets reconfirmed by continuing experience. What is seen as a 'general principle' forms another layer of nodes in the network structure of the mind, influencing other layers and competing with other types of conditioning. The usefulness of a general principle is that it gives direction and structure, but it can also lead to fixation, lack of adaptivity and even downright shortsightedness.

Here are my principles! If you do not like them, I have others.

Given the emphasis on the relativistic non-existence of 'absolute' concepts, there remains the question of the meaning of such general terms as 'goodness' (the goal of ethics), 'beauty' (the goal of aesthetics), 'truth' (the goal of knowledge), 'justice', 'honesty', and other terms of this nature. Does the significance of all these lofty notions dissolve in the nitty-gritty details of concrete situations, or, do each of them have a meaning that transcends their concrete use? Although the question may have mystified many thinkers, leading Socrates to the concept of 'ideas' and Kant to the conviction that any genuine exercise of reason must lead to univocal conclusions, we easily come to the conclusion that here we have another ‘abstractive layer’ that has to satisfy its own structural and semantic constraints, typical of what happens in the human mind. Nonetheless, the question is legitimate, as these notions play a big role as ‘general concepts’ leading to ‘general principles’ which humans communicate to each other and share within their mental frameworks. We have encountered them in this capacity at critical junctures in our discussions on ethics and aesthetics as well.

In order not to repeat the biological and logical arguments made before, let me just mention the important role these notions play in our daily existence and, in particular, how we relate to other people, society, and nature. We use them to motivate or to justify our and other persons’ behavior, both in a constructive and a destructive way. We already considered the role ‘goodness’ plays in the construction of frameworks for ethics (or ‘beauty’ in aesthetics), but from our daily experience we also know what terrible predators humans can be as soon as they acquire a position of power, which they consolidate using lofty principles. They allow themselves to be guided by fantastic chimeras motivating aggressive behavior, and their resulting actions are often devoid of the most primitive compassion even for their closest fellow beings.

Besides the abstract qualities or ‘virtues’ mentioned in the previous paragraph, there are many other types one does not usually like to consider, but which, given careful observation, seem to rule the world: vengeance, envy, cruelty, greed, egotism, negligence, disrespect, and anger. And these are just tokens covering ugly realities. What to say about political leaders sending millions of their young citizens to war as “cannon fodder” or large companies (and their managers) acquiring wealth exploiting their laborers and/or nature, motivated by lofty principles such as ‘honor’ or ’economic value’. High ideals can turn out to be very cruel.

We figured that concrete actions cannot be derived from abstractions and principles. But in daily practice people seem to do just that. The German soldiers of World War I were motivated by the erroneous belief that the German order would change the world for the better (e.g., see in this respect the letters from the front of the famous young artist Franz Marc in the Franz Marc Museum in *Kochel am See*, Bavaria). They were motivated by a good dose of patriotism on the one hand and idealism on the other, believing that they would bring a new era of well-being to the countries they were invading. Often they could not even understand the resistance they were experiencing. The German soldiers fighting in Verdun in May 1916 were ordered by their (distant) commanders to attack through a hail of enemy artillery and run to their certain death (they were ordered explicitly to attack before the massive enemy firing would stop). What was motivating these commanders? Stupidity or pure contempt of their soldiers? What was motivating the soldiers? Pride or fear? (They must have gone through hell before dying. Many were horrendously wounded and suffered a slow death by bleeding and gradually drowning in the mud.) And then, it was, from the start, clear that the battle of Verdun with its 300.000 plus casualties was a measure for nothing. It had no strategic importance for either side. Can one say that the 'general principles' these people adhered to caused their ruin? Surely a testimony to the power 'general principles' have over humans.

In my view, all such examples illustrate the workings of human psychology more than they provide information on the content or value of the concepts mentioned. Every abstract concept provides a reference to a psychological structure that pervasively influences other components of the brain and hence serves as a kind of high level conditioning—they may even induce actual conditioning through neuro-transmitters (as happens when a person becomes angry, satisfied by an aesthetic experience or entranced by love). When the person is conscious of it, it would be called 'motivation', but often the implied semantics is purely emotional and hence not conscious. For example, when the term 'patriotism' is used, people may accept the notion as self-evident and act according to the in-situ conditioning, or they may be conscious of it and follow a process of thought that provides explicit meaning. In the second case, thought induces the conditioning, which may lead to reinforced or adapted behavior. The plasticity of the brain allows a person to turn from conscious to unconscious awareness and vice versa, as happens in many learning and adaptive processes, and allows a person to function automatically in complex situations.

When people, for example, speak about 'patriotism' as a recognizable reference to a certain type of psychological structures, then this necessarily refers to the conjunction of a number of characteristics that are (more or less) jointly shared between all persons harboring the notion: sense of belonging to a given country, cultural awareness, pride, willingness to contribute, but also, and surreptitiously, preservation of one's property and lifestyle[1] or even keeping specific types of foreigners out. The term is no more than a token, but it acquires its meaning in the complex process of the mind that manages abstractions. More precisely, the brain making specific connections between various components of themselves or, if you prefer, observing itself, i.e., consciousness as a property of its 'top layer' of intelligence. Not really surprising so far, except perhaps that the connection with semantics as defined by 'effects' or 'consequences' gets replaced

[1]The New Oxford American Dictionary says "a patriot is a person who vigorously supports their country and is prepared to defend it against enemies or detractors", but I think this description does not quite capture the notion.

by unconscious structures that produce highly conditioned behaviors, as happens in all learning processes.

Considering the meaning of general concepts from a logical point of view, we immediately realize that the definition (and hence the meaning) of a concept is provided by a list of characteristics which themselves are in need of definition and semantics. The assumed logic 'closure' is that these characteristics do refer to effects that are either fully understood and taken for granted (and not explained further), or else need further characterizations, displacing the problem of signification. In other words: full logical closure is not possible already on logical grounds. The result is that the general principles can only be installed in the brain via an inductive process in which their application is used to establish the abstraction, and this process will sensibly be different from person to person and highly influenced by the person's history of learning, i.e., by the person's cultural environment.

The interesting movement is therefore the opposite, namely the building of such psychological structures, hence the learning process of conditioning and development of their characteristics. The important point is that this movement is being driven, at least partially, by the concepts themselves, through exploration and reinforcement. Of course, just the words 'patriotism' or 'goodness' or 'cruelty' are not enough to create the attitude these concepts refer to. Rather, some processes create the conjunction of experiences and affects that may then gradually be recognized as corresponding to the concept sought and is subsequently reinforced by outside agents (the cultural environment) or by consciousness (self-enhancement). The learning process is usually not intellectual, it is a capacity of the neural network of the brain, the neural basis of 'intelligence'. It may have been built up by trial and error (as love, greed, or even cruelty might be), by mimicry (e.g., flock behavior), by enhanced self-preservation reflexes, by anxiety, by exercise, practice, and even just by thought itself. We know that love breeds love and cruelty cruelty. Our species and many other mammal species are perhaps indebted to the occurrence of motherly love in the very first years of existence for their faculty to experience, appreciate, develop and interiorize love, while greed or cruelty would be much more 'natural' given immediate needs for establishing power and survival. Both mechanisms are active at the same time with unpredictable results, e.g., people loving their kin and exploiting their underlings.

What makes the situation especially complex is that all these processes occur simultaneously and are greatly influenced by all sorts of external contacts, many of them beyond personal control. Chaos all over! But most of us do eventually gain control and will either consciously, by temperament, or by habit enforce certain directions. When this happens consciously we can begin to speak of ‘ethics’ and some ‘general principles’ may gradually obtain a much deeper meaning than originally implanted, reinforcing themselves and taking hold in the psychology of the person. This can be called the essence of the learning process, much of which is only partially understood nowadays (for example, a big challenge in robotics is how to increase a robot’s artificial intelligence by learning, thereby combining experience with autonomous reasoning).

Returning to the issue of logical closure, we see that the meaning given to a ‘general principle’ consists of a set of learned characteristics, applicable in contexts or frameworks in which such characteristics make sense. Let’s take ‘beauty’ as an example. If we follow the New Oxford Dictionary, the characteristics are ’shape’, ’color’ or ’form’ that activate specific senses and produce an aesthetic sensation. The definition is circular as ‘aesthetics’ is defined as “a set of principles concerned with the nature and appreciation of beauty, especially in art”. One gets out of the circle by taking one or the other component in the definition as a basic, undefined notion, e.g., one could take ’appreciation’ as such and then say that beauty consists of ’shape’, ‘color’ or ‘form’ that elicits appreciation by their sensual effects[2]. As a starting point, this allows beauty in music, painting, architecture, and dance since in all these contexts the characteristics would occur. Still, the result is very meager and says little about what the sensation of beauty may become for a person who is engaged in deepening their ability to appreciate the artistic possibilities of shape, form or color (and in the case of music, sound). However that may be, the opening of the Pandora box of possibilities does not make the concept ‘beauty’ less meaningful, but it certainly makes it less definite and more exploratory.

The elaboration of the concept of beauty in a person or a society can better be viewed as an *invitation* to incorporate certain specific dimensions life offers, in this case through our senses. “Beauty is in the eye of the beholder” goes the saying, but that is only a static view which neglects temporal developments, or, to use a system theoretic term, the dynamics. The more a person accepts the invitation, the more they determine its definition and its meaning. They will develop an increasingly refined sense of aesthetics, but that will also imply an ever more refined choice of directions. Lao Tzu says, “Through finding something beautiful, people find something else ugly”, which can also go the other way. Again, there will be an “algebra” involved. Certain objects of art will be found beautiful by most people and ugly by others, and for most objects the opinions will be undetermined. By this I do not mean that most people have no aesthetic

[2]Biologists might go further and measure levels of neurotransmitters in corresponding neurons.

feelings, only that there are so many directions for them to choose from that most will have no effect on most people. Where is the stability presumably induced by the concept? I think a safe statement is "no more than what the original definition says", however interpreted, because *that* is the only characteristic seen to be common to all in the art category. Beauty as used more generally in daily life refers to positive appreciation of an object or a situation and hardly anything more at this level of generality. Beauty then refers to an attitude, which belongs to the realm of psychology, altogether another context.

And so it goes with most 'general properties'. Considering 'goodness' or 'the good', the characteristic would be 'beneficial to someone or something', but that is again running in circles, as 'beneficial' and 'good' might be taken synonymously. To qualify as the main characteristic of the goal of ethics this is, of course, largely insufficient. A strictly formal definition of 'goodness', abstracted from any framework of applicability does not appear to be possible, which does not mean that the generally accepted process of thought induced by the notion is not possible. This we do by proposing common characteristics of what would qualify the use of the term leaving its elaboration to the framework in question. In the context of design, 'good' would for example be characterized by 'effective' and 'successful', which would qualify the dynamics of a given product development as achieving its goals. It would be up to the system's environment to define what that means exactly, e.g., a good design would lead to a successful product with 'success' measured in an agreed upon way (perhaps numbers sold, effectivity or return on investment). It is up to the system's developer to set up the goodness criteria, hence their own ethics as we described it. We cannot say a priori what would be a 'good life' as the notion of goodness is best seen as an invitation to develop what is meant in terms of more concrete characteristics.

But can we formulate 'general principles' that would discriminate *a priori* between what would amount to good or not good? I think that is not possible. Definitions quickly become normative (after the context is understood and accepted) and hence in danger of infringing on the basic freedom available to any person or society developing its ethics because to do that is precisely what ethics is about. This would amount to producing an outside agent setting ethical rules, thereby annihilating the purpose of ethics. (It would be like telling a composer how he should compose a piece so that it sounds beautiful.) But one can posit some guidelines, solely based on meta-experience, with the necessary restraint and mostly qualifying the role the concept is supposed to play[3]. That is the meaning I use for

[3]This is also how general concepts are defined in a branch of mathematics called

'general principles'. We have encountered some of them in our discussions on ethics, but let us get a bit deeper into their genesis here. Unavoidably, the characterization of goodness was already based on one of these principles, namely 'beneficial development'. Further deepening would, for example, make that notion more precise. Beneficial development for our planet earth would mean, at the very least, 'sustainability', an eminently useful evolutionary principle, but not everything is worth being sustained, so further refinements are needed and the developmental dynamics proceeds ever further.

For the benefit of discussion, let us consider Kant's idea that beneficial development of human societies on earth would mean no war (actually 'eternal peace') and therefore necessitate 'republicanism' as defined by him in his essay on *Eternal Peace* [36]. I would consider the first as a 'general principle' derived from historical experience, an assessment of what would be beneficial for humanity and the consequences war has, while the second (republicanism) is an elaboration of political ethics to implement the principle into world political practice. More precisely, a political system could be considered 'good' if it is capable of achieving the 'no war' property and the guideline is then "develop your societal ethics so as to assure that property".

A central characteristic property of the notion of 'goodness' is the occurrence of a 'beneficiary' (somebody who 'profits'). Who are the beneficiaries and what the benefits mean will then be one of the main characters of the relevant ethics. From our understanding of the notion of ethics, this will consist in ever deepening analyses of experience with personal or societal benefits and the anticipation of scenarios for personal or societal development, using insight and acquired experience—all notions that require further deepening themselves. This is the 'genealogical' part of the semantic process—the process that ends up defining the notion. Notions are consolidated through experience with their effects and analysis of their consequences, until they crystallize as knowledge. That all this can go in a variety of directions should be clear and also that this diversity would need ever reiterated considerations in a never ending effort. This fact of life does not make the whole exercise worthless, quite to the contrary. It continuously provides new meaning and continuously needs regeneration.

'category theory'. E.g., the general concept of 'homomorphism' that we have loosely used already.

Chapter 20

Why God?

A treatment of relativism cannot be complete without the consideration of the notion 'God', since the belief in God and the practice of religion has occupied a large majority of humanity for many centuries and has influenced their lives accordingly. The notion of God as 'supreme being' seems definitely untenable in a relativistic context as is the idea of a primary creation by an intelligent agent capable of directing all future evolution. The creation of live is to be seen as a continuous evolutionary process, largely driven by intelligence as emergent behavior. Summarizing drastically, there are two main arguments for the perceived necessity of the concept of God, one spiritual and the other ethical. In the chapter on ethics we already motivated why the assignment of God as the ultimate ethical authority is to be considered detrimental. The spiritual motive, on the other hand, is of a very different nature. It is the issue of the 'ineffable', eloquently defended by Karen Armstrong in her book 'The Case for God'. This approach fits systemic relativism well, in a natural way. The chapter reaches the conclusion that a shift from "Gottesdienst", seen as religion devoted to the worship of God, towards religion as sensitivity to the mystery of the world, nature and life, hence awareness of the ineffable, makes religion a necessary human faculty. Remarkably, some major Eastern religions have lead the way to this insight since their inception.

> I shall be who shall be, says Jahweh[1].

A majority of humanity believes in the existence of God (or gods). This calls for a philosophical discussion. People produce different reasons and motivations for religion, depending on traditions and locations. There is no way I can do justice to the great variety and richness of concepts humanity has generated in this area and my views on these may even be suspect to

[1] To Moses in Exodus 3:14.

many believers. Already the sole idea that humanity herself is at the origin of all the religious concepts that have arisen rather than divine intervention, will be rejected by many religious authorities. But I do think that the history of religion in its manifold aspects is an extremely interesting topic, because of the great originality of ideas religions have proposed, the sometimes deep psychological insights and the contributions they have made to human practice and human culture.

Due to this great variety, the discussion in this chapter is bound to be very modest. I propose to restrict the discussion to two central topics in which religious concepts and systemic relativism are bound to meet or to interfere. First, and since it might be doubted that religion and the notion of God is compatible with relativistic thinking, I wish to firmly establish but also qualify the relationship. Relativism has been fiercely attacked by authorities in the Catholic Church (and others), in my view for the wrong reasons. Secondly, I am convinced that relativism may shed a new light on the mind processes involved in the religious experience. I restrict myself to offer ideas on these questions, without claiming any final truth or judgement, claims a honest relativist would never make.

As I view the situation, there are two main arguments for the perceived necessity for the concept of God(s). One is of spiritual and the other of ethical or moral origin. Let me start with the spiritual one, eloquently defended in Karen Amstrong's book[2] *The Case for God* [1].

To most of us what we see as the existence of the world, nature, the universe, ourselves, and other beings appear to be beyond comprehension, and questions like where we come from, what is the goal of our existence, and why we acquired consciousness do not seem to have simple or easy answers. A sensitivity to what cannot be uttered or comprehended, what we call the 'ineffable', not only triggers our emotions, but also engages our rational thinking, itself a mysterious phenomenon. The question of the ineffable forces itself center of stage to whoever contemplates the theater of life.

Even the most elementary type of objects physics has to introduce are surrounded by mystery. Particle physics, for example, starts by defining electrons and donating them 'mass' and 'charge' with some specific properties out of the blue and, when that does not appear to suffice, it endows them with the even more mysterious 'magnetic spin', which is made to obey new outlandish properties. Other elementary particles (in the present 'standard model' there are 16 of them) are subjected to a similar fate making the introduction of ever new properties and phenomena necessary, together

[2]I have few qualms with Armstrong's arguments, just a personal view on and a number of considerations around them, but the approach I am advocating is substantially different, given the relativist viewpoint on semantics, truth and 'existence'.

with a mathematical formalism so defined that their behavior fits experiments. The discovery of a correct and relatively simple mathematical model that precisely covers the phenomena elementary particles exhibit was eminently impressive, but one may rightly argue that the system only explains what fits the model, although that is very massive, from the big bang and major effects in cosmology to the constitution of the 92 'natural' elements of the table of Mendeleev. The theory as presently available does not quite explain all particle phenomena from basic principles, but physicist may eventually find an even more streamlined set of basic laws to mend some or all of the arbitrariness in the present model. The curse of the physicists is that they have to look ever deeper at the bottomless foundations of their theories while hoping (or believing) that all other phenomena in which these elementary particles participate (that is, presumably, all matter) can be explained and justified, if only they get their first principles right, which, as we know from chaos theory and its 'emerging behavior', is guaranteed to be impossible.

Since Gödel we know why this does not even work at the logical level: there cannot be a theory that covers everything. In any theory, there will always remain properties that lie outside its already derived content, even a massive lot of them (in Gödel's rarified theory already uncountably many). In other chapters, we already discussed the importance of chaos and the fact that it forces a progressive hierarchy of theories. When one moves up in such a hierarchy starting from physics to higher levels such as chemistry, biology, linguistics, one realizes that the next level up is not derivable or even contained in the previous one and hence needs its own singular basic concepts, axioms, and hence mystery. The best one can hope for is that the subsequent levels are not contradictory with each other (which is not even the case with our present hierarchy of scientific knowledge, and likely never will be.).

Hence, mystery there is and lots of it, and one must admit that it cannot be approached in a direct, expressible way. From the Gödel theory one would infer that one reaches a 'field of awareness' that is impermeable to logic or, more generally, to language. Although the ineffable cannot be defined[3], it can be experienced. Let me try to explain how this can be, using some analogies. Language relates to experience like a geographical map to a terrain. A good map of the Himalayas makes a great impression on whoever looks at it, but the impression does not even come close to what one experiences when viewing the Himalaya's from the top of Mt. Everest. That is the ineffable, now in the map world. A similar thing happens with

[3]By definition. But this is, in itself, not a definition, as it lacks a well-defined, explicit context.

notes and music. The notes do code the information a musician needs to reproduce the music, but the musical experience is something very different from reading the notes (and has to be learned inductively). The musician has learned to attach an experience to the inky material of notes on a score.

So much for the ineffable as "what cannot be uttered". However, the experience of the ineffable goes many layers beyond the simple experience of awe for nature, although this basic experience is certainly a necessary ingredient. Compared with the level of physical particles, the higher levels of life unfold in even much richer and more wonderful ways, producing a significance ('significance' as both meaning and strength) that comes much closer to the experience of the religious. Some very special people put their lives in jeopardy to save other people, like some deeply motivated Protestant families did in Belgium and Holland hiding Jewish families during World War II. To be honest, their selfless and highly dangerous actions defy my comprehension. I cannot view their commitment anything else but induced by an experience of the ineffable, not just a feeling, but awe for what they saw as the presence of God, inducing them to action.

Many people devote large parts of their lives to the service of others, partly or wholly in a selfless way. The very strong ethical stand of these people (as evidenced by their behavior) brings me to the discussion of the claim that we need the existence of God for ethical reasons. I do not want to redo the discussion of the chapter on ethics, but ethical considerations cannot be divorced from the question why a great majority of humanity is convinced that it needs the notion of God for ethical or moral purposes.

It requires some further discussion to put the relation between ethics and religion in perspective, especially how it works out in a societal context. Often the notion of an 'ethical God' implies the existence of a transcendental authority on ethical issues. Such a viewpoint has the property that it preempts the claim on ethical authority from a number of other instances, to wit, public authorities, a king, an emperor, church authorities, Amnesty International, or whatever. The Catholic Church (and some other authoritarian religions) has found ways around that problem by transferring ethical authority to some physical persons, e.g., Jesus Christ as the 'son of God' and the pope as his successor, but this has no biological or natural basis whatsoever and must be considered an usurpation of spiritual power (i.e., 'meme' power), verging on dishonesty. The idea of God dictating what is good behavior is obviously appealing, but there are serious problems both with the concept and with its implementation.

As an improvement, the movement to shift ethical authority towards organized religions may be viewed as positive by some thinkers, but is still very dubious. It may be thought better than leaving it with public authorities, because of the connections with power of the latter. Unfortunately, the move is flawed in some major respects. First of all, however one constructs it, it still moves authority from one set of human beings (kings, public law) to another (popes, ayatollahs, or in some more moderate religions, communities, books, or precepts). Why would one be more genuine than the other? Secondly, it makes the ethical decision instance more abstract (as if one could derive concrete behavioral precepts from abstract principles—we have discussed this problem extensively in chapter 19.). The combination can be lethal on a large scale as has been e.g., tragically demonstrated by the prohibition the Catholic Church imposed on the use of condoms, thereby causing the death of millions of innocent victims of AIDS due to unsafe intercourse[4], and by the death sentence of Islamic authorities against apostates, also endangering the lives of millions. Once religious authorities move to ethical issues, disaster seems just as inevitable as when a dictatorial government kills its opponents.

The conclusion is clear: neither organized religion nor public authorities are suitable vehicles to define the ethics for individual people and for societies (these authorities certainly have to define proper ethics for themselves to start!). Many organized religions have ancient roots and claim to transmit the traditions of some of our wisest forebears. The problem is that these traditions present a rather chaotic amalgam of different modes of thought often based on past models of nature and societal habits that are no longer applicable or, worse, provably incorrect or detrimental respectively. These are pre-scientific, by which is meant that they are not based on experimental verification, but merely on the authority of a sage or of a scripture (which often is also an amalgam of "wise thinking" based on previous authorities). What they often try to do is make what cannot be explained utterable, even in a normative way.

The religious domain is therefore one in which relativism is most needed. To proceed with the discussion, I now want to make a clear distinction between religion as the art of experiencing the ineffable and religion as the service of God[5]. Unfortunately, English has only one word for the two types. In German (or Dutch) there are two translations for the English term: 'Religion' (for the first type) and 'Gottesdienst' (for the second). I

[4]If I remember correctly, an estimate from the WHO puts the death toll due to intercourse between an infected person and an unaware partner at more than three million. The resulting children were often victims as well.

[5]There is little consensus about both the etymology or the meaning of the term 'religion'. The most common interpretation goes back to Augustine, who relates the term to the Latin 'ligare', to bind or to connect. I feel therefore free to use the term in the way I indicate. I do not want to use the term 'spirituality', because the notion of the ineffable has little to do with spirits, even though the experience of the ineffable is a mind process, and mind in Latin can be translated as 'spiritus'. But so are many more mind processes, such as science or art, which are not covered by the term spirituality.

want to use the English word only in the first meaning. Religion is then not about truth or belief, but about experience, analogous to aesthetics, but with another object. Aesthetics provides, in addition, a good metaphor on how to deal with the extreme variability of possibilities that can bloom under the experience of the ineffable.

Just as in aesthetics, there has to be a balance between consolidation, leading to a “religious theory” or at least a religious tradition, and the freedom to experiment and explore. At some point in time a tradition may be abandoned in favor of budding new approaches, primitive at first and then gradually obtaining depth and strength. This does not mean that old traditions have to be cast away, in fact, one may continue to groom them for their own sake, but they will no longer have their original creative driving force. What has been discovered by our predecessors does not have to be discarded. It can be reinterpreted, but certainly has to be re-experienced because that is the purpose of keeping up the tradition. Unfortunately, religious theory has not achieved the level of sophistication music has in many cultures, and the danger to fall back into more primitive modes is always there (also in music) unless serious and honest efforts are made to integrate and communicate the underlying experiences and insights.

Such developments do not happen in a vacuum, the connection to nature and reality is thereby unavoidable. Music uses a sophisticated system of sounds to achieve a psychological experience. With religion the need to use physical means is equally important, music and religion even meet when their objectives match. The fact that sounds, pictures, narratives, and even dance can induce us to the religious experience of the ineffable makes aesthetics a part of almost any religion. However, the most profound religious behavior as we have encountered it in people who selflessly offer their lives to others in charity, love, or just pure human decency, involves their personality completely, and is hence deeply ethical.

At this point I need to go a bit deeper into the notion of the ‘ineffable’, which I used before, perhaps a bit too casually. As always with language, each notion and each abstraction needs a fairly precisely understood common contextual framework, not as precise as in logic or mathematics, but sufficiently so that the meaning they convey can be shared. When we speak about the ineffable, we refer to a type of experience whereby we become aware of the power(s) of nature (in the broadest sense) that lie beyond ourselves but in which we participate intensely. Such an experience can take many forms and can be very strong. Some artists explore the experience and try to make it tangible through artistic means. As a prime example, Bach developed a complete idiom of musical communication (based on the use of tonal chromatics) to evoke feelings of pity, love, sorrow, betrayal, contrition, compassion, and yes, even the ineffable in the listener [25]. But scientists also occasionally get entranced. Remember Pascal's famous

> Le silence éternel de ces espaces infinis m'effraye[6]

and whether these infinite spaces are indeed silent is of course a matter of discussion (we know that celestial masses influence each other, mainly through gravitation, and that this creates oscillations).

Beyond the aesthetics (and sometimes conjured by it, granted!), is the conviction that certain modes of living create a better world. The search for higher value is strongly ingrained in many humans, some of whom would go to great lengths to realize their ideals selflessly for the perceived benefit of all. That is what made Mother Theresa care for so many orphans in difficult circumstances, Gandhi and Mandela to fight for the emancipation of their people, and Dutch Protestant families to hide and care for Jews in World War II. These people (and many others in various circumstances) experienced the ethical ineffable. Mother Theresa and the Dutch Protestant families were religious and motivated by their belief in God, but a more accurate assessment is that their dedication was the embodiment of their experience of the ineffable, within their tradition, beliefs and environment.

The awareness of the ineffable, as what lies beyond whatever framework we can construct and reason about, makes complete sense in the light of our relativistic understanding of the limitations of knowledge, and becomes an important component in one's actual ethics. It may even be considered one of our most creative powers as it has lead to some of the most impressive human behaviors, experiences, and even works of art. An issue with it is that it can easily get contaminated by convictions that are not genuine to it. It is after all a specific type of experience and leads to communication and sharing with others. No problem with that, but communication also presupposes an abstractive process in danger of rigid interpretation, as all abstractions are. The experience of the ineffable cannot lead to formalized knowledge, as it is an awareness of the limitations of knowledge and the need to accept that much *cannot* be known. It is already wonderful that such an awareness exists in our minds and can be communicated, as an avenue or an invitation to experience (which is not the experience itself). Not surprisingly, science is not an adequate vehicle of communication for it. Art does a better job, but even there the danger of diversion looms. Experience cannot be anything other than that: experience.

I want to venture the thesis that science and religion, in as much as they lead to the experience of the ineffable, are not only complementary, they need each other. Many scientists are on a quest for deeper understanding of nature, moved as they are by its most remarkable laws and mechanisms.

[6]The eternel silence of these infinite spaces frightens me.

This emotion is 'religious': it is the result of sensitivity to the ineffable. Without it, there would be no devotion to science. Perhaps no one expresses the ineffable that science deals with more clearly and more concisely than Lao-Tzu in his opening poem:

> From wonder into wonder existence opens.

This is what moves the scientist; but the ineffable can be approached from many angles, I even believe it is a prime experience in young children. Their sense of wonder when they discover something new surpasses almost any other joy.

So then, what about the notion of God? Often the term is intended to refer to an entity outside of our consciousness and to which we might assign properties, which, in any event, would be a dubious exercise[7]. The notion of the ineffable lives within ourselves, it has no 'existence' outside our minds, although it relates to perceptions and experiences induced by our perceptual contacts with the external (including ourselves viewed as external). It is a faculty that we as humans have (surely, we are part of nature, and in that sense what we think is part of nature, but can hardly be conceived outside of ourselves). So we cannot say that as we experience the ineffable we experience God (although a number of religiously oriented people would like to) for this would deflect the ineffable to become an observable natural entity. We should therefore circumscribe the notion as just a human faculty and not exceed the boundaries that language puts on us, by building structures outside of our own thinking, for which there is no evidence at all except for our mind's perspective on them, and which may even differ largely from one person to another in content and intensity.

The consciousness of the ineffable can be or become very destructive as well. Buddhist monks have immolated themselves for the cause of justice. This is, of course, a highly questionable destruction of one's own life. Others have immolated fellow men while immolating themselves as did the

[7] Some philosophies and religions (historically, the two were often not strictly distinct) consider the godhead as all-encompassing. Spinoza calls it 'the All' and my editor mentions Sufism, in which it is called 'the Self'. I do not consider such terms as logically or linguistically definable. They refer, in my view, to the ineffable, which itself refers to what lies beyond the definable. In a different direction, the religious narrative often strives at personalizing the notion of God. This idea, even though it might seem attractive, encounters two severe difficulties. One is semantic, namely what one may consider a 'person'. As soon as one extents the notion of person beyond humans one treads on shaky semantic terrain. The other is existential. As we discussed, existence is assigned within the mind and requires what we have called a homomorphism with experienced phenomena that are structurally related by the mind. Existence is therefore not an absolute notion, its definition requires a mind process. These observations relegate many religious discourses to the status of narratives, which we have discussed in the chapters on truth and epistemology, potentially valuable but in need of further assessment.

pilots who flew into the New York World Trade Center on 9/11/2001. Meeting "the" ineffable can be a very primitive experience. As it is a mental process, it is necessarily dependent on the stage and art of development in individual people. The line between the ineffable as a driving force and other psychological drives such as the desire for power, material gains, or even a blissful afterlife is very permeable, as are all things human. Even the experience of the ineffable has to be subjected to valuation, a process that in itself cannot produce results that are absolutely certain, but whose exercise is what brings our dealing with the notion back to ethics (as we have understood it).

Uncertainty is not a property humans like especially. Our appetite for the absolute is almost uncontrollable. Many religions, the most lethal and even the most benign, have dealt with the issue of negative ineffability by inventing an anti-God, the devil. But also the traditional good God exhibits sometimes markedly negative traits. It can be jealous, lethal, acrimonious, prefer one nation to another, what have you—just read the Bible or the Koran—I am not even talking about the very humanlike universe of mythological gods. Most modern theological authorities will discount such theologies as aberrations, but they illustrate nonetheless the unavoidable variability of a property that is inherently human.

At a more profound level, 'theodicy' considers the problem of how an omniscient creator can be compatible with so much random illnesses and blind evil in the world, affecting even the most innocent people (like young children) unjustifiably. Theologians, instead of trying to solve a badly posed problem in devious ways, would do better to consider such a problem as proof of a theological fallacy.

In another direction, religious authorities often try to convince people to act in certain ways using psychological inducements. Both the stick and the carrot are favorite instruments, either as heaven or hell located in an imaginary post-life future, or even in the very real here-and-now of financial success or implied punishment when illness or misfortune strikes. Sad to say, the stick is mostly preferred to the carrot. Both must be considered psychological aberrations. However, this fact should not derail our very real encounter with the ineffable. Thinking again of the Protestants harboring Jews facing immense danger in World-War II, it is incorrect to say that these people behaved in this exemplary way because of their "fear of God". From personal contacts with some of them, I know it is the opposite. They used the term "fear of God" to describe the power of their ideal of being a human, and they decided to act in complete accordance with this ideal—an example of excellent ethics. The way people express their emotions and convictions is determined by their history and cultural environment. It is their behavior that exhibits their actual ethics.

From a systemic relativistic point of view, many formalized religions provide an 'ultimate' context or reference as the essential or final basis from which further practices and theories are justified. In particular, they derive the ethics and the morals (in the meaning I have proposed) from the religious perspective they offer. Some religions allow for inductive justification, for example Jesus Christ's statement "the goodness of a tree is known by its fruits[8]", and some religions like Buddhism even coincide (at least in principle) with the ethical practice they propose, which is a way of thinking that rejoins the Socratic approach to ethics that we have followed. The production of a definite and final reference frame is often and erroneously seen as either necessary or unavoidable. For most people, it is an accepted and unquestioned basis of their lives.

However, philosophers cannot stop at that point and are forced to question further, with the risk, or perhaps the unavoidable reproach, that their unrelenting questioning itself is providing the ultimate frame. This explains the tension that often exists between philosophy and religion. Many classical approaches to philosophy have tried to integrate the religious basis into the construction of their philosophy, most notably Augustinus and Thomas Aquinas, but also and forcefully, Spinoza. In the relativistic point of view this does not solve the problem. The ineffable cannot be made un-ineffable, although some elements of the mystery of being might be resolved in the course of time, pushing the 'boundary' of what is experienced as the ineffable further. Philosophy has to ponder both the significance and the limits of reason. What reason cannot reach can be experienced in other ways, but these transcend the capacities of reason.

If religion as the experience of the ineffable is a necessary human faculty, atheism becomes a necessity as well. Some very ancient godless religions like Buddhism understand why. For full use of human potential we must imagine beyond the immediacy of our existence and the better we do that, the more our lives will be able to accomplish. On the other hand, we should not project what we imagine as the beyond onto entities with presumed absolute existence since 'existence' remains a product of our minds. There is no God that can be imagined and the unimaginable cannot be called 'God'. We can share our experience of the ineffable, but we cannot grant it a describable or utterable existence. The old Chinese teacher, again, knew how to formulate this mystery:

> Existence is beyond the power of words
> To define:
> Terms may be used
> But are none of them absolute.

[8] Matthew 7:16.

> In the beginning of heaven and earth there were no words,
> Words came out of the womb of matter;
> And whether a man dispassionately
> Sees to the core of life
> Or passionately
> Sees the surface,
> The core and the surface
> Are essentially the same,
> Words making them seem different
> Only to express appearance.
> If name be needed, wonder names them both:
> From wonder into wonder
> Existence opens.

(Lao Tzu, The Way of Life, nr. 1 in the translation of Witter Bynner [8]).

Chapter 21

Epilogue

In this closing chapter, I wish to discuss how the theory I have been developing runs parallel to, or contrasts with, some central streams in philosophy and end with a few thoughts on a question that has occupied many philosophers, namely, 'what is philosophy?'. In defining the relevant philosophical movements, I quote freely from the *Cambridge Dictionary of Philosophy* (CDPh) [52].

Monism

A philosophy is *monistic* when it considers existence as originating from only one source. There are many forms of monism depending on what the source is thought to be. Monism contrasts with dualism, in particular, dualism as conceived by Descartes wherein the mental and the physical are seen as having incompatible origins. Most philosophies have to adopt a point of view on this issue in order to provide some basis for the term 'existence' and the incidence of the mind. I refer to the article on *Philosophy of mind* in CDPh for a discussion on the various viewpoints philosophers have adopted (p. 599 in the 1996 edition).

In the systemic relativism proposed in this book, the question is dealt with in two ways. Firstly, neurobiology is taken as the going authority on the status of the mind in nature, and what biology considers nature is taken as a background reference frame for philosophy. This approach relegates the issue of the mind's origin to biology, although philosophy retains its faculty to criticize the premisses on which biology bases its assertions and to analyze the impact neurobiology's results have on its own endeavors. Without further elaboration, the term 'nature' is no more than a reference or name for the subject matter of natural sciences and biology in particular. Biology studies the natural phenomenon of life, but in doing so it also gradually defines what it means by 'nature'. This is a foundational difficulty that is intrinsic to any topic whose subject matter cannot be defined outside its own discipline and the philosophy proposed in systemic relativism is not seen as capable of providing such a framework[1].

Secondly, our development of systemic relativism views whatever is considered 'existence' to be a mental construct, which consists of a conceptual 'homomorphism' (correspondence) with what humans (as bearers of a mind) experience as objects, structures or properties in (what they view as) their external world. Biology calls this external world 'nature' and has developed experimental methods to verify its (biology's) contentions using the homomorphism, which attaches experiments to the concepts and the contentions proposed. Such a homomorphism is instrumental in ascribing meaning (semantics) to the mental constructs (by establishing the context), besides the intrinsic definition of meaning within the theory itself (when applicable). The dualism of mind-matter is thereby built into the system, but the process of ascribing meaning is itself a higher order mental process, the result of a biologically natural evolution of the mind. This latter process culminates in neurobiology as the science that investigates the constructs of the mind and observes how the mind observes itself in the form of consciousness.

I do not consider the methods science uses to build its layers of knowledge to belong to the domain of philosophy. It is up to every scientific discipline to criticize its own foundations, and this holds for philosophy as well, which I consider a science in its own right. As distinct abstractive and hence directional processes of thought, various disciplines may influence each other, but their foundational narratives are bound to be different. Their subject matter is different as well and each discipline must solve its original systemic relativism in a way that is compatible with the specific process of thought it develops. In a sense, each separate scientific discipline has to tolerate the others and their prerogatives to the building up of knowledge the way they envision, namely the combination of theory and verification each of them proposes. Many scientific disciplines are connected to each other thanks, e.g., to 'emergent behavior' and have to honor their respective ways of acquiring and verifying knowledge. All scientific disciplines are dependent on mental processes, logic, language, and hence

[1]Philosophy has attempted to solve this dilemma in its long history, proposing various cosmological and biological frameworks that were not able to withstand scientific criticism. To solve foundational problems, I advocate to remain with the science in which they arise, so as not to contaminate the other disciplines with problems that are not genuine to them. A similar issue appears at the boundary between any discipline and emergent behavior in need of new axioms and methods, e.g., between biology and psychology or psychology and philosophy, and is fundamental to our ability to generate knowledge, an issue each scientific endeavor, including philosophy, has to tackle for its own aims.

semantics, topics they each approach using their own methods, which, in turn, they develop in interaction with each other. This book posits the Socratic question of ethics as the central subject matter of the philosophy it tries to develop and uses modern insights in biology, logic, system theory, and even engineering to develop the chosen topic philosophically.

Holism

I quote CDPh (p. 335):

> **holism,** any of a wide variety of theses that in one way or another affirm the equal or greater reality or the explanatory necessity of the whole of some system in relation to its parts.

Holism is somewhat related to previously discussed monism, but has a different flavor. That a 'theory of everything' is not possible has been argued at length in this book. If philosophy is seen as having to supply such a theory, the conclusion has to be that philosophy is not possible—this is a position many skeptics have taken. However, as already Socrates warned, philosophy should not attempt to be a theory of everything. Neither should physics nor biology. Nonetheless, one may have a more restricted view on holism, namely as a theory that is capable of containing its own abstractions. If this is possible in an unlimited fashion, by building layer upon layer, then by induction one may eventually arrive at a theory of everything by gradually enlarging the basic theory with the missing constructions, while keeping consistency.

For example, one could consider integrating chemistry into physics simply by adding the laws and derivation methods of chemistry to those of physics. Each phenomenon to be considered then has to be classified as belonging to one or the other. Of course, this does not work without major efforts at consistency. Firstly, one would need a classification law to decide in which theory a system (or parts of it) belongs, which might not give a univocal result and would be based on a meta-theory in need of its own justification. Secondly, many phenomena may be considered from the viewpoint of one or the other theory leading to incompatible predictions. Alternatively, one could strive for a super-theory, that merges both theories consistently. I.e., a theory whose laws can be translated to laws in each component consistently, which also would mean that the two theories can share all their basic notions and axioms. Physics and chemistry have important points of agreements and some phenomena in the one can be explained by methods of the other, so at least some conjunction is possible and desirable. Physicists and chemists have worked very hard at deriving, or at least explaining, chemical phenomena by physical laws with extremely interesting results. Major new developments in both disciplines have emerged in this way, but major difficulties have arisen as well, due to the differing characters and scopes of the two disciplines[2].

A similar disjunction/conjunction has happened between physics and astronomy, again with many results and difficulties. Similarly between psychology and biology. However, practice shows that these mutual influences and developments have not lead to full holistic mergers. The main reasons are divergent narratives, goals and methods—genealogical and teleological reasons. We have also seen that the generation of a concept (its genealogy) and the effects it represents (how it affects the future) define its semantics, which, in turn, depends on a level of consideration that is not contained in its original domain of definition. The semantic level is *necessarily emergent* with respect to the concepts for which it produces meaning. What 'life on an exoplanet' means cannot be answered from the properties of elementary particles or other laws of physics. Physical laws would be invalid if they made life impossible (since we have decided that life exists), but neither can physics explain life without unreasonable adaptations to its axiomatics.

Nonetheless, disjunction and conjunction of theories, or combinations of both, are not the only possibilities for a discipline to create higher order systems, i.e., systems built from basic components using methods defined by the discipline with properties that can be determined within the discipline itself. We have discussed standard methods for making such constructions: aggregation and generalization. A discipline can build deep hierarchies of systems by aggregation and study their properties, thereby generating new types of objects with new properties. Modern biochemistry, which deals with an enormous variety of proteins and newly designed combinations thereof, provides a good example[3]. Many disciplines strive at some type of holism without ever being able to exhaust their constructive possibilities. Often they tread on the realm of other disciplines, thereby forcing novel

[2]For example: the elementary particles of the standard model hardly matter in chemistry, except for a few. An issue of philosophical interest here is whether a super-theory that contains both physics and chemistry is possible at all. Most chemical phenomena are emergent with respect to the basic laws of particle physics, but their laws can be added without contradiction (for example: catalysis involves stereographic properties of the materials involved, a notion unknown to elementary particle physics.). One may conclude that, indeed, a super-theory is possible in this case. However, novel 'emergent behavior' immediately appears with respect to this super-theory, e.g., leading to biological laws. The phenomenon of emergent behavior keeps appearing the more one progresses and very soon it can go in many directions that may not be compatible with each other. This escalating process has no end and branches out at every stage, leading to an exponentially increasing number of possibilities.

[3] E.g., artificial proteins that act as micro-machines or re-engineered genes creating new classes of organisms.

conjunctions or disjunctions and reaching new levels of understanding.

'Emergent behavior' is capable of characterizing the phenomenon of going beyond what cannot be reached by the constitutive laws of a given theory. Could then the theory of emergent behavior be considered holistic itself? As a theory, emergent behavior is capable of producing neither the emergent phenomena nor the laws for the emerging systems. It can only state conditions for the possibility of emergence. This explains why total holism is, from a very basic point of view, not possible. The strive to holism remains a productive endeavor for innovative system building, but holism itself will never be achievable (not even in mathematics as we know very well since Gödel).

There is still another way to interpret the term 'holism', sometimes written as 'wholism'. It is the consciousness that whatever a human experiences as existing or happening in the world is part of a grand proceeding that encompasses all. I have called this the consciousness of the ineffable. To approach this type of consciousness, appropriate mental discretion is needed in order not to destroy its very existence. What is felt as the ineffable cannot be caged in a theory that describes its properties without losing its meaning. One can work at opening consciousness to the notion and describe the experience (like many mystics and even scientists have done), but any precept or description cannot replace the experience, as I described in the chapter on religious experience.

From the potential aspects of holism as I see them, it follows that holism is not well suited to become a philosophical theory, although it can be a driver of scientific renewal. On the other hand, the consciousness of the ineffable is of great philosophical interest as a capability of the mind to become aware of its limitations.

Reductionism

A variant of monism is 'reductionism'. It consists in stating that phenomena like 'the mind', 'consciousness' or 'intelligence' are fully explained or can be reduced to just the neural functioning of the brain. A thorough critique of this position has been given by John Searle in *The discovery of the Mind'* [56], who argues forcefully (in agreement with some other philosophers) that "consciousness is an irreducible feature of physical reality." The kernel of the argument is, according to Searle, not epistemic but ontological. The significance of consciousness (in particular 'my consciousness') is not rooted in the functioning of the brain, but in its experienced existence. As I see things, Searle's arguments can be understood as proof for consciousness as emergent behavior, its 'existence' has to be sought beyond the mere processes on which it is implemented (or has, in the course of evolutionary history, implemented itself). Nonetheless, whatever further considerations are developed on the properties and structure of consciousness, these may never be able to catch the phenomenon fully. Ever deeper insights may be developed, but already the intrinsic functioning of consciousness forces, as far as we understand it at present, an abstractive representation that provides for a lopsided, brain induced view on whatever is considered to belong to what the term consciousness is supposed to represent (what we have termed a homomorphism). As a consequence, the ontological level can never be reached, what we understand as our consciousness remains forever stuck at the epistemic or knowledge level. Every existence is tied to an epistemic framework, including the notion 'existence' itself. This is the result of taking both emergent behavior and systemic relativism seriously.

Metaphysics

I quote the CDPh again:

> **metaphysics**, most generally, the philosophical investigation of the nature, constitution, and structure of reality. It is broader in scope than science, e.g., physics and even cosmology, since one of its traditional concerns is the existence of non-physical entities, e.g., God.

The position of metaphysics between 'natural' science and philosophy has been difficult in recent times. Metaphysics came under fire from the positivists who came under fire from the postmodernists who are now under fire from just about everybody. The confusion has various reasons: an unrealistic sense of the notion of reality, semantic misalignment, and the modern need to expand science far beyond physics, chemistry, and biology. Criticism on the position of various philosophers on metaphysics ranging from Kant to Quine has been easy, but solutions have not been forthcoming. It is difficult to sort the problems out as they are intertwined and the solution for one has consequences for the others. Systemic relativism deals systematically with the question without mentioning the term metaphysics. Here is its approach in short summary.

- The notion of 'reality' needs careful semantics. The idea that reality is somehow hidden in nature (a notion that also needs careful semantics) and has to be discovered, with the connotation that once discovered nature is known as it is, is not compatible with our present day understanding of how the brain as the seat of the mind functions. The interaction of mind in and with nature is more intricate. The scientific mind constructs a view, a theory, on natural phenomena together with experimental methods to verify its assertions, and nature responds to these experiments with agreement or disagreement. Disagreement falsifies at least that portion of the theory[4]. Agreement only shows that the theory is consistent with the way nature reacts to the proposed experiments. Logically, expanding on this theory of mind, one must conclude that 'reality' is a mental construction, which does not 'exist' elsewhere in nature. A well-constructed scientific theory exhibits a predictable natural process, but the idea that nature embodies that theory is unjustified. This latter contention replaces natural processes with processes that the mind has conceived. What the mind conceives is necessarily limited by the modeling methods the mind devices, since any theory is limited by its declared axioms and methods. *Science is not the discovery of reality, it is a construction of a reality in the brain based on discoveries.* By extension, all knowledge, even the day-to-day wisdom that allows us to function, has the same character as a reality constructed in and by our minds, which, when confronted with one's natural environment may or may not produce aligned assessments.

- The presumed semantic misalignment between scientists on the one hand and philosophers on the other may be reduced to the idea that science studies reality and philosophers the foundation of science. That is also what the term 'metaphysics' seems to imply: the study of what lies beyond science (or by extension, common knowledge). In contrast, systemic relativism holds that every science, including philosophy, must be clear about its own foundations. Each science has evolving foundational narratives and teleologies. The foundational narrative is needed because any theory, however carefully constructed it may be, is dependent on a number of unproven choices, terms, and assertions, which can only acquire their meaning from the development and usage of the theory itself. Most natural sciences and philosophy investigate different topics and use differing, unproven fundamental assertions and methods. All have to busy themselves with their fundaments. If some of their prior assumptions turn out to lead to false conclusions (offered by either logic or 'nature'), these have to be discarded or adapted. As for teleology, the various sub-disciplines of science all develop their own, inductively based on the phenomena they choose (or are able) to consider. The development of any theory has to be tied to a parallel development of semantics.

[4]Often an unwarranted generalization. It is not because an experiment fails that the whole theory has to be rejected off-hand, often it only has to be refined. The Popper principle of falsification has to be exercised with discretion.

- Science and philosophy have common origins, both in the East and in the West. The original philosophers were also natural scientists, reflecting on the workings and origin of the world. They were also mathematicians, trying to think formally, consistently, and verifiably. Gradually, a split developed between endeavors that would be categorized under the banner of natural sciences (physics, mathematics and technology originally), human sciences (history, medicine, law), and philosophy (logic, ethics and aesthetics), with unclear boundaries between them. In more recent times, the general fields branched out in a considerable number of related, but differing, disciplines. Chemistry, geology, astronomy, biology, and others were added to the natural science side, and epistemology, psychology, and sociology as well as various specialized philosophical subjects (philosophy of the mind, literature, and law) on the side of human sciences. However, the distinction between natural, social and human sciences does not seem very helpful as soon as the interactions of these various disciplines are considered. It is a legacy of the dualistic nature/mind past. The approach from systemic relativism and emergent behavior provides for a much more fertile ground for joint development across boundaries.

The distinction between natural sciences and philosophy has gotten blurred considerably when topics like intelligence or society came under scrutiny, motivated by neurobiology for the first and system theory for the second. The result is that the terms 'science' and 'philosophy' do not usefully characterize the domains they are thought to represent any longer. Each field that aims at developing knowledge has to consider its fundamentals, its narratives and its teleology.

If science does not aim at discovering reality and philosophy at providing fundamentals for being, then what is science? and what is philosophy? 'Reality' remains an important issue in all fields, but it is a more intricate notion than originally conceived. Both biology and philosophy construct views on the relationship between humans and nature (or the world, or existence, or the universe) with different aims and different methods. Biology aims at understanding phenomena occurring in living organisms, whereby 'understanding' means developing a theory that establishes various structural properties and relationships whose validity is confirmed by experiment. Philosophy mostly aims at understanding the human predicament in the world/nature/universe; for example, the nature of human consciousness. As we have seen, consciousness can just as well be an object for biological and philosophical research. Each of the two fields develops its own methodology and thereby defines what it understands by biology, respectively philosophy. Conjunctions and disjunctions of definitions and methodologies may then lead to a more general theory, but there is no guarantee that a unified vision will emerge, a fact that explains much of the confusion.

Phenomenology and phenomenological reduction

The word 'phenomenon' is of ancient Greek origin and translates to 'what appears'. Phenomenology would then be the science (logos) of observation or sensing. Or, to quote the New Oxford Dictionary, Version 2.2.1 (194), "the science of phenomena as distinct from that of the nature of being. An approach that concentrates on the study of consciousness and the objects of direct experience." Quite a few new words with delicate semantics in one sentence. Phenomenology has had, according to the CDPh, a tortuous history in philosophy starting with Kant, but was redefined by Husserl and then adopted in various ways by existentialists. I would have added Peirce to the list of contributors, who made pertinent analyses of the primitive act of sensing, wondering about the question whether there is a consciousness-free prior moment in the act—and presumably there has to be.

I have argued in this book that the issue of consciousness cannot be divorced from the biological study of the mind as a functionality of the human brain, an approach that would probably have horrified most existentialists. The human brain produces the mind. How it functions is investigated by neurobiology and the results of that investigation have to be taken as a prior, with all the necessary critical restraint. If the neurobiological theory leads to inconsistencies or is not matched by experimental control, then it has to be discarded and replaced by a better approach. That is how systemic relativism works as well. The history of both science and philosophy shows many examples of theories that could not be validated or, conversely, that originally looked contradictory to common experience but turned out to be correct in a more refined setting. Modern biology offers perhaps the best example of all: our present understanding of both genetics and neurobiology invalidates everything that was "known" before the 19th century, but the recent insights cannot be considered final either. Our understanding of consciousness, imperfect as it is, is bound to become more refined, with consequences for philosophy and in particular ethics, whereby, as I have argued, ethics plays a role in assisting the development of biology towards ever improved quality (and helping to define what 'improvement' means).

Biology and philosophy are bound to impact on each other. Referring to the chapter on semantics, we have to accept that the relation is mutual. Philosophy, and in particular ethics, can provide meaning to the notion of quality in the development of biology, while biology provides meaning to the notion of consciousness used by philosophers. The process of defining semantics is not one of linear progression, but one of mutual influencing and learning whose results can be assessed in yet another layer in which the relation between both fields of endeavor is considered.

One element on which existentialist philosophers agree, according to the CDPh, is the necessity of 'phenomenological reduction', by which is meant, I quote CDPh, p. 349

> 'to achieve its foundational task with respect to science, philosophy must achieve a certain reduction, or *epoché*, a radical change of attitude by which the philosopher turns from things to their meaning, from the ontic to the ontological'.

The *'epoché'*, as developed by Edmund Husserl, is, again according to the CDPh, 'a "leading back" from natural beliefs to the reflecting considerations of intentions and their objects' ([52], p. 349). The 'suspension' from 'natural beliefs' is seen by Husserl and many phenomenologists as what establishes the discipline of philosophy and is capable of leading to what Husserl calls 'apodictic truths', truths that cannot be questioned further.

I cannot reproduce here the sophisticated philosophical edifices Husserl and phenomenologist philosophers in his wake have constructed, nor the great contributions they have made in defining new notions that clarify age-long philosophical problems, in particular the 'doubt of Descartes' concerning the existence of the ego. In my view, most of Husserl's work amounts to a very valuable, high level analysis of how the mind, and consciousness as one of its components, work. Husserl himself would most likely not have liked this characterization. In the *Prolegomena* of one of his early works, *Logische Untersuchungen*, he criticizes the contention that concepts can be reduced to 'states of mind', which have no relation with external reality, called *psychologism*. The belief in the absolute validity of basic logical laws, like *modus ponendo ponens*[5], cannot, according to Husserl, be based on an empirical science like psychology (or, as I have argued, biology).

For Husserl, basic logic is a prior that does not admit any relativity to another prior. Much of Husserl's work can be saved when this (and some other) priors are just posited, but it makes the resulting theory systemically

[5] Logic systems in which *modus ponendo ponens* does not apply as such can easily be constructed. For example, a modern day computer can assert propositions p and $p \to q$ at a given clock cycle while q is not yet true, but will become so at the next clock cycle. Many computer-based reasoning systems have a built-in time dimension in which 'truth' *becomes* rather than *is* since all times and forever. Not classical, second order logic, of course, but logic in which the notion of 'truth' acquires a different meaning. Although the example may seem trivial, it shows the dependence of so called general laws on the logic system used.

dependent on that prior, a position that seems anathema to Husserl and many other philosophers. Pure deduction from immutable first principles is not possible without running into major contradictions. Husserl may be credited for stating that science cannot be oblivious to its own foundations, but the reduction to what can be asserted with absolute certainty seems to me an unnecessary prenatal death for any science including philosophy. Philosophy has a long tradition of dealing with many topics that lie beyond mere experimental knowledge, most notably ethics, but it is dependent on the best possible scientific knowledge for a sensible approach to the various topics it aims at.

Biology and psychology have changed very much in the 20th century and so have logic and philosophy. When the aim of phenomenological reduction to absolute certainty is removed, then the analysis can be seen as a valuable contribution to the biology of the mind.

Existentialism

Existentialism focusses, according to the CDPh, on 'the uniqueness of each human individual as distinguished from abstract universal human qualities (o.c., p.255).' So expressed, the philosophy I have pursued in this book is downright existentialist, including the interest in 'humanism', which was later contested as pertinent to existentialism by Sartre, the main proponent of existentialism. However, the motivation for the approach I have followed is totally different and not based on any ontological theory. It is partially based on biological insights as we understand them today. Each human is biologically and psychologically singular, which can be seen as the evolutionary genius of genetics, singularly extended to the whole human production (to use Darwin's term), including the brain and intelligence. The enormity of this fact beats comprehension, as does the enormity of nature in which it deploys. But this is not what existentialism has been focussing on, although its analysis of the human singularity remains pertinent both for ethics and psychology.

As the existentialists affirm, there is no such thing as intrinsic 'human nature'. Ethics, as how humans implicitly motivate their behavior, can go in any direction accidental freedom allows, and the results can be very ugly. Albert Camus' *L'Étranger* describes the phenomenon poignantly. The conclusion to be drawn from this, is that ethics is an evolutionary process that is not *a priori* fixed and that humans have some chance and capacity to drive the evolution of the world (remember the difference between intended and actual ethics). In the early chapter of the book I have argued that the incidence of chaos and emergent behavior play a central role in evolution, leading to the conclusion that human intelligence and the derived teleology are major novel evolutionary players, but they may or may not win the day, let alone the eon. I have argued that human individual creativity is humanity's greatest asset with humanism as the resulting ethics (in need of a more concrete and adaptive definition, of course), but also such arguments cannot be seen as affirming a 'necessary embedding in human nature', because human nature, just as all natural evolution, show strong tendencies to the spawning of ever changing and novel types of behavior. The precise implementation of human ethics (and especially humanism) is not fixed beforehand and will have to prove itself again and again against an ever unpredictably changing nature, of which it is itself part and parcel.

Social Darwinism

Social Darwinism, as a theory that social evolution should be left to so-called natural forces active in society, which will 'select' good developments by their mere power of survival in the struggle for life in the societal environment, is easily seen both as a distortion of Darwin's original observations on the biological reality of natural selection and as a philosophy based on very dubious assumptions concerning the position of humans in the world. It would not be worth mentioning were it not that many types of practical societal ethics exhibit some of its characteristics. Darwin's original term 'natural selection' is based on the observation that how species originate and evolve in nature may be due to a process that is akin to how breeders select good qualities in the way they control the procreation of the races they are trying to develop. A breeder only allows animals (or plants) to procreate if they show the desired characteristic, whatever that is. Darwin intuited that nature does something similar, but uses a much more diffuse mechanism, namely survival in the struggle for life[6]. He also had the intuition that new varieties, and ultimately species, originated thanks to, at his time, unknown mechanisms in sexual transmission (Darwin came to this conclusion after very careful observation of other hypotheses, in particular the influence of the environment and the climate, which were erroneously thought to be determining.).

It is not difficult to extrapolate Darwin's observations to societies, in which a number of mechanisms are active that are of the same nature as in the evolution of species described by Darwin. The study of such mechanisms justifies a term like 'sociobiology', but this is not how Social Darwinism was conceived. My view on this issue is that biology is not directly applicable to society, but some of the same system theoretic principles, like chaos and emergent behavior, can be observed in how society

[6] which can take many forms, like finding a niche in which competition is not that tough. Natural selection puts a premium on adaptivity and cleverness!

evolves (as I mentioned, natural selection is a type of emergent behavior, namely, control by an effect that lies outside the original field of description.) To understand how society functions and evolves is, of course, the topic of social sciences in general and sociology in particular. Biology plays a role in this, as society is constituted of biological organisms, but society itself is largely emergent with respect to biology, although it has to take the latter into account.

A difficulty could be seen with respect to intelligence, which, also, is bound by its biological roots on the one hand, but on the other produces extensive emergent behavior as control on the environment mostly by proxies, participation in society, and communication with peers, among other effects. Intelligence also has its own kind of genetics, called meme transmission by Richard Dawkins [12]. That intelligence plays a major role in the world's evolution can easily be observed, if only by the many artifacts, including weapons of mass destruction, that intelligence has created.

Besides intelligence, many other (emergent) effects can be observed, in particular, novel ways of exercising power (e.g., economic power). It is both a great challenge and an eminently interesting topic for social and political sciences to put all these effects into some kind of understanding, much as modern genetics has been able to do with the evolution of species, in the wake of Darwin and Mendel's original insights. However, we live today, and the philosophical challenge I wanted to address is to answer the Socratic question 'what it is to lead a good life' using present understanding as best as we can given present day conditions. This has been our central goal, choosing what I have termed humanism as my guide; but, as I mentioned, humanism does not exist without further concretization. The essential Darwinist position, if I may state it this way, is empirical and not normative. It tries to understand how things happen and uses a scientific methodology to do this, i.e., developing the theory and deriving meaningful experiments and verifiable conclusions. Such a theory is never final due to inherent limitations from the need to formulate and to abstract. Intelligence can be seen as a major evolutionary force both biologically and in society, but it is not a force that makes societal evolution predictable.

I have argued that how intelligence functions is subjected to chaos and emergent behavior. The mechanisms are comparable to what happens in genetics, but they are also fundamentally different in their operational details although the effects are very similar. The resulting emergent behavior can be observed in all sorts of control methods society develops, which do influence individual human life in ways humans in their society may or may not accept and try to control in turn. That all this generates societal struggles is a matter of daily observation. The important further observation is that societal development is not fixed beforehand, and is not even predictable. Societies create their future, perhaps slowly because many forces more or less balance each other and it takes time for things to sort out in the societal struggle for control. The thesis that 'what will win out must be sustainable' is almost a *la palissade*, true by definition. Nonetheless, humans have not been able to aim at their own long term survival so far, clearly exhibiting serious limits to the abilities of their collective intelligence.

What is philosophy?

Each philosopher has a view on what it means to be a philosopher. Following Martin Heidegger's *Was ist das, die Philosophie* [31], just asking the question is already philosophy, while Bocheński states in *Wege zum philosophischen Denken* [6] that the question is one of the most difficult for philosophy to answer. It has the nature of what the mathematicians call a 'fixed point': the formulation of the answer needs the answer. Not an uncommon situation for any type of endeavor that has to define its own foundations.

Short of being called naive by Bocheński, I venture that there are two ways to deal with this dilemma. The first is to resort to an external instance for the definition of the field—but what could be that instance except philosophy itself? Some political systems and religious authorities have tried to impose allowable boundaries of thought on their thinkers, and we had to argue forcefully against such an usurpation of intellectual power. The other and singularly productive way, is to learn by doing, i.e., letting the field define itself by its own development. The learning approach is often done the way mathematicians find fixed points, by successive approximations that get closer and closer to the goal without ever reaching it. However, the two approaches, external influences and internally driven induction have to be combined, because no field of thought can ever be hermetically closed or should even try to be. Philosophy is necessarily dependent on language and language does not stand on its own and is dependent on semantics to specify its topic of discourse. Semantics in turn necessarily depends on external phenomena, or, at the very least, an external context. The experience of phenomena brings in what is called consciousness and what all these terms mean becomes a complicated amalgam of language tokens that again need careful semantics—and the ever deepening spiral can run for another turn. The upshot is that philosophy has to constrain itself somehow to a self-constructed frame of semantics just to be able to exist as a singular endeavor (like any other science). The difficulty philosophers then face is to communicate the frame they are developing, by which is meant that their audience 'understands' the construction and is eventually able to participate in it meaningfully. This in turn means that the audience adopts the frame in the way that was intended, or, to put it in line with our analysis of semantics, that different auditors come to the same conclusions as the originators when they use the frame in good faith.

The previous description may seem to be just a language game, but an unavoidable one if something like a common understanding on the definition of the topic of discourse—a fixed point—has to be achieved between speaker and audience. The danger in continually trying to answer the question of 'what is philosophy' in this fashion is that the philosophical treatment becomes extremely analytic and constrained, whereas much of philosophy, as practiced by many philosophers, has a synthetic character and tries to answer, or at least understand (comprehend), questions that relate to global human conditions such as the meaning of life, the structure of consciousness, what thought is and how thinking functions, what knowledge is, and so on.

Reason enough to stop an attempt at defining in a few lines what cannot be simply defined. There are further possible ways to approach the phenomenon 'philosopher'. One is based on the observation of the effects philosophers and their philosophy have. This is then purely an external view, and it will have the disadvantage to be both partial and superficial. One may observe what philosophers try to achieve when they practice philosophy. Philosophers (almost) always try to generate knowledge of some kind depending on what they consider their subject matter, thereby justifying the characterization 'science' for philosophy. One can then look further at what the subject matter is and what the effects a philosophical theory has or has had on it, which, in turn, requires specification of the domain the theory applies to. For example, one may observe that a given philosophy affects how persons envisage their position in the world, how they characterize the faculties they possess, how they view their relations with other people, how they assess the behavior of their peers, what means they use to describe their assessments and so on. Viewed in this way, philosophy is primordially seen as a mental process that affects the way the mind itself operates, hence a process to establish consciousness of the processes of the mind (i.e., the existentialist position mentioned before).

Philosophy has produced both strong mind-sets or ideologies (think about Marxism for example) and equally strong, if not stronger, criticisms of such ideologies. Whatever is the case, philosophy has affected (some would say infected) the minds of numerous persons, whether they are philosophers or not, thereby touching on their most critical experience of existence, what it means to exist as a person. The exploration, understanding, and influencing of notions such as 'mind' and 'consciousness' is certainly what we can observe as what a philosophy is aiming at. Philosophy is, with respect to mental processes, an inquiry into their foundations, one may say an ‘ultimate’ science of the mind. But it is a mental process itself, which then translates into how the mind handles itself. However, when the mind of a person adopts an ideology, one would not say that the person practices philosophy, and it may even be questioned whether developing an ideology is a philosophical act. Philosophy requires active enquiry into mental processes, which perhaps results in a theory that may be considered an ideology, but has, just as well, to remain subjected to permanent criticism and verification.

As a science that preoccupies itself with boundaries, philosophy is capable of affecting many other avenues of life and society. It has investigated and questioned the basic terms and tenets of natural and human sciences, including its own, and then the premisses of many practices of daily life and society, such as law, religion, and politics, often influencing them significantly. To question to the very limits of the questionable seems to me to be the essence of philosophical practice. Relativism *ad infinitum.*

To question, to evaluate the answers, and then to question the evaluations again[7].

[7] No wonder philosophers are so critical of each other.

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