This is the summary of my 'theory of invention', given in the last chapter of my book '*Beyond nihilism: Imperfection on the move*' (2015) but first developed in my book '*Learning and innovation in organizations and economies*' (2000), which is my most cited work. It is the centrepiece of my idea in philosophy of 'imperfection on the move', where I try to go beyond postmodernism, with a dynamic view of the self, meaning, rationality, truth, and ethics. With that, I aim to preserve what is of value in postmodernism, such as the social constitution of the self, construction of cognition, primacy of the singular over the universal, appreciation of difference, and context-dependence of meaning, without surrendering the subject, universals, and reality altogether, or falling into radical relativism. It is along the lines of American pragmatism, and may be seen as an extension of it.

Chapter 6 On the move

In this chapter I discuss the key issue of how imperfection on the move works, in change of knowledge, meaning, and morality. Odd as it may seem, there has in philosophy been a line of thought that change does not exist, that it is an illusion. I begin with that. In Chapter 3 I discussed pragmatism, which is a view of knowledge on the move, with ideas that are fallible and are treated as such, allowing for change as in application one runs into failures or new opportunities. The question now is how all that works. In Chapter 4 I discussed the development of the self, arguing that for the highest form of freedom, freedom from the self, from one's preconceptions, one needs the other, and arguing how in love passion (eros), as an urge for perfection, needs to develop into the moving imperfection of loving friendship (philia). I also discussed how cognition differs between people, yielding 'cognitive distance', to the extent that people have developed their ideas along different life paths in different environments. This is a problem for interaction but also an opportunity for learning and innovation. In Chapter 5 I discussed imperfections of society, democracy, and markets, and the need for them to change. For these forms of change, a logic is required of change that is emergent; does not go towards a pre-established ideal or goal (is not teleological) but depends on what is encountered on the way. A logic for pragmatism. A paradigm for such logic is given in evolutionary theory, as a logic of formation without prior intelligent design. However, that logic needs a twist to account for invention, in a process in which in application of ideas in action ideas shift or new ideas arise. That logic is also applied to change of meaning in language. I end with an application to a discussion on stability and change.

Notions of change

Change

Change, of ideas, concepts, knowledge, beliefs, values, rules, and so on, is perhaps the most blatantly obvious part of experience. But in a stream of philosophy it was denied for two reasons. First, acceptance of change would mean a denial of immutable absolutes, and that would mean a fall back into the uncertainties and vulnerabilities of human earthly life. That is not an argument but an emotion, a fear of nihilism.

An argument was the following. Either novelty is really new and does not arise from what already exists (discontinuity), and then it arises out of nothing, which is not credible, or it arises from what already exists (continuity), but then it is not really new. So, change is illusory, that was the preposterous conclusion.

The argument against novelty in continuity is silly. There can be genuine novelty arising from what existed before. The paragon example is evolution. New species are genuinely new forms of life yet they arise from previously existing gene pools, by mutation and re-combinations of genes, together with evolutionary selection of their carriers.

How about knowledge? How can new ideas arise out of old ones? In a later paragraph on invention, I will show how that might work, according to a 'logic of change'. The essence of the argument is that by applying established ideas in novel contexts one runs into its limits as well as the motivation and also the material and new insights for changing the idea, to cope with the novel conditions. That, I think, is the core of pragmatism.

In language new words arise and meanings of existing ones change. Consider science and poetry. I will apply the logic of change to how this may work. The logic is close to that of the hermeneutic circle, indicated in Chapter 3, and can be seen as an elaboration of it. It shows how universals may change in the process of their application to individuals. I will also discuss how not only the meaning of a sentence depends on the meanings of the words in it, but also the meanings of words depend on the sentence and its context of expression.

That is a crucial point of logic in view of the issue of how individuals (here sentences) can have features (here words) that have a quality (here meaning) that is uniquely their own, even though there is also similarity of quality (meaning) with the same features (words) in other individuals (sentences). This point is crucial for preserving the integrity of individuals under the sway of universals.

Not only is it possible to account for change, but inclusion of change helps to resolve persistent philosophical problems that are insuperable from a static perspective, the perspective that denies change. Consider what is perhaps the most fundamental, perennial problem of philosophy: the question whether the world (or our view of it) depends on the mind (idealism) or, the other way around, that the mind depends on (is constructed from observation of) the world (realism). From a static perspective it cannot be both, but from a dynamic perspective it can. At any moment we perceive the world according to mental categories (idealism) but those categories have previously been formed in interaction with the world (realism) (and they will keep on changing from experience).

In Chapter 4 I argued that there is a fundamental relationship between freedom and change, with the highest level of freedom being that of being able to change one's ideas, to surrender our preconceptions, and for this the self needs the other.

People clearly differ in the potential for development that they are endowed with, in genetic make-up and in the conditions under which development takes place, in country, habitat, family, and social milieu. That leads to differences in perception, knowledge, skills, and values and differences in access to means of survival and development. Rationality and free will are limited, but not to the same degree for all. All this yields diversity, or what I have called 'cognitive distance'. I discussed the concept and applied it in economics in Chapter 4.

To summarize, cognitive distance is both a problem, for collaboration, and an opportunity, for learning and innovation. A greater ability to understand others who think differently (absorptive capacity), and to help them understand oneself, render collaboration at a higher cognitive distance possible, which increases the potential to learn and produce

novelty. Such ability to understand and help others to understand increases with experience in collaborating with people who think differently.

For a first step in the development of a logic of change, let us first consider evolutionary logic, since that is a logic of change without prior design.

Stability, change and evolution

An ancient, fundamental and recurrent theme in thought about humanity and society, in Western but more systematically in Eastern philosophy is that of stability and change.

Traditional conservatives are oriented towards the first, progressives to the second, but both are needed. Without stability one gets into a neurotic oscillation that leads to nothing. Stability is needed to do something well, thoroughly, and efficiently. Change is needed for learning and adaptation. Stability gives a sense of security, but perhaps also of boredom, change gives a feeling of excitement but perhaps also of fear. But they do not stand apart. For change some stability is needed. By not surrendering too soon what exists and pursuing it to the hilt one finds out where precisely its limitations lie, and what the needs and opportunities for renewal are. That is a fundamental feature also of the theory of invention that I set out later.

How can one fruitfully think about that intriguing combination of stability and change? Evolutionary logic, with its basic processes of the generation of variety, selection and transmission of success in survival, was a brilliant invention for it. There is stability in that what does not 'fit' in the existing selection environment, has no 'fitness', is selected out. But in biology novel combinations of existing genes from a 'pool' by sexual reproduction, and new genes from mutation, together with changes in the selection environment, lead to new forms. This is a solution to the logical problem of how something can arise from what already existed and yet be genuinely new.

A second reason why evolutionary logic is a stroke of genius is that it shows how new forms of life can arise without prior intelligent design. Earlier, one could not but think that a mechanism (such as a watch) requires a designer (the watchmaker), and that therefore there must be a designer God. In biology one is now accustomed to evolutionary thought but in policy concerning society, the economy and management not by a far stretch. The old intuition still drives thought into the mode of intelligent design.

Evolutionary logic also lends depth to pragmatic thought, of how ideas can arise neither from pre-established essences that they realize nor as a development towards some perfect, fixed ideal that serves as an end station of perfection. Similarly, it helps to see personal identity neither as the manifestation or realization of some fixed 'real self' nor as the movement towards a pre-established goal of perfection. In other words, evolution yields a logic of imperfection on the move.

Evolutionary thought about human behaviour has spread and developed into different branches. One is sociobiology, the analysis of human behaviour from the perspective of 'the selfish gene'. A second is behavioural ecology, which tries to explain human conduct (e.g. in searching for food) from the perspective of optimal reproductive success, without indicating how that might work in terms of genes, physiology or psychology. A third is evolutionary psychology, which tries to explain conduct on the basis of cognitive and psychological mechanisms that have developed in past evolution (and may not be adaptive,

i.e. successful in evolution, under present conditions), without indicating how that might work in terms of physiology. This includes our innate, instinctive capacity for language.

All these developments in the theory of evolution are both interesting and problematic, for one reason or another. They yield some striking and analytically impressive results, but are fragmented and sometimes contradictory.

Of special importance for ethics is the question whether next to the self-interested striving for survival altruism also could have been established as an instinct. I discussed this earlier, in Chapter 4. Would that have been fruitful and viable from an evolutionary perspective? Some acts that appear altruistic can often be explained also on the argument that at some point in the evolution of mankind they yielded evolutionary advantage and 'therefore' are a matter of self-interest, and has left its mark in our genes. That claim is often impossible to test empirically. And it falls into a logical error. Something that was in the interest of survival in evolution and has as a result settled into the genome and now drives behaviour instinctively is a very different notion from deliberate, rational self-interested behaviour. If, on the other hand, one claims that the acts are a matter of altruism, that also is difficult to test empirically. But one will have to make the claim plausible by showing how that might have survived in evolution, and has not fallen victim to competitors oriented more at self-interest. I gave evolutionary arguments for altruism earlier, in Chapter 4. However, altruism within the group comes at the price of suspicion, fear and discrimination against outsiders, in what is called 'parochial altruism'.

Evolutionary explanations often limp on one leg, and to make progress one needs a second leg in the form of social, institutional and cultural effects on how genes are 'expressed', i.e. how and to what extent the potential that is embodied in genes develops into actual characteristics, and how conduct leads to outcomes. That depends on the environment, which is diverse and this yields a diversity of outcomes that is crucial for evolution, and helps as a counterforce to universalism, the idea that a form must be the same everywhere.

Institutions and culture can 'artificially' contribute to survival and genetic transmission of characteristics (or more precisely the potential for them) that without them would not have been able to persist. That can be bad, 'weakening the gene pool', and good, correcting adverse instincts. Thus culture can help to support our instinct for altruism in its battle with egotism.

Note that there is no genetic determinism. What comes out depends on how genes are expressed in interaction with the physical, cultural and social environment in which it takes place. What is genetically present as a potential is culturally expressed. People differ in both genetic endowment and environment, and both contribute to the diversity of people. Can we culturally develop characteristics that are not rooted in our genes but help to prevent genes from eloping with us on the sly?

Evolution in society

Evolutionary logic may also apply elsewhere, with adaptation, in the economy, as discussed in the literature of evolutionary economics, and in the development of ideas, as discussed in the literature on cultural evolution. The basic processes of evolution, creation of variety, selection, and transmission of characteristics, may be seen as processes of self-organization in economic or political systems and organizations.

The literature on economic evolution and innovation proposed that, as a matter of innovation policy, one can exert control indirectly, on the underlying processes of variety,

selection and transmission, affecting the way they work, or fail to work, rather than trying to outguess them in the attempt to design their outcomes.

In the further specification of those basic processes fundamental differences arise between evolution in biology and in society. Logically, the same principles apply, but they do so in different ways (Nooteboom 2001).

In the capitalist economy and in politics variety is generated by invention. While there is much trial and error, the creation of variety here is not entirely blind, since unlike biological evolution it is informed by learning and experience obtained from the selection process. In failure one learns what not to do and to look for novel ways. In the literature of pragmatism, Peirce called this 'abduction'. This inspired, incompletely random search limits the variety of complete randomness, preventing attempts that seem insane but might turn out to be strokes of genius.

Selection takes place by means of competition, in markets in the economy, and elections in politics. A question then is to what extent that selection environment can be affected or even created by the carriers (firms, politicians) of the units that are selected (products, political programmes), in what is called 'co-evolution'.

That happens to some extent also in biology, but here, in society, the opportunities for it are much greater. Entrepreneurial firms make markets, and entrepreneurial politicians set the political agenda. Scientists may avoid obscurity by creating their own journal to publish work not accepted by others. Politicians create political parties. That may help novelty, allowing innovators to create an initial niche in which they can survive for the time being, developing their ideas, before jumping to a larger market or constituency. But when the fabrication of the selection environment becomes stronger or faster than the selection process, evolution fails. The process can then get locked up in a struggle between vested interests.

Third, the transmission of success is based on communication, and there meanings are not duplicated, as genes are, but reduced, supplemented, shifted or transformed. In Chapter 3 I proposed that people attach more or less personal associations (sense) to what others refer to. In the 'transmission' between 'sender and receiver' meanings get lost and changed. That means that transmission, here communication, is also a source of variety. Conversation and training not only carry over but also create ideas.

In sum, in so far as one can form one's own selection environment, variety is constrained by experience, and transmission is part of variety generation, evolution can fail and the result may be a different process altogether.

For evolution in society we must study cognition and language, which can yield features that are *sui generis* and may no longer correspond with evolutionary logic. Nevertheless the analogy of evolution is useful for luring policy makers, in economics and politics, away from their predilection towards intelligent design.

> In innovation and science policy there is a tenacious tendency to linger in intelligent design as a principle for making policy. The pitfall is the idea that development of knowledge and innovation should be planned from above, must be streamlined by eliminating redundancies and duplication, and should be concentrated in 'key areas' or 'top areas' in which a country performs well. The underlying assumption is that a country's success in the future lies where it excels now. That applies to incremental but not to radical, 'competence destroying' innovation and 'disruptive technologies'. For the latter, existing strengths yield obstacles. When policy is oriented at radical innovation, the underlying pretension is that some central authority knows where future success lies. But if radical invention and innovation could be predicted they would no longer be invention and innovation. To leave room for the unpredictable one must allow for variety, in the choice of areas, subjects, directions, methods, and rivalry between different approaches.

Next, there is a need for selection, ex post, in practice, of proven quality and performance, not selection of subject and approach ex ante.

In Chapter 1 I gave a critical discussion of universals, in particular of the ethical problem of their neglect and subjugation of individuals. The evolutionary perspective now shows a second problem. Universals strictly applied rule out forms of diversity that form a basic condition for evolution and self-organization. Without diversity no innovation and adaptation to novel conditions. I recall my discussion, in Chapter 4, of 'cognitive distance' as a form of variety. In language also, for poetry to exist there must be a penumbra of ambiguity, of room for novel meanings.

However, for diversity to have a positive effect there must be bridges between the diverse individuals or groups to utilize the diversity. Cognitive distance is useless if not bridged. We should strive for independence without isolation. The problem of the multicultural society lay not in diversity but in the isolation between diverse communities.

A totalitarian regime suppresses independence, but a libertarian system, where only independent individual interest counts, yields isolation. In Chapter 5 I argued that markets need not only competition but also collaboration to achieve novelty. A crucial question then is how to allow for differentiated selves and at the same time achieve connection between them. That is partly a cognitive problem, in the crossing of cognitive distance, and a problem of 'governance'. That requires the art of trust, as discussed in Chapter 4. It requires a new notion of solidarity, discussed in Chapter 5.

All this is evolutionary logic in action. Evolution does not work on the basis of 'intelligent design', but on the basis of diverse, more or less haphazard trials in different directions plus an environment that selects quality and ensures a broad diffusion and application of successes. Many trials yield no result but that is not waste but an inevitable concomitant of the evolutionary process. Anterior design, planning, streamlining, and direction take innovation out of the system.

For improvement of scientific performance one thing one should not do is to meddle with the choices by scientists and universities, of disciplines, subjects and approaches. There are three things one can do, according to evolutionary logic, by affecting the three basic processes of evolution: creation of variety, selection, and transmission of success. The first entails an enhancement of diversity from new insights and approaches and to eliminate obstacles presented by established ideas, practices, interests and institutions. The second is selection of quality, after it has been demonstrated, in proven talent, as in rewards with prizes, promotion, resources for further work, etc. Selection also in the negative sense of withdrawing means from groups that consistently underperform, and leaving room for rivalry. The third is the spreading of success, in education and application in practice. The latter is also important as a source of inspiration of new ideas. Application is a form of testing and testing is the crux of science.

A logic of Invention

Invention

The question now is whether we can say more about how thought emerges from doing. How does pragmatism work? How does one go from one idea to another? That requires no less than a theory of invention or discovery (I know one can make a difference between the two, but here I treat them as the same).

oeHoeHow can, in the words of Simone de Beauvoir (1995), ‘a transgression be the point of departure for the next transgression’, how is creativity supported by a previous creation to create the possibility of a new creation?

One may object that a theory of invention is logically impossible because that would yield a prediction of invention by which it can no longer be an invention. But one can say something about the ‘logic’ of invention without thereby claiming to predict its outcome. That also applies, for instance, to evolutionary theory: we can specify its logic without knowing what new species it will produce.

Learning has two meanings: ‘transfer’ of knowledge (I put ‘transfer’ in quotes because it is a misleading term) and creation of knowledge. Here I want to discuss the second.

Gregory Bateson posited several levels of learning (1972). On the lowest level, of ‘first order’ learning, we maintain axioms, fundamental principles of logic, meanings, design principles, etc. In ‘second order’ learning we break through such fundamental principles. The idea next is that these levels of learning build upon each other and transform each other in a process of application and adaptation.

The idea that ideas, intelligence, arise as ‘internalized action’ was further developed by Jean Piaget, in a stage theory of cognitive development (1974). In his thought, the basic principle of development, which recurs cyclically in different stages, is that by ‘assimilating’ experience in existing cognitive structures, this leads, in a sequence of steps, to their ‘accommodation’ i.e. transformation.

The basic idea is that one develops new knowledge by applying existing knowledge in new areas. That yields new challenges and new insights for change. In more detail, the steps are as follows.

On a circle one can start anywhere, and I start with the stage of ‘generalization’, in which an existing mental (or practical) scheme is applied in novel contexts.

For an example: An infant that has learned to whack a wooden hammer on blocks of wood now tries it on the passing cat.

To survive in the novel conditions, the scheme must be ‘differentiated’ to satisfy new conditions.

In the case of the cat one does well not to hit hard but more softly, as a stroke, not to receive the retaliating strike of a claw.

Next, new combinations arise of the old practice with other schemes that in the new context fit better, in ‘reciprocation’.

Use the hammer to softly prod the cat, or to move it across the floor like a mouse.

This can next yield a new scheme, in ‘accommodation’.

Try a stick with something fluffy or scratchy at the end, mimicking a mouse, the stick replaced perhaps by a piece of string. The aggressive strike of the cat turns into play.

Vygotsky (1962) proposed that a small child can make such steps beyond its current capability only to a limited degree and requires an adult that pulls the child into its novel competence as it were, into its ‘zone of proximal development’ (ZOPED).

The overall process is related to play, as an exploration of practices outside their customary domain. 'And then you were the princess'. Especially as children we appear to have an instinct to tread beyond established areas, called the 'principle of over-confidence'.[1] Perhaps this is akin to entrepreneurship, or, vice versa, perhaps entrepreneurship is a manifestation of this instinct. A darker interpretation of it is an instinct of imperialism: striving to conquer the world with the competencies one has. One is also reminded of the ancient Greek notion of 'thymos', the urge to manifest oneself, and Nietzsche's Will to Power.

When I talk of 'instinct' this suggests that it is an outcome of evolution. What would be the evolutionary advantage of such an instinct? How could it contribute to survival and the getting of offspring? Perhaps because it leads to innovation, as argued here. Could that contribute to an explanation of why humans are both more imperialistic and more creative than other animals?

In Chapter 2 I referred to Marmysz' claim that humour, being concerned with discrepancies, may also help to trigger shifts of thought, but in an amusing fashion, which may help to make the discrepancy or the novelty less threatening. Laughter then is an expression of cheer at the unexpected turns of practice, in action and in the use of words. Do animals have humour?

A logic of invention

The logic of the Cycle of Discovery is as follows.

'Generalization' is needed for four reasons. First, a shift away from an established area of practice may be needed to escape from the established order there. In established areas there are often strong forces against deviance from established doctrine or custom, mentally (it is intellectually unsettling or threatening), socially (one loses one's legitimation) and institutionally (a host of established rules, structures, customs, technical standards and norms have been moulded to fit the ruling 'dominant practice', and the novelty does not fit). Second, to obtain novel insights in the limits of applicability or validity of an existing practice. In the old environment the practice has aligned itself with the circumstances, or has turned them around to fit the new practice, and then there is no longer any fresh information on shortcomings or new opportunities. An example is technical features from an innovation that have become the standard. A third reason is to create new challenges that exert pressure: without adaptation the practice will not survive. In the new environment one encounters shortcomings that necessitate adaptation.

This aligns with the old idea that crisis is needed for change. 'Necessity is the mother of invention'.

Fourth, generalization is needed to obtain new insight and material, in the new environment, for novel combinations, in the effort to respond to the need for renewal.

The change of context, in generalization, can be real, as in a new market for a product, or virtual, as in a computer simulation, or intellectual, in a thought experiment, or scientific, in a new application of theory, or a matter of debate, in dialogue. One can actively seek the new environment or one can be overcome by it, as when someone else comes up with a new theory, technology or product that forces one to adapt.

[1] I was alerted to this by a psychologist from New Zealand.

Change of context disturbs the existing order of established, dominant practice. Mentally it loosens awareness, and triggers the beginning of critical enquiry of tacit background knowledge that earlier was taken for granted, or of which there was no awareness.

In 'differentiation', to confront the crisis in the novel context, one will first try to find a way out by delving into existing repertoires of actions, different ways of doing things, resulting from earlier ideas and attempts, in other circumstances, which might again be tried.

If that does not suffice, more drastic measures must be taken, and we move to 'reciprocation'. Mentally, reciprocation is association, with connections between previously unconnected ideas.

> This is related to the shifts of meaning that may occur as words are applied in new contexts, along the 'hermeneutic circle, discussed in Chapter 3. Metaphor is an instrument, seeing one thing in terms of another. Different concepts exchange connotations. Below, I will return to the attempt to clarify this further with the notion of scripts.

The novel context is needed to encounter novel ideas as material for novel combinations. Especially those local ideas and practices draw attention, which appear to succeed where one's own, old practice, appears to fail. Reciprocation entails experimentation with hybrids: elements from newly encountered practices are inserted in the basic logic or structure of old practice, in 'backward reciprocation', or elements from old practice are inserted in the newly encountered practice, in 'forward reciprocation'. The history of technology, for example, is replete with such hybrids (Mokyr 1990).

> Before blinking direction indicators existed in cars, direction was indicated, in the earliest cars, by sticking out a hand. From railway signs they learned that it could be done with a mechanical hand flipping out, keeping the windows closed. And at first that did have the stylized shape of an arm with a hand.

Next, hybrids lead to inefficiencies because old elements do not fit well in new practices, or vice versa, or conflict or overlap or partly duplicate the old or the new. However, it allows the potential of novel elements to manifest itself, as well as obstacles for the full realization of that potential. This yields a new crisis that exerts pressure for the acceptance of trying out more radical change, also in the basic logic or design principles or architecture, to eliminate redundancy, conflict or obstacles. Experience with the hybrid and its problems indicates where the inconsistencies, redundancies, complexities ('spaghetti') and bottlenecks lie and can yield hints in which ways or directions change of logic or structure may fruitfully be tried.

This is my rendering of the notion of *abduction* from the pragmatism of Peirce.

When reciprocation is goes in two directions, or is many-sided, with exchange of elements between two or more practices, this yields several hybrids operating in parallel. That yields insight in differential success of alternative design logics, which can give direction to novel principles. That can lead to second order change, 'accommodation', in the form of trials with new architectures of old and new elements. That yields pressure on those elements because without adaptation they no longer fit well in the new architecture. That can require prior or simultaneous adaptation of those elements. Think, for example, of adaptation of materials, instruments, components and their arrangement, tasks, skills, locations. It can lead to a cascade of subsidiary innovations, before one can proceed with the architectural renewal.

The mechanical hand as a direction indicator in the car has all the drawbacks of mechanical, moving parts, in failure, breakdown, getting stuck, rust, and maintenance. But when also electric light came into in cars, a leap was made to the light that blinks on the side you go.

At the beginning of accommodation there is a chaos of forms and variations of the new practice, in which old elements linger on while they no longer fit, and there is duplication and redundancy, messiness.

An example is that when in the construction of bridges there was a shift from wood to iron old swallow tail fixtures were still made that are needed for wood but do not make sense with iron, which can be welded or fastened with nails.

Another example is that when artillery became mechanized, no longer horse-drawn, when the gun was fired some personnel took a few steps backwards, more than made sense for them to avoid the recoil. It turned out that this arose from an old drill needed to hold the horses from bolting.

In accommodation, often diverse alternative designs compete until in a process of 'consolidation' sooner or later convergence arises on a 'dominant design' (as it is called in the innovation literature). And then we are back at the beginning of the cycle.

The cycle indicates that invention is accompanied by the breaking of equilibrium, and the breaking of unity, needed to arrive at novel combinations and experiments with them, in hybrids. It is an operationalization of imperfection on the move.

It has implications for the good life. One often hears about the need for equilibrium and unity of ideals, character and action, in an integral and consistent whole. But if the good life is a process of self-discovery and self-development this necessarily goes together with its disturbance, in the breaking of unity and equilibrium. In search of a new coherence and equilibrium, certainly, but then in the expectation that this also will be disturbed, and in the will, the alacrity, to draw happiness from the process. That is, I think, the true spirit of Nietzsche. The good life is unbalanced, in fits and starts.

I wonder if this story of the cycle has a broader scope, and is perhaps applicable to morality. There the question arises whether morality is given prior to action, as a basis for it, or, vice versa, actions construe mortality. Again, both apply. Here we arrive again at pragmatism. At any moment we have moral premises but in our actions, and those of others, and above all in the interaction between the two, they are transformed. Could that process also run according to the 'logic' of the cycle?

The scripture of invention

I now elaborate the cycle with the notion of 'scripts', discussed in Chapter 3, to make it a little more concrete.

To recall: A script is a network of connected 'nodes' that represent component activities (in case of a practice) or notions (in case of a concept). In an activity a connection between components may indicate a sequence in time, one-sided or mutual dependence, the use of pooled resources, a relation of authority (supervision, control), etc. In a concept or theory it may indicate logical implication, conditionals, etc. As discussed in Chapter 3,

Cognitively, scripts may be embodied in networks of neuronal connections and patterns of neuronal firing in what Gerald Edelman called ‘neural Darwinism’.

The classic example of a script is that of a restaurant, which can be seen as a simple sequence of nodes of entry, seating, selecting, ordering, eating, paying and leaving. Each component activity in turn has subscripts for different ways of performing the component activity. For example, in the payment node one may pay cash, by cheque, credit card, or debit card, and each has its own script. There is also a superscript, in which the restaurant is part of a wider script of location, traffic, parking, energy supply, etc.

If something happens but one has developed the appropriate mental script to absorb it, as part of acculturation, one is at a loss about what to do. This is part of the problem of integration of foreigners: they cannot properly ‘read’ events.

In perception, one subconsciously tries to assimilate sense impressions into existing scripts, and when a fit occurs, the script is ‘triggered’, unless no scripts are detected in which it ‘fits’, in which case it is ignored or there fails to be perception.

This entails that perception is always already an interpretation, modelled here as assimilation into one or more scripts. When a slot is found in a script for the perception to fit in, the whole of the script is tentatively attributed to what is perceived, even when not all is perceived. In philosophy and psychology this is known as ‘Gestalt’. This greatly helps identification and fast and coherent response to perception, which serves survival of the self. It also entails prejudice, invalid attribution.

Scripts serve to identify an individual entity as having a place in one or more scripts. I propose that the process models the sense making discussed earlier: something is recognized as belonging to a category by trying to fit features of it into a script.
When a perception entails simultaneous activation of several scripts, this can lead to tentative connections between them that are strengthened or weakened in subsequent perception and action. This, I propose, is how association works in the brain.

Can one call a script embodied in the brain a ‘mental representation’? Perhaps, but it is not a simple ‘reflection’ but part of an active process of mental construction.

The notion of scripts can be used to elaborate the cycle of invention. When self-service restaurants emerged, compared to service restaurants the order of nodes, and details of their functioning, was changed into entry, selection, paying, seating, eating, and leaving. If one does not know the script, and one enters and sits one will not get food. The altered sequence of activities has implications for the nodes. Selection is no longer done from a menu but by picking up items on display.

In generalization, i.e. application in a novel environment, an existing script is fed into a new superscript. In differentiation, script structure and nodes are preserved but in one or more nodes a different selection of subscripts is made from existing repertoires. In reciprocation one borrows subscripts or entire nodes from other, outside scripts observed in the novel environment. In accommodation, one tries to eliminate obstacles in existing script structure for realizing the potential or efficient use of new nodes, by changing the order of nodes or the nature of their connections. When in this way a new script emerges many secondary changes are needed, in modification of nodes and their repertoires of subscripts, in the process of consolidation.

The logic also indicates that there are different levels of novelty: a new selection of subscripts from an existing repertoire, or addition to the repertoire, or a whole new node with its repertoire, or architectural change of network structure. In invention one should also look

at the superscript of the user into which the invention has to fit. What changes of that script would the user have to make? The more radical that change, the more difficult it will be to have the innovation accepted.

In sum, scripts serve to identify and make sense of perception but are also affected by it, in 'novel combinations', yielding novel concepts. I don't think this process is well characterized by the empiricist phrasing of 'elementary sense data used as building blocks in the construction of ideas'. All this is hardly described adequately by the phrase that 'sense data build ideas'. However, the process of assimilating perceptions into scripts does contribute to the change, transformation or breakdown of scripts.

Play, invention and evolution

In the Dutch periodical 'De Groene Amsterdammer'[2], the following question was raised: Cannot play, which is observed universally among people and animals, especially when young, have value in itself, rather than only as an instrument for survival in evolution?. Does everything have to be expedient to survival in evolution in order to exist?

It reminds me of existentialist philosophies such as that of Nietzsche, with his Will to Power, or Heidegger, with his Being in the World. I my philosophical view I would associate it with the will to creation, which I consider to be a basic drive, as discussed at in this book. Playing seems close to the experimentation that creation entails.

But whatever intrinsic value play can have, value for itself, not as an instrument for survival, the questions still remains how it could have survived in evolution. After all, much energy is spent on it, and how could that be afforded if it did not contribute to survival and/or reproduction?

I leave aside the consideration that play can also have a socializing function, which helps survival.

Here I propose that apart from that an inherent drive to play, as a joy for itself, can be conducive to survival.

In fact, that is what I have argued with my 'theory of invention', set out above. There, I argue that invention arises from experimentation with existing competence (knowledge, skill) in novel contexts, which generates failure, a resulting incentive to change, as well as the suggestions on material and directions for experimental change, arising from the novel context.

Soon after I published the book I received a response from a psychologist, saying that what I described is known a 'principle of overconfidence' that children display in play: disingenuous, fearless, sometimes reckless expansion of what they can do, think or say into novel contexts.

Entrepreneurs appear to have kept that instinct alive in spite of regimentation in education and jobs. Perhaps that is why often entrepreneurs are drop-outs. One of the fundamental problems of much innovation policy is that it does not leave enough room for play.

So, my argument is that an autonomous drive of playful experimentation is both wasteful and conducive to invention, and this may have contributed to survival, and as a result have been embedded as an instinct in the genome.

Intrinsic joy of play and survival in evolution can go together, and perhaps must go together for the instinct for play to survive.

Order and change in language

[2] Of 7th august 2014.

How does meaning change? Let me summarize some elements from the discussion of meaning in Chapter 3 that are useful here. Ferdinand de Saussure proposed a distinction between the intersubjective order of language ('langue') and diverse, individual, creative word usage ('parole'). Unlike Saussure, here I am not looking for the structure of 'langue' but for a logic of 'parole'.

In hermeneutics (theory of interpretation), largely attributed to Hans-Georg Gadamer (1900-2002), there are the notions of the hermeneutic circle with a paradigmatic and perpendicular to it a syntagmatic axis (Gadamer 1977). Paradigm here refers to a concept with existing meaning and syntagm refers to expressions in which concepts are used.[3]

As Frege proposed, the meaning of an expression is a function of the meanings of the words in it, but the meaning of a word also depends on the sentence it is in. The moving of a word from one sentence and context to another will shift its meaning.

> To summarize what I discussed before: The connection between denotation/extension and connotation/intension is as follows. Associated with a certain notion or concept there are characteristics that are used to recognize something as belonging to the category (intension), and a repertoire of more or less personal associations that one then has (connotations), and that whole is the paradigm. The more personal associations cause people to never assign exactly the same meaning (connotations) to something. That is a source of both error and creativity. It is also part of what I called 'cognitive distance'. We always identify and categorize individual things in a context of specific conditions and that is called the syntagm. There, from all possible features of a concept those are selected that fit the context and novel elements are added from that context.

All this is relevant in order to arrive at a clarification of the process in which ideas shift and new meanings emerge, on the basis of experience with individual cases in specific conditions, with which novel connections are made, in what the pragma(tis)tic philosopher Peirce called 'abduction'. That means that in diverse, originally unconnected phenomena one imagines a connection, in a new idea or hypothesis.

> I now connect all this to the Cycle of Invention discussed above. That yields a 'logic' of change of knowledge, practice, technology, product, etc. I propose that the cycle also applies to change of meaning, and yields an elaboration of the hermeneutic circle, or, perhaps, yields an alternative for it.

The connection is clear. Both the hermeneutic circle and the cycle of invention show how a change of content (knowledge, meaning) arises because known content is applied in new contexts and by adaptation to those and inspiration from them leads to novel content.

The cycle adds a few elements. In the beginning novel content is tentative, ambiguous, diffuse, ill understood, and unordered, with gaps, overlaps, incongruities or outright contradiction. In the course of experiments with the new content more order arises, with a coherent structure, streamlined by elimination of redundant or incidental elements, in consolidation. It is reduced to the 'essence'. I now associate that with the process of abstraction, the construction of a new universal. As indicated before, that is economic, in the offer of simplicity. The loosening from idiosyncrasies of a specific context makes it possible to transfer experience to a novel context, in generalization. The cycle shows how adjustment

[3] A complication here is that the term *paradigm* also has another, though related, meaning of a system of often tacit fundamental views, opinions and principles that determine how one looks at things and makes sense, and which it is difficult to step away from.

to a novel context can happen 'proximately' to existing knowledge/meaning by making different selections from an existing repertoire of practices/connotations, in differentiation. In more 'distant' change we adopt novel associations from foreign practices/meanings that we encounter in the novel context, reciprocation. This is my proposal for the working of *parole*.

This process is equivalent to 'scientific method': on the basis of experience one tests hypotheses and to the extent that they appear not to apply one changes them. He process also embodies pragmatism, and abduction, as I indicated before, in which from application and experience in different contexts of practice we arrive at new ideas which then can be applied and tested anew. Imperfection on the move. That, not deduction from indubitable principles makes up the core of science.

Flexibility, but not too much

We are told that everything has to be flexible, because that is good for innovation and innovation is needed. It should be possible to easily break relationships, fire workers, and sell parts of firms, and organizations must continually turn themselves around. There is something to that. Flexibility is needed to prevent rigidity, to allow room for novelty.

But flexibility can go too far. Revolving door employment is not good. For a fruitful relationship, within and between firms, one must invest, and that takes time. Often, the investment is 'specific' to the relationship, i.e. cannot be recouped outside it, so that the relationship must last sufficiently long to make the investment worthwhile. Otherwise, the investment will not be made and the relationship remains shallow. Specific investment is needed when one makes the high level, specialized products, with unique combinations of features, which yield the highest profit.

Flexibilization is often accompanied; see the US, with legalistic relationships. Shorter relationships are less personal, less based on personal trust. They require a more contractual control of relationships. That increases costs, and the irony of it is that it reduces the flexibility of relationships by locking them up in the straightjacket of a contract.

Ironically also the drawbacks apply especially to innovation, while that is where flexibility is most advocated. Innovation typically arises from surprising novel combinations, from people and firms with different capabilities. As a result, people do not immediately understand each other. They must invest in sufficient mutual understanding and that requires patience and is also a specific investment.

Relationships entail risks. First, the risk of mutual dependence, especially when one makes specific investments for the quality of the relationship. Second, the danger, especially in innovation, is that knowledge or the innovation is captured by a competitor.

> Especially under the uncertainty of innovation it is difficult to cover the risks with formal, contractual means. First, the uncertainty is too large for one to be able to specify all relevant contingencies. Second, a contract can tie a straightjacket that stifles initiative and leaves no room for the surprising turns that innovation can take. Thirdly, the demand for a detailed contract is readily seen as a sign of mistrust, which evokes further mistrust, in a vicious circle that is difficult to turn around in the building of trust.

When contracts are difficult, as in innovation, trust is more needed. Where it is not present at the start it has to be built up and that again is a specific investment that requires the perspective of a sufficiently durable relationship to make it worthwhile. I discussed trust in Chapter 4.

In sum, especially in innovation one should not strive for maximum but for optimum flexibility, in relationships that last sufficiently long to evoke investment in mutual understanding and trust, but no so long as to obstruct the change and renewal of relationships.