

Psychology of Entrepreneurship

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Research in brain science and psychology from the last years has given new insights into human nature, i.e. how we think and how we behave. Do these insights also provide ideas and applications, which can be of benefit in the field of economics and beyond? To answer these questions, I proceed here in the following way:

First, in parts A, I want to describe some biological, neurophysiological and psychological facts about our brains and our behavior. This description brings together knowledge on an interdisciplinary and international level. Some basic knowledge is necessary to foster considerations of economic implications with a solid basis, avoiding talking in platitudes. Neglect of these basic facts results in unsuccessful communication and wrong decisions of entrepreneurs.

Obviously, successful entrepreneurship as a key factor in the development and maintenance of successful economies. Therefore, in the second parts B, I would like to focus on the implications of parts A guided by the following questions:

- I. What are fallacies and mistakes entrepreneurs are prone to because of our human nature?
- II. What should entrepreneurs know about decision-making?
- III. Which biological, neurophysiological and psychological constraints should be considered by entrepreneurs when bringing new products and services to the market?

For easier navigation through the arguments and better memory of what is presented, I play with the numbers 1 to 10; each number is associated with specific insights from brain science and psychology and its potential applications.

A 1. Unity of consciousness

It may come as a surprise, but with respect to our topic I will start with the origin of life. The development of life on earth emerged jointly with the invention of the ability to make “decisions”. Already unicellular organisms are able to move into a specific pre-programmed direction, to find a place with better living conditions. To do so, a “decision” on the basis of the available information is necessary, to decide between better and worse. Decisions and life are fundamentally linked.

The precondition of this close tie between decision and life is “movement” in its original sense. Who is moving has to decide – in a practical sense to move from one place to another, in a metaphorical sense to change conditions and situations. Decisions presuppose that the whole organism is involved. This integrity, the necessary unity or identity of the organism, is always the target value of a decision. And only if a decision has taken place, an action can be executed.

However, the motion of an organism can only take place in one direction. All information processing serves the purpose to orient the organism to this one direction. With respect to higher living beings, this fact enforces the unity of consciousness as a necessity.

At every moment, the brain has to filter something specific out of the immense amount of information it has to deal with. And this something is always **one** something. This implies that we

refer to the unity of consciousness, despite the multiplicity of (implicit) parallel processing in the brain.

B 1. Implications

Like maintaining the integrity of the organism by moving to better conditions, the totality of a company has to be always the target of a decision. This requires like in organisms a reliable information transfer between different compartments. In the moment such mutual information is disrupted (as it happens after certain brain injuries), instability is the consequence. This can both be observed in the economic and political sphere.

Another consequence of the necessary unity of consciousness is that “multitasking” in a strict sense (to execute several tasks simultaneously on the conscious level) is not possible. The subjective present (lasting approximately three seconds) allows only one content of consciousness. Choosing a longer time interval, for example half an hour, we are of course able to cope with different tasks. However, this “asynchronous multitasking” needs a special logistics of the brain to store information in the working memory and to recall it again. To be efficient, high concentration is required. If a company or even an entire country would stay away from multitasking for just one hour a day, and if everybody would focus his or her attention on just **one** task, the greatest push for innovation could be expected.

A 2. Two hemispheres, a duality of brain functions and two states of consciousness

The left and the right hemispheres of our brain represent different functions. For most of us, the left hemisphere is considered to be dominant, because most language functions are located on the left side. Furthermore, analytical functions and inferences about what is going on are associated with the left. The right hemisphere is associated with spatial cognition, with registering what is going on and also emotional evaluation. In other words, the left hemisphere is responsible for detailed analytic information processing, the right hemisphere for more holistic processing.

However, both hemispheres are connected, a connection which is necessary to allow for the unity of consciousness. The conceptual competence of the left hemisphere is not separated from the pictorial competence of the right hemisphere. Concept and image are complementary and represent different aspects of our knowledge about events and facts.

A duality of functions is also given concerning the repertoire of the mind. There is always “something” in our mind, i.e., we see, feel, believe or want something. But this content of consciousness, the “what”, can only be made available when logistical functions are operative. Without “how” functions no content could be made available. At first we have to think about the “power supply” of the brain, i.e. the activation machinery that fluctuates throughout the day and force us to sleep regularly. The second logistical function is the temporal organization of functions, which are represented in spatiotemporal patterns, and which are glued together with a temporal machinery. And the third logistical function is attention, the ability to be focused on something. “What” and “how” functions are necessary to be able to perceive, to think and to act, to be conscious.

And there is another aspect of duality that has great importance: Approximately at the age of four, humans develop the ability to be aware of being conscious of oneself; and in discovering this, it is

also evident for the child that other human beings also have consciousness; this research is referred to as having a “theory of mind”. This implies the possibility to understand the situation of another human being, to take a position external to oneself. Therefore, in principle, we have two states of consciousness: an internal self-related perspective and an external perspective.

These two perspectives of an internal and external point of view are quite important with respect to decisions: It has been shown that moral and economic judgments elicit very different brain patterns when judgments are made from the “first -person perspective” compared to the “third-person perspective”; the alternatives are: “I should (not) do it” – “One should (not) do it.”

B 2. Implications

The dual organization of the brain can also instruct entrepreneurs in decision-making. Detailed analytic information processing together with the view for the whole, analysis and synthesis are necessary to reach excellent decisions, which promote future creative processes. It is not sufficient to have only an analytic view towards problem-solving, but at the same time it is also not sufficient to have only a holistic perspective. The complementarity of paying attention to details and to the whole provides stability.

The ability to take an external perspective allows thinking about facts and circumstances in an abstract way. The internal perspective is on the other hand the basis of sensitivity for others, the source of empathy. With respect to enterprises the implications should be to look for the right balance in strategic behavior. Hierarchical relations between decision-making levels are necessary to be capable of acting operatively. Heterarchy is necessary to involve all members of a company – independent of their position – in the knowledge generation of the company. Hierarchy and heterarchy have to be conceptually separated, however, both have to be actualized to promote creativity and to foster innovations. The challenge of leadership is to develop sensitivity for the frame of reference and to communicate and even teach the two perspectives: In which situation does hierarchy, in which does heterarchy apply? It has to be understood by everybody that responsibility requires a hierarchical structure, whereas knowledge creation occurs within a non-hierarchical environment; the latter is also essential for the development and maintenance of a genuine corporate identity.

A 3. Three types of nerve cells in the brain, and three types of knowledge

All nervous systems consist of three types of nerve cells only: receptors or sensory cells (approximately 500 million in humans) receiving information from outside and informing us about the world; motor cells (approximately 4 million) representing the output and making actions possible; and the great intermediate net (more than 100 billion), or what we usually refer to as “the brain”.

The receptors represent the specific adaptation of an organism to its environment. The human light receptors, for example, can only process a very narrow band of electromagnetic waves. Outside this band, we are blind to the rest of the world, which actually implies that we are “blind” to most of the things that happen around us. The motor cells regulate the motion apparatus, the inner organs and ensure the stability of the organism. And they also control the emotional expression with our face muscles.

Concerning the intermediate net, every nerve cell distributes its activity to approximately 10,000 other cells; and it also receives and integrates information from approximately 10,000 other cells. Because of this principle of divergence and convergence of nerve cells, in other words because of the spatially distributed activities of parallel working elements within this neuronal net, all psychological domains represented in the brain are highly interconnected: There is no percept without memory, without emotional evaluation and the planning of an action.

Such a “trinity” is also a characteristic of human knowledge. When we refer to “knowledge” we usually concentrate only on the consciously available or explicit knowledge. However, modern brain science reveals that there are three types of knowledge: explicit knowledge, but also implicit or intuitive knowledge and, third, pictorial knowledge.

Explicit knowledge can be represented in words or signs and is associated more with the left hemisphere of the brain. Implicit knowledge is referred to also as “tacit” knowledge, and is for instance, dominant in our ritual or automatized behavior. Pictorial knowledge is more associated with the right hemisphere, and can in itself be triangulated into visual perception (because “seeing is knowing”), topological or geometrical knowledge represented, for example, in diagrams or histograms, and, third, into episodic knowledge.

Episodic knowledge is built up of the pictures of unique experiences from our past, which are imprinted in our memory. With episodic memory, we are able to time travel to our past and to contact not only these episodes, but also to contact our “self”. Many of these pictures are re-coded and newly staged in the way that we ourselves are part of the image; we become our own “Doppelgänger”. In this way, pictorial knowledge represents and is necessary for our personal identity; we know who we are, because we can double ourselves. (The tragedy of Alzheimer’s disease is no longer being able to time travel to the past because of the loss of memory and, thus, being unable to consciously confirm one’s identity.)

B 3. Implications

Interestingly, the output cells are much smaller in number than the receptor cells. Once a decision for an action has been made, the effort to execute an action is much lower than information processing before the decision. With respect to entrepreneurs, this tells us that avoiding decisions at the right time can be very cost-intensive; one may be lost in an ocean of too much information to be processed. Complexity reduction is required, and one can learn from the brain that “informational garbage disposal” is most important.

The limitations of our senses, the blindness for most parts of the world can also be used as metaphor. Quite often entrepreneurs (like every person) tend to register only that information that corresponds to their expectations. The challenge for the entrepreneur is to orient the sensitivity of the information channels in such a way that relevant information from beyond the frame of expectations can be identified, incorporated and turned into creativity and action.

Implicit or intuitive knowledge works best the richer the working platform of our brain is. In implicit thinking, unconsciously relations are established between islands of knowledge, and potentially successful actions are acted out implicitly. Those actions become conscious if they seem to be successful; an insight is the result of this implicit processing and it can be accompanied by the so-called “Aha-experience”. Therefore, strategic planning of entrepreneurs should incorporate intuitive knowledge to promote creativity and success.

A 4. Four functional domains of the mind, four rules of thinking, and four sources of error

There are only four functional domains of the mind, i.e., perceptions, memories, emotions and planned actions (or “volitions”). These provide the possible contents of our immediate experience. However, this modular representation of functions does not imply that these domains are isolated from each other, because of the architecture of the brain they are highly connected. In every mental act, many areas of the brain are involved simultaneously. Whatever is represented in our conscious mind is always colored by an emotion, has always a memory component; nothing is independent of each other, and the words we are using are often misleading: “Pure” rationality or emotionality is not possible.

The belief in such pure rationality goes back to the French philosopher and mathematician René Descartes, and is still dominant in the Western culture. Descartes formulated four rules of thinking (*Discours de la Méthode*, 1637), and our confidence that we are rationally thinking and acting is mainly attributable to Descartes’ historical impact. The first rule demands to formulate a problem clearly and distinctly, without hastiness and prejudice. The second rule requires dividing a problem into its parts. Third, to solve a problem, one should start with the simple and proceed to the complex. The fourth rule is the most difficult one: All the ideas and facts to treat a problem have to be taken care of, and a problem has to be considered in its entirety. These rules are of course quite relevant on an operational level like writing a budget. But can they be generalized? Are we capable to think without prejudices, to disentangle a problem before we know what the problem is, to consider all details? The answer is an emphatic “No”, and this answer had already been given at approximately the same time by the English politician, businessman and philosopher Francis Bacon (*Novum Organon*, 1620) who discussed four errors of thinking.

The first error is to overrate our analytic abilities. Our think tools are imprinted and constrained by natural evolution. Imprinting by evolution is also the source of the second error; We usually are not aware of our personal and cultural imprinting, and we often enjoy our prejudices. The third error in thinking is related to the fact that we use language. Thinking can never be expressed perfectly in language; explicit communication with others represents only a subset of our thinking processes. And the fourth error is conditioned by the theories or expectations we adhere to on an implicit or explicit level. Theories and indeed prejudices are necessary to navigate effortlessly through our social and physical surroundings; they express the economical principle of our brain, i.e., to work efficiently and effortlessly. However, this conditioning usually implies not being aware of our hidden theories, which model our thinking.

B 4. Implications

The high interconnectivity of all brain cells ensures that there are for example no decisions, which are not neuronally embedded into processes of perception, emotional evaluation, memories of the past and intended actions. In a goal-directed decision all these processes are involved.

Descartes second rule of thinking, the necessity of dividing a complex problem into its parts, has the disadvantage that often in concentrating on the parts the problem as a whole is not considered adequately. This rule, on the one hand being predominantly responsible for the success of modern science, has, on the other hand, caused the splitting of societies, politics, economics and science into “partial cultures”. Inter- or transdisciplinarity is the difficult but necessary challenge to overcome

this particularization. This is also true for companies because disconnected activities often ruin investigations and creativity for innovations.

For the entrepreneur, not being aware of the four errors of thinking, i.e. overrating our analytic abilities, neglecting the constraints of imprinting, counting too much on explicit communication and forgetting that we often rely on implicit theories and prejudices, is a serious obstacle for creativity and innovation. Therefore, knowledge and transparency about our human nature should be part of the corporate culture of a company. Everybody can know about it, and in fact knowledge about ourselves can easily be acquired.

A 5. Five ways of learning, five universal traits of personality and five mental operations for making decisions

Learning is the way to acquire knowledge, and five different ways of learning have to be distinguished. The first form is learning by imprinting. We enter the world with genetically determined programs, but they are confirmed or switched off in early phases of life. The second form of learning is habituation, which is actually a very intelligent way of learning. Habituation enables us to neglect irrelevant information and to free up mental space for focusing on the essential. The third form of learning is sensorimotor or procedural learning. Movement patterns like in sports, are acquired which are then implicitly stored. This kind of learning is basic to being able to write and read.

The fourth mode of learning is classical conditioning. A specific stimulus (for example an air blast onto the eye) releases an innate reflex (an instant closure of the eye), i.e. an unconditioned stimulus drives an unconditioned response. If another stimulus repeatedly precedes an unconditioned stimulus, this new stimulus, which at first was irrelevant, serves as a notification to release the reflex; it becomes the so-called conditioned stimulus, and it elicits the unconditioned response. With classical conditioning, something which may have been meaningless in the beginning is now associated with a response. The fifth form of learning is learning by trial-and-error (also called operant conditioning) or learning by consequences. The basic idea is that successful action is imprinted, because success causes satisfaction of needs.

It may come as a surprise, but every human being can be described with reference to only five different traits, the "big five", and they represent anthropological universals being independent of cultural background. The five personality domains are: extraversion versus introversion, emotional stability versus instability, placidity versus aggression, openness versus reticence, diligence versus laziness. Despite this small number of traits, individuality and personal identity is not an illusion; every person is unique, representing a special position in a five-dimensional space (mathematically speaking).

And the number five can also be identified when we make decisions, as they are based on five mental operations. First, facts and situations have to be determined, i.e. have to be classified. Second, these classifications have to be compared, and comparison can take place with respect to quality or quantity. Third, results of a comparison allow choices between alternatives, this choice being, fourth, the basis of a decision. The fifth step is then an action following the preceding decision. The accomplished action opens the next cycle to create new mental categories.

B 5. Implications

Advanced societies and their economies require “lifelong learning”. However, because our entire mental repertoire is mostly conditioned in the early years of life, it is an absolute necessity to cater for the right balance of abundance of provided possibilities and adequate time to learn in this first imprinting phase.

In a metaphorical sense, what is appropriate for societies is also appropriate for companies to achieve a high level of creativity and innovation. Members of the company should be offered possibilities and time to develop ideas. Interdisciplinary teams are an excellent way to enhance the richness of production of innovative ideas.

With respect to advertisement of services and products, the fourth form of learning, i.e. classical conditioning, should not be underestimated. With classical conditioning, a meaningless stimulus or event becomes, via repetition, meaningful and triggers a response. Because of this effect, which may be positive or negative, the entrepreneur has to consider the market environment carefully. The entrepreneur should also not forget that he himself could be the target of classical conditioning. Especially for decision processes, classical conditioning may provide a hidden framework.

Learning by trial-and-error or learning by consequences is also of importance for companies. Obvious rewards for the staff are of course money; but also social appreciation or affiliation with the company is important. However, fundamental for this type of learning is activity to test situations and conditions. If spontaneous activity of this kind is too much restricted within the company, employees learn less. Here we can also see a source of creativity by harvesting serendipity. Often consequences cannot be anticipated; if a chance event or a sudden insight, which was not anticipated, results in a feeling of satisfaction, this event or this idea may be the beginning of a new product.

A 6. Six basic emotions

In all our actions, emotions play implicitly or explicitly an important role. Emotions seem to be manifold; can they be classified in psychology? Surprisingly, this can be done in examining the emotional expressions in different cultures. Independent of the cultural frame, there exist only six basic emotions: fear, sadness, anger, disgust, joy and surprise.

How is it possible that these emotions are understood and experienced interculturally? The reason is again our genetically imprinted programs; they encompass these emotions as basic configuration. This enables us to experience certain reliability in intercultural communication, even without understanding the foreign language.

Why do we have emotions at all? Emotions are evaluation authorities of our brain to classify the relevance of experiences and events. Without reference to our own emotions, it is also not possible to take appropriate decisions.

Another important feature of emotions is that, compared to the other contents of our consciousness (perception, memories and actions), only emotions show longer time constants – up to hours and even longer if we think about sadness or happiness. Emotional evaluations are also necessary to ensure the continuity of the neuronal processes of our brain.

Sometimes patients suffer injuries in frontal areas of the brain. It has been shown that in these cases emotional evaluations are decoupled from other functions. Such patients show no difference with respect to intelligence, but they are no longer capable for meaningful decisions with long-term consequences. Without the emotional framing we are captured in a present without a future perspective.

B 6. Implications

Actually, the different muscles in our face have been selected during evolution to express our emotions, to inform other human beings about our specific internal feelings. In this way, the evolutionary selection processes determine the social sphere. As a consequence to restrict communication with others using email contacts only, neglects our human heritage. Working environments should be constructed in such a way that immediate personal contacts are possible.

Another important feature of our emotional apparatus is that decision processes are possible only if they are emotionally embedded. The loss of emotionality often causes irrational decisions. Successful entrepreneurs have an intuitive knowledge that authentic and communicable decisions need both: deliberate rationality and immediate emotionality. Only if decisions are also based on the level of emotions, targets will be pursued in the long run and the staff can identify themselves with these goals and are motivated to achieve them.

A 7. Seven competences in speech and communication

To communicate adequately, seven linguistic competences are necessary. First, to be able to speak, we have to produce speech sounds, i.e. we own “phonetic” competence. The reservoir of phonemes in the more than 5,000 languages still existing in the world is extremely similar; there exist approximately only 100 phonemes in all languages, which are genetically given. In learning our mother tongue, only a subset of these genetically given phonemes is confirmed, the other ones are turned off. Thus, the English, Chinese or German repertoires of speech sounds are different which shows up in the accents in speaking as grown-ups when we talk in a foreign language. In learning the words of a language, we build up “lexical” competence. Talking to each other, we normally use not only single words but whole sentences. To be able to do this, we need to know grammatical rules; this is our third “syntactic” competence.

Using words and correct grammar is necessary but not sufficient to transport meaning. Meaningful speech needs “semantic” competence. After certain brain injuries patients may lose semantic competence; their language may sound normal, but they don’t say anything. And in communicating with language, we deploy specific intonations; with this “prosodic” competence we communicate our emotional states.

Talking also has to be adapted to the context at a given moment, and it has to match the specific situation. Adequate speech, i.e. understanding the frame of reference represents our “pragmatic” competence. The list of linguistic competences is completed by number seven, the “social” competence. In different cultures, in different social circumstances different linguistic habits are applied, which have to be taken into account to communicate successfully.

B 7. Implications

A successful decision-maker and entrepreneur has to master all seven linguistic competences, or has to be at least aware of their importance for successful negotiations, or to reach other people in an empathic way.

Usually, one of the greatest obstacles in intercultural communication is our inability to speak foreign languages free from accent. Accent-free speech is possible only if the repertoire of phonemes we learn up to puberty is widespread and encompasses at least three different languages, for example, in the European context, a Germanic, a Romanic and a Slavic language. To support this, language fluency should be the prominent target in a globalized world. A language is not just a medium to transfer information, but a language carries also its cultural environment.

A special reference has to be made to “semantic competence.” It is often observed that spoken language is content-free, and that the person who speaks is searching for an idea that should be expressed. Similarly, one may observe that a person who speaks gives the impression of talking mainly to himself. Pragmatic and social competences can be learned and should be adequately employed; the necessary personal frame of the entrepreneur should be, however, to maintain one’s authenticity.

A 8. Eight phases of life, eight corners, and a lucky number

Human life can be divided into eight phases, some being phases of transition. The first phase begins after conception and ends with entering the world. This prenatal phase is already essential for how we will master life until its end. The second phase is the first years up to approximately three or four years when, in particular, trust in the world may be established. A third phase follows: after we discover our own thinking and learn that other people also have a mind (“theory of mind”), and this phase is characterized by learning in kindergarten or primary school.

The fourth phase is puberty as a phase of transition and discovery of one’s own self. It follows phase five when we learn and prepare ourselves for a professional life. Phase six is the longest phase, on average half of life expectancy, when we work and provide for ourselves and the social system financial security, for the young and the older generations. In the seventh phase after retirement we may start something new in the sense of “re-tiring”, i.e. putting on new tires, or enjoying what we have accomplished previously. The phase eight is that of old age at the end of life, which may be in wisdom.

The number eight can also be used to illustrate another important result of modern neuroscience. Let us imagine a cube, which is transparent (a so-called “Necker cube”). The cube has eight corners, and it can be seen in two perspectives, either the front side ahead or the backside up front. This cube is a symbol for the dynamics of our perception. Once we are aware of the two perspectives, we are not able to avoid a change in perspective. Approximately every three seconds, one perspective transforms into the other one.

This openness for change is a characteristic of our entire cognitive apparatus. We keep something in mind for several seconds (identity of content of consciousness). Then, an inner decision process occurs, the brain wonders “Is there something new in the world?” If the new something is another perspective, this perspective enters consciousness. This change in consciousness points to “complementary” as an essential feature of our neuronal apparatus. Identity and change,

stationarity and dynamics are complementary processes, which are basic characteristics of our brain.

It is not a secret that most people suffer from some kind of superstition. We all have a tendency to believe in supernatural powers. Here the magic number 8 comes in, which in China is considered to be a happy number promising wealth. The number 13 in some Western cultures is not attractive, and a ship should not leave the harbor on a Friday, a 13th of a month. Here a particular weakness of the human mind can be seen which affects human behavior both in a negative but also in a positive sense.

B 8. Implications

Socially and economically, an interesting aspect characterizes phase seven, the “generation plus”. Humans in this phase of life are less homogeneous than humans in the preceding phases. Most of them want to allow for more individual interests and goals. For entrepreneurs, this individuality creates specific challenges in providing and advertising services and goods. Developing landscapes of needs and requests for the “generation plus” will certainly trigger innovative ideas.

A question which often comes up, is whether leadership and entrepreneurial competence can be learned. This is partly true, but from a psychological point of view certain features of a personality are determined in early phases of life like trusting in others or trusting in oneself, which is essential for successful work as an entrepreneur.

The complementarity of stationarity and dynamics should also guide the decision processes of an entrepreneur. On the one hand, what has been proven to be successful has to be conserved. On the other hand, openness for new situations and developments are essential.

A 9. Nine stumbling blocks in navigating through the world

In thinking, decision-making and acting, we can identify at least nine stumbling blocks or traps in reaching the adequate thought, the right decision and the appropriate action.

First, our evolutionary heritage results in a “disease” which I would like to call “monocausality”. If we want to understand something, we usually are searching for only *one* underlying cause; and usually we find only *one* reason. However, because the world is mostly not as simple as we would like to have it, adequate comprehension of most situations and adequate problem-solving should be better based on “multicausal” strategies.

The second stumbling block is due to the way we display complex issues, for example, in using “boxological” drawings. Every picture is an abstraction, and abstraction neglects information. Schematic pictures represent specific states of a problem or situation; they are timeless pictures. The temporal correlation and interaction of the process dynamics of the elements are neglected and need an extra explicit simulation. Power Point presentations can be utterly misleading.

Third: The fact that we talk (or write) to each other opens up the language trap. Not everything what we think can be represented in language appropriately. This is particularly experienced in intercultural communication, which is typically characterized by misunderstandings.

The fourth trap is our dependency on the assessment of others. For example, the expected media coverage with respect to a decision and its consequences may influence the decision. The feedback through other persons or the media generates a frame of dependency. We may not be able to avoid this; however, we should be able to know that such a frame exists.

Stumbling block number five is blindness to chance events. Not all strategies and actions can be calculated rationally in advance. Sometimes serendipity plays a decisive role in finding creative new solutions.

The sixth trap is short-term thinking. To follow short-term plans and goals prevents long-term strategies. Tunnel vision and short-term actions may destroy future possibilities. Long-term strategy has to be robust with respect to short-term fluctuating scenarios.

Closely connected is trap seven, the myth of speed in thinking or acting. We often mistakenly mix up speed and high competence. Unfortunately, with this respect psychological research has made unfortunate contributions in judging intelligence by means of the speed of problem-solving. Wanting to be fast (and first) often prevents deepness in thinking.

A widely unknown source of errors is that we miss a “statistical sense”. As the result of our evolutionary heritage and the imprinting of our brain, we are inclined to create simple categories and to treat problems in an effortless way. However, our lack of a statistical sense often leads to false interpretations of statistics, for example, in judging risks.

Stumble block number nine is the person we are – with all our human weaknesses. One of our worst enemies is laziness, another one is stupidity. Stupidity can be evil if one is not willing to take note of available knowledge. Self-staging and having no respect for others is another personal trap. Facing all these human weaknesses with self-transparency is necessary to be able to step out. And one should add the erotic trap, i.e. that decisions are sometimes made to attract somebody.

B 9. Implications

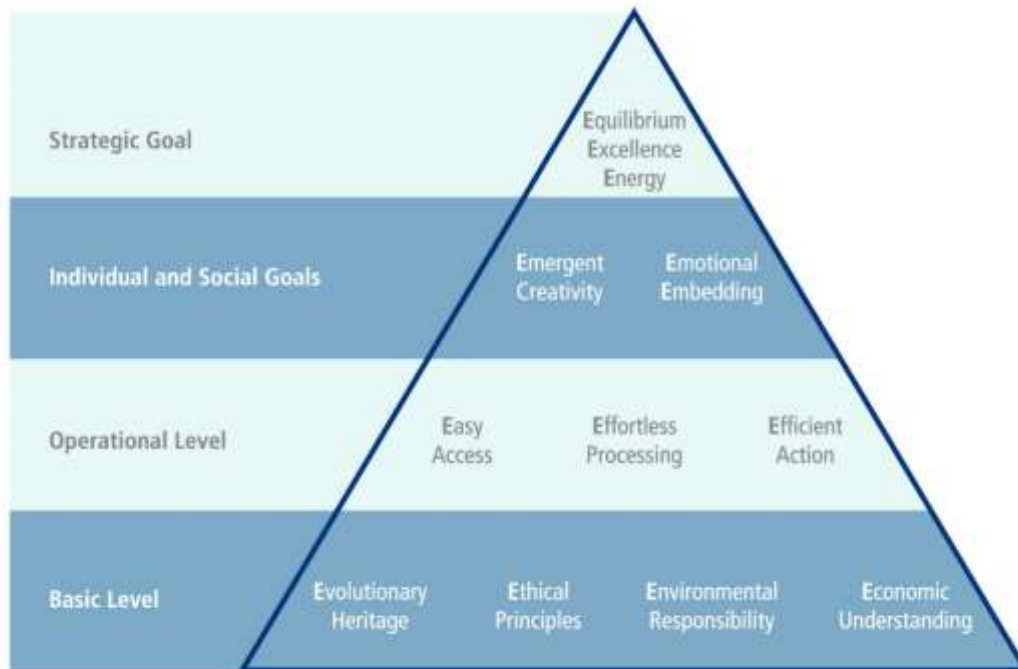
Every politician and entrepreneur should be aware of the listed nine stumbling blocks in reaching adequate thoughts, right decisions, and appropriate actions. Not enough transparency with respect to these obstacles could result in enormous social and economic expenses.

“Monocausality” prevents adequate problem-solving using “multicausal” approaches; “boxology” neglects information and temporal processes; the language trap narrows our communicative possibilities; dependency on the assessment of others may influence decisions in an inadequate way; blindness for serendipity prevents new creative ideas; short-term thinking and the myth of speed in thinking or acting may destroy future possibilities; our lack of a statistical sense may result in errors in judging risks; and our human nature asks for self-transparency to avoid too many conflicts with ourselves and others.

10. The E-pyramid

The E-pyramid represents a summary of the basic conditions revealed by modern neuroscience and psychology to support socially responsible and economically successful decisions to stimulate an innovative culture.

E-Pyramide



Source: Author.

The E-pyramid consists of four hierarchically ordered levels. At the lowest basic level, the most fundamental and ineluctable conditions are displayed. Our evolutionary heritage, the impact of an evolutionary process of millions of years, manifests itself in the imprinted constraints of our (physical and) mental apparatus.

Ethical principles, for example, responsibility with respect to employees, are another evolutionary feature. A human being without other humans is unviable, we need to be embedded in social communities, and we need to pursue pro-social behavior. And as evolutionary products, we also need to show environmental responsibility. Economic understanding is necessary to utilize resources on the personal, institutional and global level and to guarantee long-term stability.

On the second operational level, the principles underlying all our mental operations are to be found. To create easy access to new information and to confirm previous information with our sense organs is again an evolutionary experiment spanning millions of years. Interfaces must be designed in such ways that easy access to information and straightforward transformation into knowledge can be achieved.

Effortless processing of information characterizes the processing of stored and assessed information. Failures of effortless processing can be transferred with respect to institutions and companies in various ways. If the emotional context is missing, which is important for any mental

activity, if – with respect to companies – the common motivation and enthusiasm is lost, effortless communication within the company breaks down.

In the evolutionary process, all living beings are programmed to act efficiently. In the biological context, acting is the execution of a goal-oriented movement. In reaching the goal, needs of the organism are satisfied and as a result a dynamical equilibrium is achieved. In companies, efficient action requires clear targets to motivate and to release creative processes.

The third level outlines individual and social goals. Foster individual creativity, i.e. to develop the emergence of something new out of the own consciousness, is a challenge for every individual. Legitimately, no simple formula can be given to meet this challenge. However, curiosity, incorporation of knowledge from other fields, openness for serendipity, reflection and consideration of the demonstrated human conditions will generate a supporting context. The need for emotional embedding for many performances was already discussed.

At the top of the pyramid we find the three strategic goals of a culture of decision and innovation. Since the beginning of life, reaching homeostatic balance has been the driving force. This equilibrium is never stable it is always dynamic. Paradoxically, such an implemented dynamics guarantees long-term stability. Excellence and energy are necessary to achieve dynamical stability.

Ignoring the knowledge condensed in the E-pyramid would imply ignoring human nature, human needs and strengths. Politicians as well as leaders can best support entrepreneurial activities and an innovative culture by integrating the demonstrated results from modern life sciences into their decision processes.