ACADEMIC LECTURE

Human freedom and the brain

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Abstract: Freedom of will does exist, it is self-leadership of man based on reason and ethos. Evidence comes from truth. Determinism cannot be proved since if you try, you mean to prove a truth; but there is no truth without freedom. By contrast for freedom there are many pieces of evidence e.g. science, arts, technology.

Freedom utilizes creative abstract thinking with phantasy. Freedom is graded, limited, based on nature, but not developed without good will. We perceive reliably freedom by self-consciousness and in other persons as long as we are sober. Freedom needs intelligence, but is more, it is a creative and moral virtue.

The basis for freedom is phylogenesis and culture, in the individual learning and experimenting. Factors in the becoming of freedom are not only genes and environment but also self-discipline. But the creativity of free will is dangerous. Man therefore needs morale. Drives and feelings become humanized, cultural interests are developed. There is a humane nobility from long good will.

The cerebral basis of intelligence is in the sum of the association areas, the basis of will and conscience in the prefrontal fields. This rational motivation system is superimposed on the limbic system. Voluntary movement needs the basal ganglia. When they search for motor programs the Bereitschaftspotential increases slowly, this is no proof against freedom.

Since freedom is real; we can help people to become more free. A cause of deterioration is self-corruption. Free will is the top human ability; we've got always to work on.

1. When we want to understand the relation of freedom and the brain we need a concept of freedom; this today is confused. Usually only the external, the economic and political freedom is considered. It is clear that freedom in these fields is important, but this external freedom of the social state with rule of the law and democracy would not exist – after all it is created by man – if man would not have internal freedom. The essence of this, however, is freedom of the will. For if it were so as Schopenhauer claimed that man may perhaps do what he wants, but he cannot decide what he wants, he would be unfree. This freedom of the will has been challenged. Does it really exist? Of course we are not totally free, after all we are living beings with needs on energy and so on but we are not puppets either determined by unconscious processes of our brain.

The ancient Greeks believed in freedom (1). Perhaps because, coming from the North and being a nation of conquerors first and then, living on beautiful coasts became masters of the sea, a nation with great physicians, mathematicians, geographers, historians, artists, poets and philosophers with an undogmatic religion in which the people were near to the gods – there even were sons of gods among the people in ancient times as they believed – and perhaps just because their philosophers, first of all Herakleitos (2), had discovered nature as a self-organizing system and at the same time that man is able to understand the logos of nature by research which was a great gain in freedom. Man is free by creativity was summarized by Sophokles in his famous chorus in the Antigone. It is not by accident that people who were so free in thinking also invented democracy.

In the bible we find a lot on god's freedom but little on freedom of the will, by contrast the bible is full with omnipotency of god and his providence which was interpreted by priests who at the same time were the rulers of the people. Freedom of the will appears only in the gospel of John and this as freedom by truth. This gospel is a late book of the bible, written hundreds of years after Christ under the influence of Greek philosophy. Religious authors that were influenced by the older part of the bible denied freedom, first of all Mohammed. Spinoza (3) too belongs to this line of thought; although he was writing on nature, he knew little of it. And despite the fact that he later criticized the origin of it, he was trained in Hebrew theology. Hegel already has seen this (4). In the medieval ages fortunately the Greek philosophy was rediscovered and integrated into the teaching of the church. Albertus Magnus and Thomas Aquinas acquired the wisdom of Platon and Aristotle as a treasure of Christianity. Most of all the Franciscans (5) believed in freedom and defended it against the Islam. They believed more in the Sermon on the Mount than in Paulus. Duns Scotus saw that will is in all parts of mental activity, and Johannis Petrus Olivi wrote: the will is a king. In the Renaissance Pico della Mirandola (6) pointed toward creativity as the essence of free will including its influence on the becoming of the character. By contrast Luther (7) threw Aristotle and the freedom of will away, although on the other hand by his translation of the bible and by introducing songs in the language of the people he actually did a lot for education. In Luther's teaching as in that of the apostle Paulus man has only the freedom to accept the grace of god.

Another consequential opponent of freedom in modern times was Schopenhauer (8,9). In his teaching there is really no will, but he renamed drive into will, although will is very different from drive. A drive is a primitive function, existent already in fishes, it has causes in genes and in vital needs of the organism, by contrast will is a high cortical function, fully developed only in man, it has well considered reasons and values and its basis is not only nature but also culture. Schopenhauer localized the focus of what he called will into the genitalia; in this point the Freudists followed him. Schopenhauer, however, although he denied free will, maintained the responsibility of man – a point that is forgotten today by Roth and Singer.

The fundamental importance of the freedom of the will was rediscovered in modern times by Immanuel Kant (10). He distinguished between freedom in the negative sense (Nietzsche (11) called this freedom from ... it means freedom from oppression etc.) and freedom in the positive sense (Nietzsche called it freedom to ... which means the ability to do good deeds). Kant believed, because he was impressed by Newton's physics that in the nature there may be no freedom. In order to save freedom he divided the world in an empirical part without freedom and a mental–moral world with freedom. How these two worlds were connected remained open. In reality there is freedom in nature and this in the realm of life in the stages of evolution; the problem is a cybernetic one of creative information processing in higher nervous systems. Max Planck (12) thought that considered from outside, man is unfree, but from inside free. This contradiction, however, does not exist. As long as we are sober outside and inside perceptions are in agreement. For instance we realize it when we are very tired, and one sees this also from outside. But the idea of the determination of everything by god was in the twentieth century still so strong that Einstein did not accept accidents in nature. He said: God does not play dice. But others believed just this to be freedom, when quantum physics came. Pascual Jordan believed erroneously that chance is freedom. There are of course a lot of accidents in nature, and they may contribute to freedom

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when phantasy is asked, but they are not its essence. The problem was that in Plancks and Einstein's time modern Philosophy since Decartes, Kant and Laplace despite enlightment was still under biblical-religious prejudice: nature had acquired a quality of omnipotence and predestination. The concept of freedom was therefore quasi metaphysical, it was an all–or–nothing concept. But nature is really full of grades and modes of freedom (and despair): a worm has not the freedom of a dog to feel what his master wants, and in deep depression a brave man may be so hopeless that he thinks of suicide. Freedom is not a mechanical or metaphysical problem, but a cybernetic fact, a result of higher information processing by systems in learning systems. Freedom of the will consists neither of accidents nor of behavior at pleasure, but it is the ability of self-leadership towards the good. Why to the good? Because the evil is destructive. But just because freedom rests on nature and culture, we can analyse it, and can help people to become more free. The essence is higher, creative information processing, it is a matter of innovations and decisions by rational and moral principles. By the way: the task of physicians is to promote freedom.

In ancient Greece there were three concepts of freedom: first, Eleutheria, freedom from suppression, second, Areté, which means virtue and third Sophrosyne that is prudence or reasonableness of the will. Herakleitos (13) said: Sophrosyne is the most important virtue. Hesiodos, besides Homeros the second early teacher of the Greeks, wrote: Before virtue the gods have set sweat (14). So the Greeks knew that we can and must do something for freedom. In short, it was clear since the ancient times that ethos belongs to freedom of will.

2. Freedom is not an illusion as recently claimed by some (15). That man has freedom of will indeed is easy to see from the following example (16): anyone who seriously denies freedom means to tell truth by this, however, he contradicts himself because without reasoned will and its freedom to invent methods for research there is no truth. It takes creative thinking in order to discover truth. Without the creative abilities of our brain there is for instance an intestinal motion but no reasoned will. At this point scepticists doubt, that there is any truth at all. But on court of law such scepticism does not exculpate an engineer when his bridge breaks down because of bad construction. Not only science, but also technology, medicine, arts, and law are created by means of freedom of the will. There are so many discoveries of facts which converge from different fields of research that fundamental scepticism regarding the ability of man for truth is unrealistic, even if these discoveries are only approximations. Furthermore from disturbances of freedom such as obsessive–compulsive disease one cannot conclude on total lack of freedom in healthy adults.

3. Of course freedom of the will does not mean to jump out of nature. Real freedom is based on nature (17), it is relative, has grades, different domains, it is changeable and yet it is a global ability. Man is more free than an ape, a sober man more free than a drunken, an adult more free than an infant. But a monkey is also more free than a worm. Freedom is based not only on reason, but has a vital basis in blood supply, and it needs information and communication and therefore senses and a motor system. In the realm of life many steps of the evolution were necessary before the freedom of man appeared. For instance an insect that must wait for the sun to warm up is in this domain less free than a mammal with regulated production of heat. Regarding the tendency of nature to select intellectual and creative abilities there are many examples from social insects to the exploratory behavior in young ravens, the use of tools in many species and the learning of social hunting by dolfins.

Wolf Singer and Gerhard Roth (18) erroneously claim that our freedom is an illusion. Under pathological conditions it is true, that there occur illusions of freedom, for instance in mania or in intoxication with LSD. Some intoxicated jump from the balcony because they have the illusion that they are able to fly. Drunkenness causes an illusion of freedom and results in many accidents. The conclusion is that realistic perception of freedom is essential for life (19), and this is true for both self-perception and judgement regarding other's freedom. For instance we are not allowed to give our car key to a drunken friend.

Man has instincts indeed, but he learns in childhood and youth to regulate them by precaution, by postponement, by integration. In this process also the feelings are humanized. Of course man is, even when adult, not completely free, for instance he cannot change his genes; and he displays when different impulses interfere, instinctive actions of displacement behavior; and some need help when trying to give up bad habits.

4. Because freedom is creative it is also dangerous. Homo sapiens invents weapons, he defrauds ingeniously and he has done such terrible deeds as atomic bombing on civil cities. Therefore he needs morals beyond the monkey group order and care for the young, and he must adapt his rules to the changing conditions of culture. Freedom can be learned only by cooperation of the youth and other persons of good will. Man has the task to develop himself as well to help others, because without the care of others he would not be a man. Among the discoveries of Charles Darwin the role of competition for the origin of species is overemphasized. Darwin himself stated in his book on the descent of man that for the becoming of living beings within a species the role of cooperation and mutual help is more important than competition. Unfortunately this point is suppressed in today's discussion. There would not have been a development towards man without cooperation: the evolution of reliable will occurred in social hunting. There are shining examples of helpfulness in all cultures: in the west Herakles and Jesus, in the Far East Konfucius. Egoism is infantile; a mature man is expected to be fair to everybody. It was not a good idea to proclaime egoism as the basis of economy. In short, the evolution of freedom leads to new duties beyond the individual.

5. What is the basis of freedom in man? First of all phylogenesis, when the apes were forced to live in the savannah, they became hunters in groups; this gave an advantage for the survival of reliable individuals in dangerous situations. The apes then needed larger groups and therefore better communication. Language evolved two million years ago in Homo habilis (20); he had a Wernicke area in the temporal lobe. Thus a primitive language was an early step towards Homo sapiens. Homo habilis had only half as much brain as we do, only a little more than apes. Language is important but not the essence of man. The Neanderthals had of course elaborate language, and they even had 200 grams more brain than we do (on average), but after 200 000 years they had the same primitive weapons as before. Although they of course were masters in the use of fire, they did not develop the art of cooking and therefore retained a massive dentition with very strong chewing muscles. The Neanderthals, as far as we know, did not develop arts, while the modern man who came to Europe 40 000 before Chr. had better weapons every 2000 years and created perfect art for instance expressive natural paintings. The difference in creativity probably came from the fact that the modern man had a larger frontal lobe whereas the Neanderthals had a small shallow forehead (21); they had more of brain in the posterior lobes and therefore had probably a good orientation. The climate was not the cause of the difference; it is true that there were cold times, but the Neanderthals had developed in Europe from Homo erectus, thus they were better adapted to the cold than Homo sapiens sapiens who came from Africa.

Secondly, freedom is based on culture, on many discoveries and their tradition, on knowledge, law, morals and many inventions beginning with the mastery of the fire which was the sign of man from the beginning.

Thirdly, however, freedom comes in the individual child and youth from education and learning from experience, partly from examples among family members or teachers, partly however from experimenting and experience with his own will and conscience,

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and this is the factor which is forgotten today. Chimpanzees are able to learn sign language if the teaching starts early in childhood – not word language because they lack the Wernicke area for rapid auditory regulation of the phonemes –, but they never develop language by themselves. By contrast, children without hearing often develop sign language by themselves, without an example (22). Thus, the difference is in creativity. The variance of the great personality factors – such as emotional stability, agreeableness, conscientiousness or openness to experience, in all of which is creative will, comes only to 40 % from heredity, 10–15 % from familiar influences, but on the average almost half comes from something what the psychologists erroneously call ''external factors not shared with the family'' (23). In these factors of cause is the own will of the child and the young; for instance development of intellectual interests, choice of good or bad friends etc. There is no "Nürnberg funnel'' to bring knowledge and ethos into a man without his own will. What is learned and what remains depends on internal motivation and own activity. What the behaviorists wanted with conditioning tends toward a herd-being. Although it is necessary to set limits to bad behavior, indoctrination of freedom is impossible. You can only promote germs of freedom and bring the meaning of freedom to shining by a good example and love; this is socratic education. What happens in this is like a springing spark as described by Platon (24). Free learning is based on interest, on insight, on truth, on trust, on sense. Because of the influence of man upon his own becoming there are the enormous differences of personalities much bigger than in other species. This individuality even influences higher animals, for instance dogs, when they live in company with humans for a longer time. Most people have enough intelligence; intelligence is inherited more than half. The larger differences come from the will: on the one hand the fair, helpful, brave, creative, on the other hand different modes of self-corruption but, of course, also many disadvantaged by disease, lack of education, poisons, some even before birth (25).

6. The behaviorist manifest (26) threw not only will and his freedom away, but also consciousness. This ideology acted behind the fence of three concepts: stimulus, response and adaptation. But consciousness is not an epiphenomenon, it is important. A patient who regains consciousness after a head trauma can compensate many defects by active training. He may recover even from severe aphasia, if he had sung in his youth so that the language came with the melodies in his right hemisphere, he then can reconstruct speech by singing. But if he does not regain consciousness after the trauma, there is no repair even if he stays alive for a long time.

The level of consciousness in the brain is the cerebral cortex. If we have a lesion in the retina, we see it as a dark scotoma; the retina is a part of the brain, and the optic nerve is not a peripheral nerve but a tract of the brain. However, if we have a lesion of the optic cortex, we do not see it. Even if the whole visual cortex is suddenly lost on both sides by a vascular insult and therefore the patient is blind, he does not see it, and it takes days or weeks until he realizes that something is wrong with his vision, but still he cannot see it. The further forward toward the frontal lobe the lesion, the longer the time until the patient gains insight, and with lesions of the prefrontal cortex, the anosognosia often remains permanently (27), what makes therapy much more difficult. Consciousness thus does not live behind the brain but it is produced by the activity of the brain, especially the cortex and it is a very important factor for freedom.

7. But now an important point: in the brain there are two motivation systems, the old one in the hypothalamus (28) and limbic system deep in the brain and the new in the frontal cortex, more specifically in its youngest part, the prefrontal cortex (29). The old motivation system is conservative; in comparison with the monkeys there is little change. But this old system is in a mature man under the leadership of the new so that the drives and feelings are humanized at least in people of good will. An example: Gerhard Roth (30) claims that man is a puppet of the activity of a small nucleus in the limbic system, the amygdala. In monkeys this nucleus is important for the anxious perception of bad voices or furious faces of fellow monkeys. If in an adult rhesus monkey the amygdala is destroyed on both sides, the animal looses fear, becomes more trusty and therefore he is much-liked in the group. But in man after bilateral damage of this nucleus there is almost perfect compensation so that these persons live normal and have normal feelings (31).

The leading function of the frontal cortex is the result of normal becoming of a human personality in an environment with protection in childhood, challenges in youth and responsibility when adult. But in a spoiling social environment the opposite is possible, namely that a demanding limbic system abuses the intelligence of the cortex to become an accomplice for bad deeds. This self corruption to hedonism with intimidation of the conscience may occur in a welfare state as well as under totalitarian pressure.

In the prefrontal cortex there is a division of function (32): creative thinking and planning depends on the cortex on the frontal pole and on the convexity of the frontal lobe, by contrast the conscience depends on the orbital cortex. Unilateral lesions in the frontal lobe are better compensated than left temporal lesions, but bilateral lesions in the prefrontal cortex cause severe defects of behavior, and the feelings become shallow. Extensive bilateral lesions either in the prefrontal cortex or in the sub cortical fibres toward and from it cause changes of personality, reduction of initiative and productive thinking so that the patients often are not able to carry on a self-guided life (33). Lesions of the orbital cortex can change a good person into an unreliable fellow. Of course the prefrontal cortex does his leading activity not alone but by the help of older centers among them the centers for attention in the anterior part of the cingulate gyrus and in the parietal cortex. By the way the intelligence does not depend solely on the frontal lobe; intelligence is correlated with the volume of all association areas (34) of the brain that are those areas of the cortex which are not devoted to primary sensory or motor functions. It is the sum of these association areas that is characteristic for the higher development of the brain in the evolution of mammals. The brain works cooperatively as a whole, but all information is transmitted to the frontal lobe, and the prefrontal cortex has its own information system (35) and influences not only the perception and the motor system but also the selection of events in the stream of consciousness for storage in long-term memory by its influence on the hippocampus (36). The prefrontal cortex also influences – besides the circadian rhythm – the deep nuclei which by transmitters like dopamine, serotonin, noradrenalin and acetylcholine regulate our wakefulness, mood, readiness for learning, etc.

How is it possible that the activity of the prefrontal cortex within the system of the brain makes us more free? Information processing power of the prefrontal cortex and its influence on the rest of the brain we are not in captivity of the drives and of the things anymore. We are able to make models of the world (37), consider them – independent of their presence – from different points of view, change them and check how they fit to the situation and to our perspective, and we use thereby a system of abstract concepts, symbols, principles and theories to reach coherence, meaning and transsubjective understanding. And we can transmit the results of this free thinking to our motivation system making it more free by inhibition of destructive tendencies – lesions of the orbital cortex disinhibit reckless and obscene drives – and by enabling it to earn happiness from good-willed work; of course within limits, we still need sleep, water and so on. The cooperation of the prefrontal cortex gives us exact phantasy, exact because such a complex system as our brain would be lost in absurdities, if our ideas would not be checked on the real world. This holds also for our behavior with persons. We transcend ourselves and have understanding and empathy with our fellow men but also with animals like dogs; this understanding is now called "theory of mind''. The prefrontal

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cortex enables us in the realm of needs, interests, striking perceptions and so on to clear our will, to develop our self, to make decisions and to keep course in view of distractors and self-chosen bindings and values. This leading cortex enables us also to gain insight of ourself, to set goals for our own development and to correct ourself by experience. In this connection we have feelings like regret, shame, sorrow and internal freedom, all of which are not illusions.

8. Because of the activity of the two motivation systems in man there are not only conflicts between drives but also between drives and the longterm goals of the will with well-founded self-binding. Therefore to freedom also belongs that a person when drifting or in conflicts comes to pure terms with himself and his people. Furthermore creativity misleads some to phony behavior.

9. The execution of our decisions belongs also to freedom, thus the ability to willed motor activities. It is more difficult for information systems engineers to build up a good robot automat with smoothly regulated movements and target acquisition than to compose a nice music by a computer. Usually external stimuli play a role for our movements, in this case the task is more simple for the motor cortex since it is an association area of the tactile area (38) which is juxtaposed to it, and it also gets visual and auditory information via premotor fields. But to produce a voluntary movement without all external stimuli is more difficult, and for this an older part of the brain is still necessary, the basal ganglia (39). One can see this in the disturbances of voluntary movements caused by diseases of the basal ganglia such as the Parkinson syndrome or athetosis. In Parkinson's disease there is akinesia: the patients cannot start walking although they don't have paresis and although the motor cortex is intact. In athetosis the patients cannot move the arm which is contracted in a bizarre position although there is no paresis and the motor cortex is intact. But if the athetotic hand is touched by the other hand without pulling, just by skin contact the contracted arm can follow the other hand as with magnetic force: this shows the influence of the tactile cortex on the motor cortex what makes the help of the basal ganglia unnecessary when an external stimulus leads the movement. The command for voluntary movements of man does not come from the basal ganglia which don't have either consciousness nor will, but from the frontal cortex (40), – and this command may precede the movement by several seconds in a variable way, but the electrical signal is small and its occurrence is variable in time so that it cannot easily be averaged and recorded so far. What we can measure regularly is the Bereitschaftspotential (41) (the subject of much discussion today) and in its production the basal ganglia (42) participate together with a fronto-medial area the supplementary motor area (SMA) (43). The Bereitschaftspotential is pretty small too – about 1/100 to 1/10 of the spontaneous alpha-rhythm of the electroencephalogram – but with averaging by means of backward analysis (44), triggered with the beginning of the muscle contraction over many equal simple finger movements we can measure it. After the decision to participate in this experiment the frontal cortex delegates the execution of the series of movements to the basal ganglia. After the slow Bereitschaftpotential another sharp potential (called motor potential) can be recorded from the scalp which is a sign of the firing of the pyramidal cells of the motor cortex whose nerve fibres go directly to the motor neurons of the spinal cord that activate the muscles. This activity of the cortical pyramidal cells – 60 milliseconds before the beginning of the muscle activity of the forearm – is still much smaller than the Bereitschaftspotential, but we can measure it (45) because it is in fixed temporal relation to the start of the movement. The basal ganglia however when after the command of the frontal lobe preparing the movement work much slower than the cortex, they increase the activity slowly in the course of about one second and signal about 200 milliseconds before the movement to the cortical consciousness (46) that they are ready so that it can be checked by the frontomedial SMA whether the time is suitable for the moment. This sequence of events is not in contradiction to freedom, for the movement is initiated by a cortical command and its execution in an acceptable moment of time is again controlled by consciousness. The supervisory function of the SMA regarding the suitable time for movement is underlined by two lesion syndromes of this fronto-medial area: one is a diminished spontaneity of movements, another is a disinhibition of hand movements, the "alien hand" (47) which makes movements initiated by the basal ganglia that appear alien to the patient. When 40 years ago I was searching together with my doctoral student Lüder Deecke for signs of will in the brain (48) – at that time the human person was investigated by the physiologists only as a passive system by external stimuli and recording of evoked cerebral potentials – and when I found the Bereitschaftspotential, it was soon clear to me that this potential can not be the command signal. Therefore I gave him the name Bereitschaftspotential (readiness potential) and this proper term was taken over from the German language into the English (49). You can see with the method of backward analysis, which had to be designed and developed for this discovery, also the effort of the frontal lobe when learning (50) or the delegation of tasks for execution from the frontal lobe to posterior parts of the brain (51) when the experimental situation is asking for this, since the time resolution of electrical or magnetic recording is much better than that of the imaging methods that are based on movement of blood in the vessels.

By the opponents of freedom it is often mentioned that in the cerebral process of volition unconscious events are participating. This argument shows little understanding of the brain since most of the billions of processes in the brain are unconscious. Consciousness requires a high neuronal coordination, and the consciousness is narrow. The flow of information in the peripheral sensory channels has to be condensed by at least about 1:10 000 (52) before reaching consciousness. Thus consciousness can deal only with the most important events. However, the unconscious and the consciousness closely cooperate and consciousness controls the important events, among them always volition. In the large brain with its enormous knowledge stored in memory the initiative for thinking perhaps does not always come from the frontal lobe. The brain sometimes makes suggestions on its own initiative which suddenly come to consciousness as ideas, especially when we have tried before to solve a problem or to remember something, but these events do not come from the absolute unconscious (like discharges in the autonomic nervous system) they are prepared by previous conscious thinking. All this is not a sign of lack of freedom but of the great richness of information processing in the brain. We are when mentally healthy not manipulated by such spontaneity, rather we check what the brain is offering. It is not the condition of normal men but a sign of mental disease if someone looses the freedom to control his thoughts or actions. By the way just the discovery of the Bereitschaftspotential potential in 1964, which was the first physiological sign of will in the brain gave the psychologists the courage to do research again on volition, for between 1945 and 1965 all research on the will ceased (53) because of the influence of Freudism after the Second World War; the research on will is now in full blossom again (54).

10. This is my answer to Gerhard Roth's argument against freedom from the Bereitschaftspotential. Roth is a zoologist who most of the time has worked on salamanders. He claims that the human personality is almost completely programmed at age three (55), that is during a time when no memory on personal events is preserved. This is a grotesque misjudgement about the becoming of man, for the reasonable human will evolves in the child beginning from age three and in the youth under the cooperation of his own conscience, and the will continues to learn throughout life.

Wolf Singer (56) has another argument against freedom, he claims that in the brain there is no location where decisions can be made.

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The neurons, so his opinion, make a thunderstorm and then we do something. But so chaotic is our behavior not. The neurons normally behave well coordinated except in dreams, when they are activated at random from an old brain stem nucleus for training. A neuronal thunderstorm, however, is characteristic for epilepsy. It is probably true that in the brain there are no ''grandmother-neurons'', that means that there is no single nerve cell which is specialized for recognition of our grandmother; the brain works always in a cooperative manner, so that many cells act together in variable combinations. But this is true also for perception as for volition. However, that we have perception has not been doubted even by the sceptics. All higher forms of life would be impossible without perception. Thus the ideas of both of the opponents of freedom are unrealistic, and it is an astonishing sign of disorientation and sensationalism that they are propagated by the media. I would rather like to comment these events with irony and humor if our situation were not so serious.

11. Therefore a last point: we are living in a time of enhanced seduction to hedonism. The consumption of drugs, the alcoholism of women since 1968, the cerebral damage in children before birth due to alcohol and cigarette smoking during pregnancy are increased and consequently the fetal alcohol syndrome and the attention deficit – hyperactivity disorder (57). The consumption of illegal drugs increased in Germany from 1965 to 1971 sixty fold, the high dose alcoholism of woman from 1968 to 1990 more than tenfold (58,59). In addition in the last years came obesity of the children due to lack of movement as well as insulin resistance even before birth due to alcohol, a risk factor for high blood pressure, diabetes and early dementia. A flood of dementia is impending if nothing is done for prevention. And there is a high level of aggression, mobbing and violence among youth and against teachers with all sorts of crime. A similar situation is now in the financial world where reckless rating agencies and investment banking have caused a huge damage to global economy. In this situation indoctrination of general inability for accountability of man is damaging indeed. Man is a potentially noble being who has always to work on his freedom. Today in addition we have to help the developing countries to gain more freedom because freedom is an important factor of development, and this helps to stop devastation of the earth.

There is a lot of talk on prevention but it is difficult to organize it (except for a health levy on alcohol and cigarettes the revenues of which should go to the health system). An example: our most common disease is high blood pressure but we do not feel it and therefore only half of the cases is diagnosed, only half of the diagnosed cases is treated, and only half of the treated cases is sufficiently treated. The method to wait until the patients come to the doctors does not work in this case. To go to the patients to measure their blood pressure without annoying them is difficult. It does work however by means of their children. When in 1978 in Ulm the measurement of blood pressure was introduced into the schools (59), all participants were enthusiastic: the teachers because the children liked this practical method, the children were proud because they found many cases of high blood pressure in their families, also the doctors because they could earlier and more effectively treat the disease. Unfortunately this inexpensive method (it does not need a new bureaucracy) is not yet in general use. Since high blood pressure causes stroke and dementia, prevention preserves freedom.

12. In conclusion, man is born for freedom of the will but he must develop it. This freedom is the highest ability of man, more than speech and intelligence: it is the comprehensive virtue to make life worth living by doing good deeds and finding happiness of meaning. Freedom is never complete, always in danger but we can and must do something for it, among other things by helping one another. There is, independently of the class, a human nobility that comes from long good will. But we should behave worthy of this high gift and not abuse it to ruin the beauty of earth.

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