

Understanding Professionals, Politicians and The Society in The Motorized World – and How To Help Them

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Abstract— The paper is a summary about the paradigm change which is on the way in the motorized society and the related professions today. How the enormous losses of human life from accidents and air pollution as well as the degradation or the urban environment are tolerated gives rise to the question, what is wrong in the related disciplines of transport and urban planning. A brief summary about findings from interdisciplinary research the last five decades describes the way to a better understanding why human behavior has been affected by cars and what chances we have to escape from this “evolutionary trap” of this technological and technical progress. The empirical results of the application of these research findings in many cities are finally listed in a comparison between “positive” and “negative” effects on cities, human societies and cultures and the environment.

Index Terms— Body energy, change in values, environment, human behavior, mobility, parking, theory of evolution, traffic accidents, transport and urban planning, virus-effect.

I. INTRODUCTION

Contradictory to other threats to human life and human health the society is surprisingly tolerant toward road traffic victims. “Every year the lives of approximately 1.25 million people are cut short as a result of a road traffic crash. Between 20 and 50 million more people suffer non-fatal injuries, with many incurring a disability as a result of their injury.” (1) Even more people suffer premature death due to road traffic air pollution (2). “A recent estimate of the health effects of air pollutants from traffic in Austria, France and Switzerland and their related costs, using comparable methods, found that air pollution caused 6% of total mortality in the three countries, or over 40 000 deaths per year. About half of all mortality caused by air pollution was attributed to motorized traffic. This corresponds to about twice the number of deaths due to traffic accidents in these countries. In addition, traffic-related air pollution accounted for: more than 25 000 new cases of chronic bronchitis in adults, more than 290 000 episodes of bronchitis in children, more than 500 000 asthma attacks and more than 16 million person-days of restricted activity. (3)

Road traffic injuries cause considerable economic losses to individuals, their families, and to nations as a whole. These losses arise from the cost of treatment as well as lost productivity for those killed or disabled by their injuries, and for family members who need to take time off work or school

to care for the injured. Road traffic crashes only cost most countries 3% of their gross domestic product (4). Compared to the efforts of governments to stimulate economic growth, it is difficult to understand why they tolerate that tremendous economic loss from road traffic.

From a rational transport and traffic engineering point of view it is totally illogical to prioritize the car against sustainable pedestrians, cyclists and even public transport, concerning efficiency in energy use and resources. For the same purpose of trips, cars use several hundred times more energy and produce more than 20 tons of waste even before they move the first mile. A student of physics cannot pass the examination if the answer to the question to move a person of 80 kg from A to B would be: “Take a vehicle of 2 tons and burn hundred times more kcal of precious not renewable fossil fuel”. But it is obvious that this kind of basic scientific and engineering logic is not present in the road traffic system of today.

II. RIFT IN PROFESSIONAL HISTORICAL EXPERIENCES

For millennia the society, the master builders, architects and urban planners have developed villages and cities on a human scale and public space for social, economic and cultural activities as a safe environment for residents and visitors. With the invention of (heavy) railways much more space was needed for the railway stations and marshalling yards and storehouses in the 19th century. Therefore this infrastructure was situated mainly outside of the historical cities. (There are some exceptions especially in colonial cities). In the existing cities engineers were able to integrate the upcoming electric tramlines with innovative ideas and smart solutions. With these modes urban growth was possible along rail based public transport lines. The secret for this success story is the fact, that the space per person necessary for mobility don't differ so much between pedestrians, cyclists and public transport users (about 1 m² for pedestrians and about 9 m² for public transport users moving with 50 km/h). These three traffic modes are agreeable for sustainable mobility in cities of human scale. Cars need more than 10 square meters only for parking and more than 100 m² on the road, driven with 50 km/h. Why have Architects and urban planners not recognized this dramatic change of scale in the public space? They were so fascinated by technological progress that they wanted to design “The city of tomorrow” (5) around the needs of cars and car users. They wanted to replace the urban density of historical cities which they called the “European chaos” like Le Corbusier, the leading architect

of that time, by disperse open urban structures and spatial separation of urban function to provide a healthy environment for the people. A network of modern transport systems should connect living areas with working, recreation and the city center. The human scale from the previous 10.000 years of urban development was lost in urban planning since then.

III. RIFT IN THE SYSTEM OF VALUES OF SOCIETY AND RATIONALITY OF PROFESSIONALS

If we consider the actions and not the declarations of our society, she has changed the hierarchy of her value system in few decades as never before. Killing people with cars on the road was not seen as a crime, it was an “accident”, an unintended injury. Polluting the air with poisonous gases and particles from car traffic and noise levels in urban areas dangerous to health were subordinated under comfort needs of car users. Precious public space was occupied by car owners for parking. Restricting mobility for nonmotorized users of public space in order to give car traffic free flow became very soon not only normal, but also part of the new traffic regulations.

Was this fundamental change of thinking and acting only the effect of general enthusiasm for the new technologies, which promised a better life? If this would be the case, why have rational thinking people, like scientists or engineers not recognized the tremendous changes in the transport system concerning use of resources, energy and space? Quantifiable basic indicators of their daily work! Very late epidemiological studies on the effects of modern road traffic on human health were launched, when this transport system was already established nearly everywhere on the globe. Why was the Red Flag Act (6) from 1865 abolished in 1896 and replaced by the Motor Car Act (7) 1903? The speed limit for motor vehicles in urban areas was enhanced from 2 mph first to 14 mph and finally to 30 mph. This speed level is outside of human evolutionary mobility experience.

The technical transport system of today is not a natural phenomenon, it is an artificial system: the vehicles, the roads, the laws and regulations etc. are manmade structures, like most of all artifacts. These structures influence human behavior, obviously in an undesirable manner. It seems that the motorized society continuously produce more problem instead of mitigate or solve them. Why are all the measures of transport scientist and traffic engineers to solve these problems not successful or generate even more problems? What is the background of the core disciplines in the transport system, the so called paradigm of their activities?

IV. CORE -HYPOTHESES OF TRADITIONAL TRANSPORT SCIENCE

Traditional transport and traffic professional have built their hypotheses on direct observable data and their personal experience with the new transport system, which enabled nearly effortless movement with speeds, a man can never achieve. They carried out (car-) traffic count, which show a continuous growth in the 20th century. Based on this background the pillar “Growth of Mobility” (the first core hypotheses) was erected and never questioned. To satisfy this “mobility needs” more road, expressways and motorways and

other transport infrastructures have to be built to provide the society with a modern transport system.

Based on individual experience by moving or driving faster, the second pillar (one of the core hypotheses) was erected: “Travel speed save travel time”, the second core hypotheses of traditional transport sciences. This is the benefit of fast transport systems, the time saved can be used for other purposes. Travel time saving by moving faster is the core variable to calculate the benefits for investments for fast transport systems. It is the justification for continuous investments into existing roads, to widen or remove bottlenecks, if congestions occur.

Due to the extraordinary benefits of car traffic, the third hypothesis has to be respected “Freedom of Modal Choice”, which basically was interpreted as: “no obstacles to car traffic”. For practitioners this was translated as “car traffic must have access to everything, everywhere at any time”. These are the three pillars on which planners, engineers and politicians have planned the transport and urban systems of the 20th century. The huge amount of space and energy needed for this system received no consideration for a long time. The fun and the obvious benefits of this new individual traffic mode were so convincingly, that the society blindly followed the ideas of the highly respected transport experts, as the author has experiences this personally in the early 1960ies.

V. THE ROLE OF MAN IN THIS SYSTEM – FIRST FINDINGS

This was the time, when I asked the simple question “What is the proper lane width for roads?” The “standard lane width” for national roads and motorways was 3.75 m at this time. Cars were between 1.6 an 1.9 m wide, trucks maximal 2.5 m. What is the reason for this oversizing of carriageways? A scientific answer for this question could not be found in the literature at this time. Only road design standards from different countries were available, which have been copied from each other more or less. The solution and the answer for this question were found as a byproduct of a research project about “Effects of different road markings on driver behavior” (8). But the solution was far away from the fields of traffic and also far away from engineering also. To drive on a rather narrow lane with high speed the driver must have the physiological “equipment” to recognize the deviation from this lane very quick and correct this deviation before leaving the edge of the lane. The rational level in the neocortex of the brain is much too slow and to energy-consuming. A faster and more efficient “computer” in much older levels of our evolution of our brain is necessary to solve this problem subconsciously (9). By solving this problem, the lane width, a design element, which gives continuous information to the drivers, can now be chosen in agreement with the speed limit stated. Lanes in existing road standards are much too wide and induce speeding. Car users are encouraged (misled) by the road infrastructure to drive faster than the speed limits allow. But as in other disciplines, research results contradicting dominating practice, are not accepted soon. Decades later, under the pressure of environmental action groups, traffic engineers began to rewrite their beloved design standards. Not because they understood the internal mechanisms of human behavior in the artificial environment

they are planning, building and operating, but under the pressure from public and financial constraints.

VI. EMPIRICAL FACTS

Household surveys in the 1960s and 1970s in which trips of all modes were registered showed a rather constant average number of trips per person per day. Nowhere a “growth of mobility” was observed so far. Pedestrian, cycle and trips with public transport were only replaced by car trips. The hypotheses of continuous growth of mobility simply don't exist. This is obvious, if we understand that every trip has the purpose to compensate the local deficit at the destination. Local deficits are the cause for physical mobility. Since the number of purposes in the society is constant, the number of trips is a constant too. The analysis of these surveys showed also, that the travel time does not differ between different modes. Not only the average travel time per day is a constant but also the travel time distributions in the system. Later international comparison of surveys proved the fact of constant travel time globally (10) (behind the indicator “travel time” is a much deeper cause: body energy for mobility (11). Two pillars of traditional transport science and transport policy have been factual errors. They don't exist at all, if we analyze the transport system with scientific methods. But the professionals in the transport sector, as well as the scientist, simply ignore that facts and justify their activities with “personal experiences” from a system for which they have no evolutionary experience at all.

VII. SCIENTIFIC FINDINGS OUTSIDE THE FRAME OF TRADITIONAL DISCIPLINES

In 1975 Walther (12) published his analysis of travel time perception between pedestrians and public transport users, which showed an exponential overestimation of time with increasing walk-distance to public transport stops. The reciprocal is a negative exponential function which he called “acceptance”. This function was already known from the discovery of the “language of bees” by Karl von Frisch (13). I had now two – mathematical identical – functions, one from bees in a natural environment and one from people in an artificial man-made environment (14). If a mathematician sees the exponential function, he knows that the inverse function must be the natural logarithm. This function is known, if we consider human behavior, which was observed by Walther and later on in Vienna, in psychology. Strictly speaking in psychophysiology as it was established in the 19th century by Weber and Fechner, the so called Weber-Fechner-law (15), from 1871. But what is the cause for that nearly identical behavior in two totally different systems. If we follow Riedl's evolutionary epistemology (16) we can expect a common cause for this behavior, a homology. And in fact, the cause for bee-behavior regarding distance, was not the information about distance, it was the info about need of energy to cover the distance to the feeding place. Now it was easy to find the cause for human behavior in the artificial man-made system: it must be the body energy (17).

VIII. UNDERSTANDING WHY THIS COULD HAPPEN

Why this story? It is important to understand the difference

between reality and the hypothesis of stated “freedom of modal choice”. People choose in general always the mode which promises the greatest benefits for the lowest effort. In our terms the greatest benefits for the lowest amount of precious body energy. And the car is in this respect the greatest miracle. Compared to pedestrians, car drivers save more than 50% of body energy per time unit, but can move with a speed, unimaginable in the whole history of mankind before. This all happens in a convenient, protected and fashionable vehicle, respected and admired by others. Most of these effects are deep rooted in subconscious levels. The car is not only a technical artifact outside of the man, it causes effects in the oldest level of the evolution of human beings: the level which decide about body energy. The car is the fascinating invention, good for the brain and belly and for the heart. Its workload for mobility decreased substantially although the brain perceives simultaneously a movement much faster than a man can run. This has fundamental positive effects on feeling and behavior. It changes the system of human values, properties gained in the human evolution much later. Social commitments, important for the society, the health of people, the human scale city, the local shops, children, clean and healthy air are subordinated to one overarching aim: getting motor vehicles and provide life space for them, where they can rest – parking – and where they can move fast and convenient. The roads in villages and cities were converted into carriageways. “Better life for people” turns into “better life for cars”. The car-society began to transform the cities for people into agglomerations for car users.

Institutes were established at universities to produce experts in relevant disciplines, from engineering to justice, to convert nature into carriageways and motorways and normal human social behavior into the rules of road traffic regulations in which car traffic have advantages in relation to all other users of public space. Car users got free space for parking, or very cheap subsidized parking fees, garages have to be built at every human activity (18). Car owners and car users are heavily subsidized by the society with tax reductions, investments for infrastructure, subsidized price for gasoline etc. All this is coming from inside of the brain of people and welcomed by politicians and the society. Cars have level crossings, people as pedestrians, have to climb up and down from sidewalks. It is obvious that the car has taken the control over thinking and acting of the society, the experts and scientists. This has become the normal rationality of the traffic related disciplines. And what is in the brain, finally comes out of it and design, with the help of hands and engines – and fossil fuel - the new environment for the society.

IX. AN EFFECT ON PROFESSIONALS, DECISION MAKERS AND THE SOCIETY LIKE A VIRUS ON A BODY-CELL

This behavioral change of humans and the human society reminds on the effect of viruses on body cells. In both cases the affected entity changes its behavior from normal into one, which follow the needs of the virus – in our case the needs of the cars. When viruses get control over body cells, they “convince” the body cell to reproduce the virus RNA instead the DNA for the healthy body. The car, as explained before,

became a virus for the human society. (19) More of the household budget is spent for cars than for children (20). “Life space” for cars is more important for parents than a safe environment for children. Sufficient space for parking cars is regulated by law, but there are no regulations to provide children’s rooms. Windows must be kept closed at night time, due to traffic noise levels in cities, if air pollution exceeds permissible limits, people are advised to stay in closed rooms, instead to stop the cause of pollution: car traffic. These are just some few examples of this strange behavior of our motorized societies. The “outside structure” of cars has fundamental effect on the “inside structure” of people and the society, especially on the mental and cognitive one. The car generates a cognitive impairment for the individual, the scientist and the society as a whole due to the feedback between the effects on body energy and the effects of fossil energy in the engine.

When this happens the car becomes a part of the human body and has to be protected like the body itself. If there are problems, the solutions must be found somewhere outside. Therefore the related disciplines are searching for solutions, where they recognize the problems. Problems are obvious, where traffic flow is interrupted and congestion appear and where is not sufficient space for parking cars, since every origin and destination of a trip must be accessible with the car. None of the relevant disciplines have ever been educated about the “human nature” and the evolutionary preconditions – and constrains – of man. The man was and is a blind spot under these aspects. All disciplines in the transport sectors are seeking for solutions of the problems on the visible symptoms and not on the hidden causes (21). The cause is the enormous power of the binding effect between man and the motor vehicle. It is a physical effect, which cannot be dissolved by psychological or mental measures for the system users, under the prevailing physical, financial and legal structures.

X. LEARNING FROM MEDICAL SCIENCE

If we would apply the judgment from medical science, which exclude a body cell as a part of the body if it is docked by a virus, the car user excludes himself from the “body of human society”. This sounds as a very hard judgment for social sciences. But if we consider the situation in a rational manner, it is not wrong. The difference between humans and car users for such an assessment is big enough of most indicators: fifty to hundred times more space, several hundred times more energy for mobility, danger, air pollution and noise for the environment, damage of villages and cities from in- and outside, mutual support of corporations instead benefits for local social integrated economic activities and no encounter between pedestrian and car users on the same eye level. This is only a selection of facts, ignored by the related disciplines.

XI. THE WAY TO THE SOLUTION

A physical cause can only be treated by physical measures. The treatment can only be successful, if docking of cars at human activities can be inhibited absolutely. It is the same principle like the successful treatment of virus-caused diseases. This treatment cannot be ceded to the individual cell as well as to the individual people. Transport and all relating problems need a treatment at the cause: the organization of

parking. This is the position, where the car docks to the men, like a virus to the body cell. The binding power decreases exponentially (22) with increasing distance (23) between the position of human activities and the car park. Traffic flow problems are only symptoms of the defects of parking regulations. Therefore no sustainable solution can be found, by treating only traffic flows. It is too late, too painful for the car user society and ineffective also.

The practical application is the rewriting of building and land-use codes: car-parking places have to be separated totally from human activities physically, financially and organizational. In principle, private cars have to be parked outside of human villages and outside of cities for people, in garages of parking places. Exceptions are only for physical handicapped people. But as well as for all other (medical) treatment strategies, measures for the transition period are necessary. In our case a tax has to be established for “parking in places which are harmful for the society and the environment”. The tax is high within 250 m around the location of human activities and its amount is decreasing with the greater distance between local activity and the parking places. This money has to be used to restructure the human scale of villages and cities,

By implementing these measures in combination with measures for sustainable modes, pedestrians, cyclists and public transport people become free from the car-addiction as it can be proved in many cities today. The success-story of the city of Vienna, becoming number 1 globally in “Quality of Life” (24) has very much to do with the implementation of these principles since four decades.

XII. EFFECTS OF THE “THERAPY”

The implementation these principles show the positive effects:

- In areas without private car parking the public space is free of danger for life and health.
- The public space becomes a meeting place for people and safe mobility and a play ground for children.
- An opportunity for highly qualified planners and engineers as well as for politicians with a sense of responsibility for the society, the environment and the future.
- Great parts of sealed surface can be converted into green space for urban gardening or trees to improve local climate.
- Window can now be opened to the streets, which enhance the security of the society, since many eyes have a look on the public space. People feel responsible for their neighborhood, as it was for millennia of human settlements. This strengthens the social cohesion.
- Delivery service is much easier if no private cars block the necessary space.
- Due to the fact, that travel time is constant, the much lower pedestrian speed “capture” more time in the neighborhood. More destinations and a bigger variety of activities become accessible in a walking distance.
- The road space can be converted into a space for living, working, shops and recreation, as place for informal contacts in which children can grow up in a social environment. A lot of learning by doing will be possible which is suppressed today.
- There are lesser obstacles for emergency or fire brigade vehicles in such an environment.
- This environment is handicapped accessible for everybody.

- Public transport becomes the customers for which it is designed and managed.
- Municipalities can save a lot of money, for construction, management and operation of the car-system used today. On the other hand more tax is gained from the increasing number of local economic activities, which are now much more tied to the local people and their needs. This effect can be seen where a city has implemented this measures already (25).
- Cost for the (adverse effects of prevailing) transport system decline for individuals and the society.
- And finally: this system has been successful tested for more than 10.000 years and is the base of human cultures and urban societies.
“Negative effects or obstructions” of the structural change in parking management are:
- More inconvenience for car users.
- Less accessibility for shopping centers outside of the city.
- A challenge for urban planners and municipal administrations.
- A big challenge for architects and land-use planners.
- A big challenge for intelligent transport and traffic solutions.
- Less profit for real estate speculations.
- Less sold cars.
- Less need for road construction.
- Devaluation of locations in areas of urban-sprawl.
- Economy of scale for some products is restricted to regions.
- People have to walk longer distances.
- More dependency on neighborhood.

XIII. WHAT ABOUT “ELECTRIC MOBILITY”?

First of all, walking, cycling and most forms of public transport like rail or tram are electric mobility, as well as mental mobility. The only advantage of electric vehicles is less air pollution. Electric powered cars, like the Tesla car, need the same space for parking and moving, endanger in the same way like fossil energy powered vehicles. And finally the life-cycle analysis of electric vehicles is not much better than for traditional vehicles. There is no reason for privilege concerning parking regulations. They also have to be parked outside of human settlements.

XIV. IS THIS A STEP BACKWARDS, A KIND OF NOSTALGIA?

Concerning the effects of the common car traffic on mankind and environment, it is after all a big jump forward toward a sustainable future and a big challenge for innovation in urban development, cultural variety and social cooperation. Like in the natural evolution which don't discard reliable solution, this “therapy” is following the same principles to escape from the dead end of a once promising progress. This is not unusual in natural evolution, in which the majority of attempts end in a similar manner. There is of course some restriction of external powered physical mobility. But on the other hand it is a challenge for more mental mobility, due to the fundamental relationship between these two kinds of mobility: Physical mobility, times mental mobility, is a constant (26). Or the popular saying: “Those who can't use their head must use their back” or “Use your head to save your heels”.

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1959-1963 Studies at the Technical University of Vienna

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