

3.4 Knowledge - Action - Learning

In the preceding chapters the importance of the steering factors economy (**money**) and politics (**power**) for development have been analysed. Here we must discuss now the rather weak, but probably decisive factor for development: **knowledge**. Consensus and acceptability are especially important under tribal settings, where consensus has to be reached through convincing arguments - and is getting increasingly important in all democracies where people (should) participate in decisions that determine the development of the society. Nowadays it is economy that dominates development. What concerns development projects, we do not have to go deeper into problems of awareness and ethics as "responsibility", "justice" ...), as long as we deal with projects that can be motivated economically, that "make money". The present experience and attitude is: "If it pays it works, if you don't get out more than you put in, forget it." Things one can make money with can be done easily. Progress and development is considered as an "automatic" and positive by-product of the competitive strive. But - if we deal with the needed care for the natural and social environment, more and more under pressure from the economic development, we can't do without.

The big problem we have to deal with from now on is the problem of restrictions. With the narrowing of the limits that are set by nature, the factors of responsibility, justice and prudence get decisive.

3.4.1 The contributions of science

The "roots" of analytical science are to be found in the Greek culture. *"Without the analytical habit which had been kept alive by Euclid's Elements and Aristotle's writings, Kepler, Galileo, and Newton, as well as all the great men of science that came later, would have had to join the Sino-Indians in contemplative and casual observation of nature. To the extent to which we may turn history around in thought, we may reason that without the peculiar love the Greeks had for Understanding, our knowledge would not by far have reached its present level; nor would modern civilization be what it is today. For better or for worse, we have not yet discovered one single problem of Understanding, that the Greek philosophers did not formulate."* [after Georgescu-Roegen p. 38:] Unluckily we have to add, that most of the really vital problems, already formulated by the Greek, have not been solved. Especially the question, how societies develop or should develop and how the individual should act. Those questions, for development the most important ones, can't be tackled by causal analysis, as there are no other societies or planets where similar processes might be observed.

On one side, science proofed the most effective way in problem solving, on the other side, "causal research" is very limited, what was in fact the topic of the foregoing chapters: *"To the same extent as the interest for a better society, that had ruled the Age of Enlightenment, was replaced by the strive to sub-*

stantiate the eternity of the present one, a retarding and disorganising element came into science. [...]. The obstruction of science against an adequate treatment of problems connected with the social process, led to a levelling of methodology and content ... " [Max Horkheimer: *Bemerkungen über Wissenschaft und Krise*. In *Zeitschrift für Sozialforschung*, Jg. 1(1932), S. 3:]. Quantification and mathematisation of science is valued as "quality mark", as a measure and classification of the "scientific character" of disciplines and studies - on the other side the effects of exclusion, the increasing remoteness to reality are known [s. Myrdal in Piper p. 232:].

If economic, as well as other scientific theories, have to be of some use for development, those artificial borders and limits established by science and its disciplines have to be redrawn or overcome. For Leontief, who used mathematics, the lingua franca of economic science, extensively himself, it is masking too much, especially in its theoretical approaches. He recommends to submit again to the scientific postulates of Francis Bacon: Observe, measure, explain and test" [Piper p. 244:], instead of hiding volatile cognition behind impressive walls of algebraic signs.

For Edgar Salin, who based his holistic thinking on the humanists, Plato and the Greek, it was clear that the neoclassical theory, due to its premises, can only produce partial insights. Galbraith, even more explicit: "*I do not think that someone who is only economist and excludes social and political thoughts, is of any meaning for the real world.*" [ibid p. 286:] Even on the purely scientific base those restrictions have been criticised as leading to errors and misfitting theories: "*For it is precisely in the realm of that large part of social reality, which is left outside the economic analysis by the abstraction from "the non-economic factors", that the equilibrium assumption falls to the ground.* [Myrdal in Pieper p. 10:] Myrdal hopes that the young economists of developing countries "have the courage to throw away large structures of meaningless, irrelevant and sometimes blatantly inadequate doctrines and theoretical approaches, and to start their thinking afresh from a study of their own needs and problems. Instead of chewing over our old doctrines and doctrinal controversies, many of them a hundred years old or more, ..." Otherwise they will not be able to solve the problem of "satisfying the demands of the destitute masses." [Piper p. 101 f.]

The Greek established a belief, and with it a culture, of thinking in terms of non-divine causes. Causal analysis needs clear definitions and the delimitation of its object. Without analytical boundary there is no analytical process.

An other decisive testmark of scientific quality is the verifiability, or "post-Popper", rather the possibility of falsification.

But - the expansion of this way of thinking accumulates real-world-problems in all areas excluded from "scientific" thinking. Especially in the case of economics we might say: **The problems with economics - as, in fact, with any science - are the problems it excludes.**

In addition there is the problem of how to synthesise this fragmentary knowledge: "Is it not already true - at least in the field of economics, that practically no synthetic work has been achieved with the thousands of Ph.D. dissertations which, since the advent of the computer centers, have dealt with still another particular? It is hard to see how even an Adam Smith or a Karl Marx could find their way in such a jungle of so-called analysed facts." [Georgescu-Roegen p. 29:]

Dialectical argumentation on aims and values does not find its place under this umbrella. The disciplinary science's are limited, restrictive, selective, not integrated, hedged and hedging. Take the two extremes:

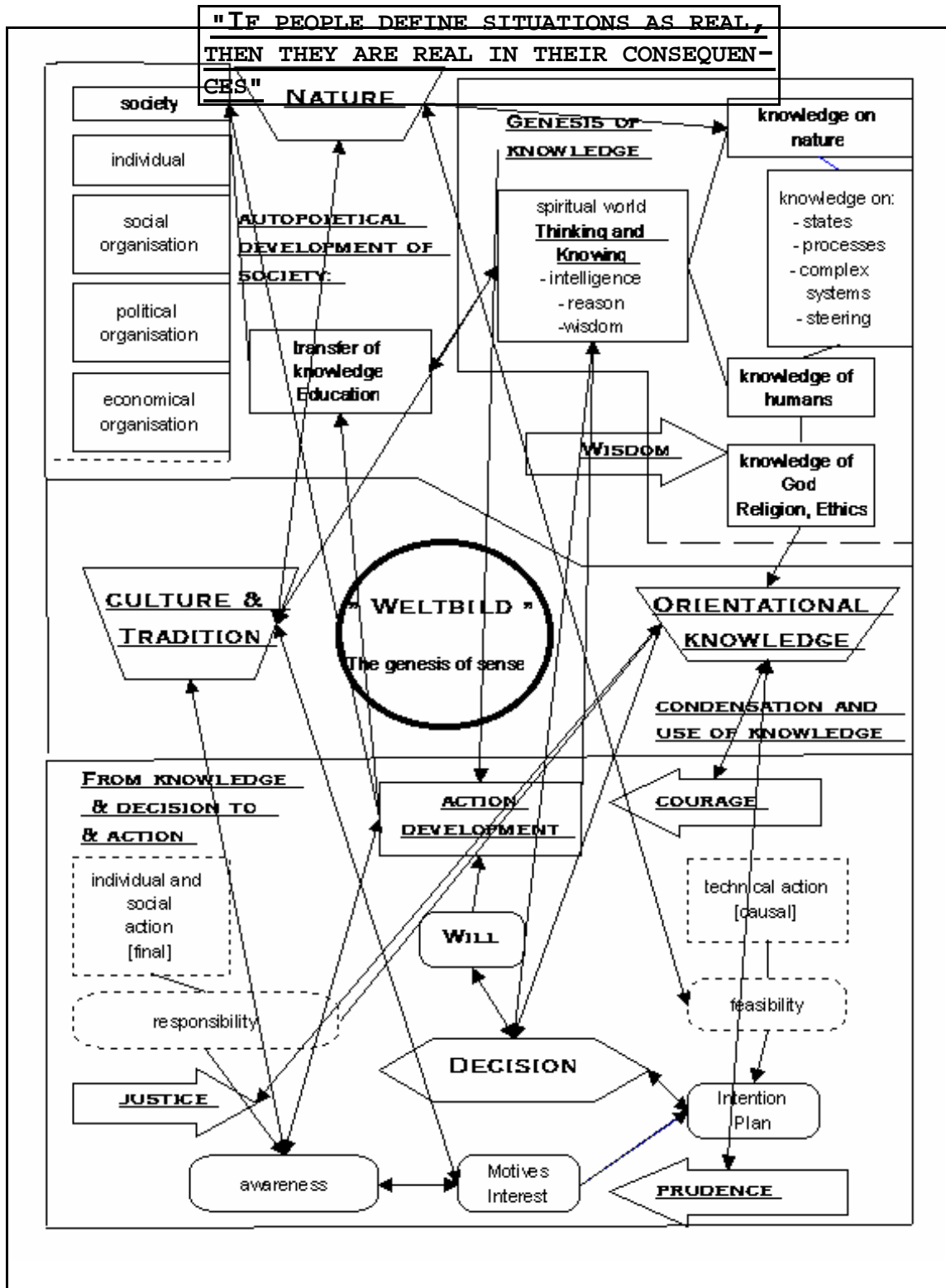
- Economists do economy, teach it, live from it, propagate it and promise, that if we use the right method, it will show the promised result: growth and progress.
- Ecologists do ecology, teach it, live from it, propagate it and preach, that we have to change the ways we deal with nature.

The "scientific results" of those disciplines are used directly for party, so power-politics. That produces only "opposition", but no "useful" results, that means results, that are in the interest of society, and to a consensus on how to adapt to the conditions set by nature.

There are very few outsiders trying to reunite those disciplines. For Georgescu-Roegen the capacity for the dialectical approach is the factor making the difference between computers and the human brain: "*Thinking, even mathematical thinking, would come to a standstill if confined to self-identical notions. ... Infinitely continuous qualities, dialectical penumbras over relations and ideas, a halo of varying brightness and contour, this is thought. ... The reason why no computer can imitate the working of the human brain is that thought is a never ending process of Change which, as I endeavoured to show in this chapter, is in essence dialectical. The arithmomorphic structure of any computer, on the other hand, is as inert in relation to novelty and Change as number itself. Without the dialectical nature of thought no association of ideas, let alone the emergence of novel ones, would be possible.*" [ibid p. 90:]

This, what I call "useful result", better its lack, is an other problem of reductionism. The Greek were obsessed with the question **WHY** - but when logics and science married, the other "**WHY**" - going beyond the logical **causa formalis** - the **causa efficiens** was lost. So science in its western form does not produce motives needed to induce behavioural changes. But such motives would be the only means and end of environmental awareness raising and education targeting sustainable development.

The integral, holistic knowledge contained in the traditional "Weltbilder" is important for development. They contain the condensed sense, the essence of the local social, political and economic experience. They determine the fields of awareness, motives and values, that means that they, and not the scientific recommendations (!), are the true base for decisions - what means that they are guiding development! If we take the Thomas-Theorem seriously -



- we will need a different approach to development sciences and put more weight on the search for the factors that are really decisive for action. The definition of reason makes clear, that reasonable action is going beyond intelligence and requests the knowledge of local values - that may differ from place to place; and it requests the acceptance of transcendental "presentiments".

Def. **Reason** we call the spiritual capacity, activity of human beings, as far as it is not only directed, as the intelligence, towards causal, discursive cognition, but towards cognition of values, towards the universal interrelation of things and all events and towards a purposeful activity inside this interrelation. The drive, to grasp the world by r. and to organise it following the r. is called - rationalism; metaphysical r. is the belief in a r. in the world-events "the whole of the higher cognition": r. is besides the sensual perception the other of the two stems of our cognition. It is the capacity of (system.) principles; as such it produces the three transcendental ideas soul, world, God, is the capacity, either to judge after principles (theoretical r.) or to act (practical r.). The principle of r. in its logical use is such, as to find to the conditioned cognition of understanding the unconditioned. After Anaxagoras and Aristotle had found the term of r. (greek - NOUS), the Stoa assumed a "world-r.", considered as identical with the regularity of nature. Hegel made the r. to the world-principle: the real (identical with the spirit) is the existing r.: "What is reasonable, that is real, and what is real, that is reasonable." ... The r. is the spiritual organ that receives the invisible, transcendental, divine; - presentiment. After Fichte, who is pleading for an ethical term of r., the "common rule of r." "is the only last purpose, that a reasonable being may impose to himself." This r.-belief was already postulated by the enlightenment."

The objective of development is to solve problems, mainly social problems. The solution of the problem is important, action is needed and methodology is secondary. Knowledge, be it scientific or not, is only needed and useful if it leads to changed behaviour or to true action.

3.4.2 Action

For Karl Jaspers action is an other "way of thinking", that completes the scientific, installing (administration, organisation) and working thought.

def: **Action** [Philosophisches Wörterbuch:]: *Action, each activity of the human being, in which his organism takes part and for what he feels responsible (difference to reflexive movements). While with each thing something can be done, action has the special accent, that the weight of the ethical lays upon it. (Nic Hartmann, ...). Action is always expression of the man as a whole, even if action often can be separated from automatism only with difficulty or not at all. The feeling of spontaneity of action rests in the security, that action is not determined by external stimulus alone, but influenced as well by thought. The action is a phenomenon of freedom of will (- freedom) and aim-oriented doing. In the actual anthropology the opinion has been expressed, that the human is not really the thinking being, but rather the acting. ...*

Development is action, even research is action - but both are most often excluding from the discussion the basic factors that lead to action. Science and development are molded by interests, intentions and motives. The closer scientific or diagnostic recommendations get to action, the stronger is the influence of non-scientific, practical and political factors.

The fact that development can be scientifically studied (ex post) - but (ex ante) not or only with difficulty planned and executed - is grounded in the fact that human action is free, that there is a diversity of potentials and choices, alternatives for development:

Def. **Contingency**: *relates to the alternatives of behaviour in a specific situation contained in a system. It describes the level of degrees of freedom in the steering of behaviour: how far a system can behave in one way, but as well different. Each psychological or social system experiences contingency of other systems as a problem of lacking security of expectation; the proper contingency in comparison is experienced as degrees of freedom and elbow-room for alternatives.*

Contingency, alternative behaviour, is the space for democracy. But contingency does not mean that there are no "hints" available to detect the right and good development. The individual and social decisions, as selection among alternatives, has to take values into consideration. The diagram represents the four classical virtues of Aristotle:

| | | |
|-------------------|---|-----------------|
| <u>andreia</u> | = | <u>courage</u> |
| <u>sophrosyne</u> | = | <u>prudence</u> |
| <u>dikaiosyne</u> | = | <u>justice</u> |
| <u>phronesis</u> | = | <u>wisdom</u> |

A development research that insists on proper "scientific methods" while neglecting the factors that determine action and aims - is useless. The present

approaches in development suffer from the restriction of thinking and potential solutions to technocratic and economic approaches.

3.4.3 The Dominance of the Scientific-Technical, Economic-Functional Thinking on Science and Training.

If recommendations of development organisations are not executed by the developing countries, if projects fail, the argument is often: "Lack of awareness, lack of will". But if the problem of execution is looked at from the point of view of the "developed", things look different. Scientifically grounded recommendations assume a direct and intelligible connection between causality, the technical recommendation and action. Their secondary criteria are limited to technical and economical feasibility.

Def: Technique (greek. *tekne*, art, work of art), the way to carry through, to reach, to work out something, in a general sense the human activities, as far as they intend to adapt the encountered, given, to the human needs and wishes. Craftiness, creativity, natural science, knowledge, understanding are the preconditions of t., securing, rising, refinement of the human existence was its aim. The processes were during thousands of years craft and empiricism, in the 19th century it turned to be increasingly scientific-rational, especially after the detection of the power-machines. Since then the problem of t. and culture rose, that only revealed itself in its whole extent in the 20th century. Out of the spread of t. in all countries of the world and the following changes of the ways of work, the society and the human lifestyle (industrialised society, industrialisation) far reaching consequences resulted, of which the most important are: The turn from faith and the "irrational" to "knowledge", aim-oriented thinking, rationalism, exact calculation and testing, economy in the use of the means of production; enormous mining of raw material; overproduction, increase of wants; intensification of individual freedom in the physical sense while in the same time relevant decrease in the sense of personal values (-estrangement). That means under simultaneous mechanisation of the community; it resulted a totally new experience of space and time, thinking in worldwide spaces and duties, for who finally the world gets too small and narrow; turn from a holistic work approach, demanding the whole person, to a rationalised and mechanised specialisation; valuation of cultural level unjustly only after the measure of technical progress. Through this on the other hand the traditional cultural values have been impaired, especially religion, nationality, contemplativity on the whole; as well because the increased t. for different reasons was followed by the heaviest economic crisis, that shook not only the European world at the base. Especially since the end of the Second World War, t. is seen with distrust and fear by European cultural critics. The endured horrors of the air war and the possibly imminent ones of the nuclear bomb make the t. look as a power hostile to life, which evades the mastering by man more and more and reaches an independence threatening for human life (...). More and more often

t. is called demonic and apocalyptic. Through this the existential - fear as basic of the being is confirmed and gets new support, so that it can be called by A. Künzli "the occidental sickness". Such thoughts are refused by the admirers of technical progress as meaningless and romantic. The endangering of the personality by t. can't be denied. As each one producing or using ('attend', in the right way) machines, instruments and technical installations has to submit to the discipline, that is the precondition of the usability (directions for use, operating instructions, traffic laws, regulations to avoid accidents and damages during use). The producers and users of techn. things are members of a collective, that enforces this discipline; in their thinking, feeling and wanting they are largely determined by it and its causal-mechanical "Weltbild". Wide ranges of the civilised humanity are on the way to turn into functionaries of the technical collective, to get stunted in their humanity and to be eliminated as carriers and augmenters of cultural values. This insight is increasingly spreading and goes together with a critical attitude towards technical progress.

Those comments on technique are critical. The classical term *tekne* was much closer to the idea of Islamic sciences. Aristotle defined in his *nicomachian ethics* **tekne** as an art, not only as an experience and routine, as knowledgeable action that does not only know the causal what and how, but includes the final why, the aims. Tekne was cultivating, Care-Ful, wholistic - not only productive and efficient. The modern technology emphasises causal, material, productive functionality and efficiency. It submits all action under the laws of economy, demanding the highest efficiency, the biggest use with lowest possible input. "Operationalisation" under those fragmentary rules has a heavy impact on our society with negative side-effects that even threaten democracy.

The link between technique and the social world is fading away. The cognitive aspects have a very limited base as well, 'only' natural science, knowledge and insight is needed, while the value oriented reason and wisdom are lacking. The actual connection between science and technique creates its own values and aims. This leads to the fact, that application of technique is done on the base of technical **feasibility** and reliability. Application of research goes from the laboratory direct into the open space of social life! [s. Anderegg:] The objectivity of scientific results gives the technical application (engineering is so often functional behaviour and **not** action) a seemingly preferential quality, enhanced by the fact that cognitive contingency has been excluded by (ad hoc) definitions.

Those aims defined above, > securing, rising, refinement of the human existence < look rather high flying, as the basics of technique don't include any value-orientation. Securing the human existence is in fact a political objective, the refinement of the human existence clearly an ethical one; except if we identify values in hard currency, as it has happened in the West.

What can be seen already here, is the need for the engineer to proceed from a natural-science-based technology towards a more human-action-oriented engineering. The 'hard', scientific base

of engineering is not sufficient - the actions as such as well as the social impact of engineering will have to be assessed more critically.

The terms *poiesis* and *praxis* are helpful in working out the difference between an action oriented development and a rather automatised "strive for progress", representing more a "behaviour" than an action [Eder p. 306]: "Poiesis is determined by the purpose to enlarge the cognitive capacities in the adaptation to nature. The principle of this evolution is the increase of knowledge and power over the environment of the society. Praxis is caused by the purpose to define the purposes of poiesis, to give a cultural orientation to the social evolution. The principle of this evolution is the increase of forms of communicatory understanding." "Praxis declenches evolutive processes whose logic is not rule and control, but cooperation and understanding. Cooperation and understanding do not only rule the way to deal with the society, but as well the dealing with the environment. The practical dealing with environment has nevertheless been replaced by the evolutionary implementation of poiesis as the dominant form ..."

The origin of science is "The instinct of exploring the environment, an instinct man shares with all other animals. Here and there, some tribes came to realize, first, that knowledge gives controlling power over the environment (unfortunately, over men as well) and consequently makes life easier for him who possesses it; and second, that learning what others already know is far more economical than acquiring his knowledge by one's own experience. It was then that man began to value the aggregate knowledge of all individuals in the community and feel the need of storing and preserving this knowledge from generation to generation. Science, in its first form, came thus into being." [ibid p. 22:]

So science was from the beginning connected with teaching and with the profession of scholars. Memorizing provided the easiest mode of storage of knowledge - and it still dominates many traditional cultures, especially the Asian ones. Asian cultures did never overestimate the idea of causality. It is a culture of contemplation and casual observation - not of systematic research.

But be it accidental or planned inventions - inventions alone do not pave the way for social development. Contemplative Asian cultures are on one side not targeted to be innovative, inventive, creative - but their traditions, be it Islam, Buddhism or Confucianism, are guidance for social development - and they are valuable, and they are acceptable, and they are practical and they are practised.

What happens on the other side, in our "Scientific Culture" with recommendations as the one of Leon Walras: "Science has not only the duty to formulate the ideals of justice, it has to find ways and means leading towards their realisation." [Pieper p. 63:] What kind of science might do that? I, the author of this queer report, say and do the same as Georgescu-Roegen: "In this situation we must not insist on asking always "why". For some problems we may achieve a greater insight if we ask "for what purpose. ... Man knows that a causa finalis, not a causa efficiens, makes him work for an academic degree or save for old

age." [Georgescu-Roegen p. 16:]

3.4.4 Steering of Action: The socio-cultural knowledge - the base of orientation.

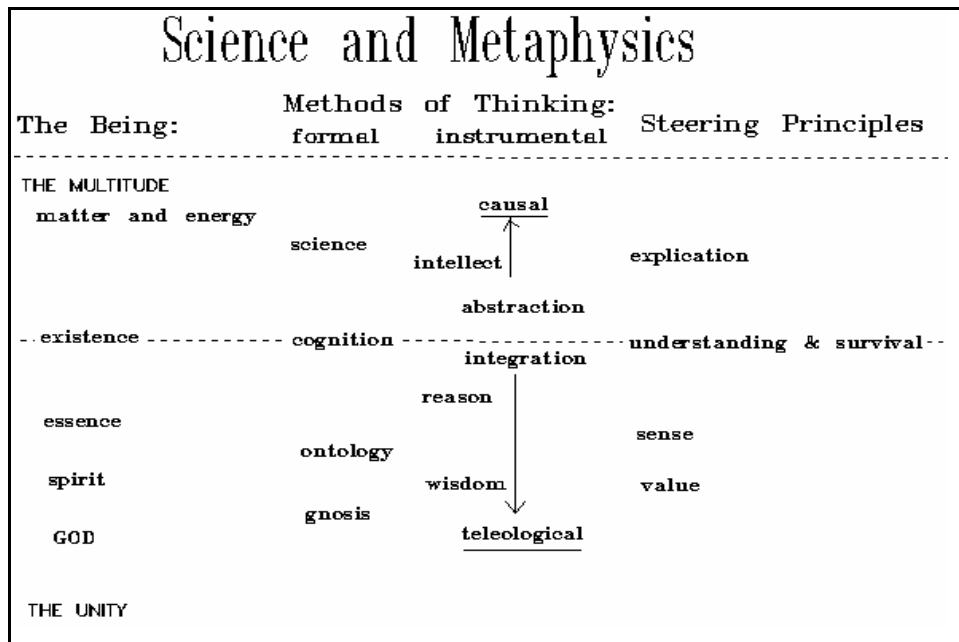
Existence, cognition, and with it survival, was always in between causalities and finalities, in between rational explanations and spiritually meaningful aims. The purely intellectual, rational, scientific development lacks purposes and motives:

Def. purpose: ... *an imagined and wanted future process or state, whose realisation is the causal link on the way to the aim, it is an anticipated imagination of the effect of our action (Wilh. Wundt), it gets the means attributed and submitted to reach it. Purpose and aim may be the same and the reached aim may prove to be the purpose of a further aim ... The possibility of reaching a purpose can only be presumed as far as a purpose and aims setting intervention in causal natural processes is seen as realisable (- finality). If in the realm of the biological there is a purpose and aims setting authority is contested ... Kant calls ... the term purpose an "alien in natural sciences". The explanation of natural processes out of purposes is called - teleology; - purposeful. The modern psychological occupation with essence and function of purposes led to motives research.*

Def. motive: (lat.) *cause, impulse. The m. doesn't cause the action but only gets visible by and in the "sketch of an action" (Sartre). - In the aesthetics m. (or SUJET) describes that what is the cause of an artistic creation. The American psychologist G. Allport tries to prove a functional autonomy of m.s. W. Hellpach speaks about the dwindling of m., describing with it the ethnopsychol. phenomenon, that in institutional life-styles, action is not based on motives because the psychical life assumes a fixed standpoint. In modern psychology motivation theory gets more and more important.*

Motives are the causes of will, motives are what moves the humans. That shows the critical problem of institutionalised meaning, of behaviour versus action. Instead of motives, automatisms, technocracy, operationalisation (s. management), mechanical rules, in short "Sachzwänge" (= factual constraints, "the force of things") are determining development, using very limited guidelines as orientation: feasibility, profit, growth, productivity.

Development as seen from the humanitarian side and from the side of a depleted nature looks different. Needed is care - the return is not increased income but a sheer preservation of present state. But if we want to develop an economy that respects nature and that allows all humans to survive, we have to find motives based on values and meanings of life that are valued higher than profit. We probably need more social cooperation, respect towards nature and respect of the limits it poses on sustainable development. We need more responsibility, justice, prudence and wisdom - not more technical knowledge, not more individual courage (risky investments), cunning and dominance.



3.4.5 Recommendations Concerning a "Development Science" as "Science" of Finalities

Human ingenuity made old dreams come true. It enabled us to conquer the earth, the sky, the sea and its abysses and even to visit to the moon. It won over sicknesses, expanded life expectancy, facilitated (for some at least) work through machines. Does this ingenuity prove useless now to solve the most basic and original needs of humanity - to guarantee a decent, honest life - earned through work - for all?

How can use and management of the natural environment be sustainable? Does it allow an integration into the world-market? How is its chance to survive compare with expanding markets and much higher profits in the other spheres? Can a no-growth, no-innovation (or slowed/targeted innovation) subsistence market survive at the periphery of the world-market? What happens if all productive and distributive infrastructure is owned by the minority of capital owners?

If economics and the other 'sciences' do not find answers to this questions - they won't be of much use for the next century, as the human being will most probably just proof that it was an error of evolution and will disappear.

To expect solutions just by letting it go is nonsensical. Market orientation proofed as destructive for the natural environment as it proofed destructive for subsistence oriented societies.

The chance is that we are free - we are no longer preconditioned by God's will, by the tribal rules or by fate. All the more it is important for us to know - where we want to go.

A specific development science, better a development philosophy, is needed, due to two problems caused by the present reliance of "the society" on "scientific results":

Problem 1: Science has no real access to complex settings.

Problem 2: Science has no access to values and aims.

Problem 3: In spite of the restrictions that most scientists would probably accept, the public conviction remains, that science will save us from all kind of future problems. Science is considered to be the problem solver per se.

In spite of the fact, that scientists do now the restrictions of their approaches perfectly well, they often assume leadership function in society - based on the respect payed towards their scientific work. The connection of research and teaching leads always, not just in the middle ages, to "scholastisation" of knowledge. Teaching and learning needs and strives for "possession of knowledge". Knowledge goes through a process of "formalisation-materialisation", through which it turns into knowledge that can be taken for granted. Nothing to complain about, as far as it is not used for political purposes without an adaptation to the local situation, as long as it is not taken as "universal truth", truth that has not to be submitted to dialectical process. Otherwise policies, and with it action, will be determined out of fragmentary knowledge. So:

- a) Relying on the promises of science to find solutions for any problems - would be as dangerous as to rely on similar promises of other ideologies (as "Islamism" e.g).
- b) The ideological barriers of scientific disciplines are dangerous if the disciplines propose "socially valid" solutions out of their limited standpoint and view, if "*Weltanschauung*" is developed out of disciplinary thinking.
- c) The dominance of certain sciences, earlier of theology, at present of economics, is dangerous, as it invades thinking, gets religious qualities and power - and excludes dissidents!

> Science as "Ersatzreligion" is not helpful for development.

Good science (that exists!) can set landmarks of small truth's, as e.g.:

- here is soil good for potato growth
- this village has promising social structures for the establishment of a cooperative
- in this region forestry can be done under central rule
- . . .

That means, at its best, it can show alternatives, what is very important - but it can not determine the road of development.

Bad science is probably related with "Alfred North Whitehead's complaint that "the self-confidence of learned people is the comic tragedy of [our] civilisation"." [Georgescu-Roegen p. 41:]

Development science has to show alternative ways and their limits. Mathematics, all science strictly oriented towards measurable facts can not. As an answer to manifold critiques towards mathematised economics, Georgescu-Roegen beliefs, "that what social sciences, nay, all sciences need, is not so much a new Galileo or a new Newton as a new Aristotle who could prescribe new rules for handling those notions that Logic cannot deal with." [ibid "]

For that purpose the sciences producing knowledge that should serve as orientation of action, will have to start with the humans. They have to analyse ex ante the potential effects and integration of their scientific recommendations on society. "Economic analysis will have to deal with all the relevant factors if it wants to be realistic; general economic theory will have to become social theory." [ibid p. 100:] A similar recommendation originates from Myrdal: "A worth-while theory of underdevelopment and development, if it can ever be formulated, would have to be based on ideas distilled from the broadest empirical knowledge of social change in all its manifold aspects, acquired under the greatest freedom from tradition-bound predilections." [Myrdal p. 163:] The freedom from tradition-bound predilections has to go quite far, social science as such won't be sufficient. "It is equally understandable for physics to treat as fiction and view with mistrust the unobservables it had to invent in order to unify into one picture disparate observables and thus simplify its logical foundation. But there is absolutely no reason for economics to treat as fiction the very springs of economic action - wants, beliefs, expectations, institutional attitudes, etc. For these elements are known to us by immediate acquaintance, that is, more intimately than any of the economic "observables" - prices, sales, production, and so forth." [Georgescu-Roegen p. 336:] "The question is why a science interested in economic means, ends, and distribution should dogmatically refuse to study also the process by which new economic means, new economic ends, and new economic relations are created." [ibid p. 320:] "The obvious conclusion is that if economics is to be a science not only of "observable" quantities but also of man, it must rely extensively on dialectical reasoning." [ibid p. 337:]

For the formation of a culture an integral approach is needed,

embracing all groups, needs and wishes. All extreme version of ideologies do not fulfill this request. The extreme version of Islamism refutes causalities - the extreme version of economy refutes all finalities except profit. The integral approach needs science's to communicate and integrate on a higher, the "Gestalt" level. It needs dialogue and consensus - based on truth, not on political winning strategies and power games.

To study and understand the "Gestalt" of the local culture is by no means easy. It is not just ethnography: *"Nothing is further from my thought than to deny the difficulties of how to study the economic Anschauung of a society in which one has not been culturally reared. Nor am I prepared to write down a set of instructions on how to go about it mechanically. But if we deny*

To get some orientation in the forest of the scientifically set landmarks we need a truth-seeking that is not based on disciplinary ideology, not bound by economic interest, a truth seeking that is able to recognise the difference between truth and ideology.

man's faculty of empathy, then there really is no game we can play at all, whether in philosophy, literature, science, or family. Actually, we must come to recognize that the game is not the same in physical sciences as in sciences of man; that, contrary to what Pareto and numberless others preached, there is not only one method by which to know the truth." [ibid p. 363:]

And still it might be easier than the predictions of Hardin in *"The Tragedy of the Commons."* That concept is purely game-theoretical, the assumption is, that the different users do not communicate and do not know each other's intentions. That's wrong. It is obvious that each one wishes to use the maximum he can of "the commons". But each one knows as well that his neighbour has the same intention, and all know that the effects are destructive. As they are communicative, (sometimes) reasonable, they can get to a "convention" - if they want, if they agree. Since Vico we know that man himself is the best instrument to study his own creations:

"... the student of man has additional means at his disposal. He can feel into facts, or resort to introspection, or, above all, find out the motives of his subject by interrogating him." [Georgescu-Roegen p. 363:] *"... we should send some poli-
toscopes to reveal what other people think, feel, and might do next ...*

But perhaps one day we will all come to realize that man too is an instrument, the only one to study man's propensities. That day there will be no more forgotten men, forgotten because today we allegedly do not know how to study them and report on what they think, feel, and want."

3.5 Learning and Education

3.5.0 Definitions, Conditions, Aims and Processes of Learning and Education

Education is in many respects closely connected with development. First it has the same problems, as it is mainly future oriented, its aims can't be set "scientifically", but are the result of a willful act of planning and decision making. Second it is submitted to the cleavage between causality, technique, training and progress on the one side, and finality, society, education and cultural development on the other side. What shapes education and development dominantly, are the operational-functional aspects. What is mushy in both it the political act setting forming strategies and plans.

Education tries to change and improve the psychical disposition of others. Pedagogics is defined as a technique and art. Its aim is not an artificial formation of the human mind, but a development in harmony with the social and natural environment. Through *majeutics* it tries to give birth to truth, to enable the individual to lead a good and just life in the community. Its basic method is (again!) topics (s. chapter 2.3.3).

The major precondition of education, from the part of the one to "receive" it, is the voluntary readiness to accept new, probably contradictory information, to change (or at least consider a change in) interpretational patterns, to change motives, values and, if appropriate, behaviour. This "mouldability" depends on inner and outer factors and is the field of (general-, development (life-age-), character-, milieu- and social-) psychology. The ability to learn is specific for each age. In general it is decreasing after the age of twenty, in social matters it is increasing after the age of thirty. The ability to learn, to accept that not everything is known and that not everything considered as "normal" is unchangeable - is equal to the ability to be taught and educated!

The complexity of different factors that are effective in education may lead to disturbances and conflicts. The major one nowadays being the dominance of the economic usefulness of training, the loss of free space for playful trial and error, the loss of the security to be an actor and the suspicion to be only a wheel in a machinery.

In education there is a very big difference between the training of the intellectual capacity, consisting mainly in knowledge transfer, serving technical production <> and education, targeting the formation of reason and wisdom - the value oriented base of purpose- and meaningful action.

TRAINING SERVES PRODUCTIVITY - EDUCATION SERVES DEVELOPMENT.

The major aim of education in such a situation is to reawaken the will for education, to free the adult soul from its cage. Adult education is decisive for development. Nohl e.g. said [Schepp p. 102]:

"THERE ARE TWO WAYS TO FORM THE PEOPLE,
POLITICS AND PEDAGOGICS."

Education (as development) has to deal with several polarities, here ad hoc summarised under the following topics. Normally each first element of the following categorisations is taught at schools and in training courses - in formal ways. The second part (socio-cultural-open-value and reason oriented systems) is learned in informal ways:

- 1 - The individual <-> and its integration into the community.
 - The orientations of individual success <> versus mutual understanding and consensus.
 - Production, that is a technical procedure <> action, that is a socio-culturally integrated process.
- 2 - A closed system, the conservation of mostly causal knowledge, with some cumulative increase inside the given structures <-> an open system, acceptance of the unknown, continuing explanation and interpretation of systems of meaning, looking for new orientations, looking into the future, open for change and development. The formation of conscience is not only cognitive, but communicative; a dialogical-dialectical transgression, critique and development of the existing system.
- 3 - A complex, but fragmented, system of facts, of secure knowledge, of understanding, intelligence and logics <-> a system of values and virtues, some eternal and global, some differing for each culture and changing in the course of time, the system of reason and wisdom.

3.5.1 Individual, Professional Success Oriented Knowledge < Versus > Social Integration.

The major motive to go to school, to learn and exercise is individual interest plus the need and wish to earn ones living through professional work, the wish to get a better income and a higher social status.

An additional and corrective element to this is the need of the society to create members that integrate into its system of values - the need for "socialisation". Action is not possible in isolation. And with increasing professional specialisation, adults do more and more restrict their learning and activities

to the small professional field of production - leaving the rest of the world for "the experts".

Unluckily - training at schools, especially at universities, is predominantly positivistic, restricted to training in cognitive methodology - so unfit to train for holistic understanding, responsibility, action and social life. University- sciences are antagonistic, even caustic, against everything that has to do with values. The relation of science with practical work is thin, as the aim of sciences is to establish and test theories - but theories are far from action!

The everyday (lifeworld, topical) knowledge helps to solve "normal" everyday problems and conserves a "normal", traditional lifestyle, what is indispensable for the functioning and stability of each society. [after Schepp p. 64/103:] For Nohl the creation of consensus was the basic function of education, because only if a basic consensus is present in a community, it can stand contradictions, conflicts and pluralism without damage.

The background of intersubjectively shared knowledge is the base of valuable, justifiable arguments. The lifeworld is so the resource of meaningful aims, action and motives. It is the participants world, it determines what they can see and understand and do. After Habermas (1981) [after *ibid* p. 72:] lifeworld is the totality of the hermeneutically accessible, in the largest sense historical or sociocultural facts, the totality of meaning. It contains the common stock of interpretations, the legitimate, intersubjectively shared norms. Hermeneutical pedagogic claims, that not empirical facts are decisive for a theory, but that it is the communicatory interrelations alone that make the facts meaningful.

Recommendations for education aim at reuniting work and the lifeworld. For Humboldt true education was only possible if education was separated from work, what led to the successful dual system in vocational training. At universities the problem is much more acute and not solved so far. The recommendations of Schepp [after Schepp p. 138:] for the introduction of the social aspects into university education are:

- manifold practical experience at schools, industry, social stages, excursions
- cultural life, common exercises in lay-art as music, games, theater, creative arts, handicraft, sport, dance ...
- a lively, social companionship, a *vita communis*, of professors and students
- public colloquia on current political and social problems
- a willfully wanted small size of the academy. Everybody should know each one by name and look at it as a group and not as an association of individuals. (compare chapter 1.2.1.2.2 on interdisciplinarity).

3.5.2 Traditional, Secure, Closed Knowledge < Versus > Future and Development Oriented, Probable and Open Knowledge.

The relation between education and development is not only very close due to similar "scientific" problems. Institutionalised educational concepts can strongly enhance or block development. Pedagogical action is only possible in cooperation with groups and organisations that further social development!!! Learning in the technocratic, organised form makes stupid (s. Freire: *Pedagogy of freedom*). So even what concerns the interrelation with politics we have a strong similarity between education and development. Both need orientation towards the future, towards a future that is open - and not known. Both are at present lacking orientation, as they follow the mainstream of economic development. Both have heavy doubts on the possibility to mold or even determine the future, as personal and social development is guided by a multitude of diverging factors.

Education has to be based on historical and cultural experience. It may have a strongly conservative accent and influence on how far ideas about future development aims enter the political and lifeworld dialogue. Only an open pedagogical system, accepting the fact, that all knowledge is surrounded by larger fields of "the unknown", allows to respond to developmental questions.

Pedagogy, as politics, has the duty and the problem to reactivate the interest of the individuals for a dialogue on a common future. Both being of almost equal importance in the formation of a social constitution.

The preconditions for all learning, so as well for institutional and social learning, are the acceptance, that other perspectives, other worldviews (WELTANSCHAUUNG), other ways to see and to interpret the world are possible and that they are as "reasonable" as the own one. This is not only a matter of intelligence, but dominantly of emotions and intuition. Progressive learning, while emerging from fundamental, traditional knowledge, questions and criticises such.

Processes of social learning can't be planned or steered, as the outcome is open, has to be open, due to democratic participation in setting finalities, due to the multitude of development potentials. Development as social learning has to open the eyes of the participants to the different perspectives and potentials, to make those understandable and acceptable.

"Science" in those fields, "development science", can not simply present a stock of transferable knowledge, but is a continuous process of understanding, interpreting and reinterpreting the lifeworld and its system of meaning.

So, after over 200 years of scientific and technical progress, progressive learning gets stranded with ethics, with the old moral questions posed by the Greek, especially Socrates:

How can we know the good, how can we ground virtues?

How should we live that our souls get as good as possible. To

give birth to this kind of knowledge, that is in fact orientational knowledge, was for most the time an important, if not dominating, part of education - and it still is for Islamic education (to be discussed in the following chapter 3.6)! True knowledge is knowledge that leads to action, action that is furthering the common good. This knowledge is called "*phronesis*" - it is the knowledge of virtues - and virtues are not matter of technical training, but of contemplation or even gnosis.

It is painfully clear for pedagogues since quite some time, that it is an illusion to think that our major development problems, being mainly social problems, can be solved by learning. The "*German Society for Educational Sciences*" e.g. blamed that approach, stipulated by the *Club of Rome*, already in 1980 [Heid; Mollenhauer; Parmentier; Tiersch [1981]:]. Did not already the concept of illumination fail to eliminate the social differences of the class-society with its differing interests? The trust in the positive effects of formation, education and learning turned into an ideology, evicting those social contradictions. Bernfeld notices in 1967 sarcastically, that "*too fearful and fine, to recognise the engine of social change and to manipulate this noisy and dangerous monster, they [the pedagogues] turned towards culture. And here, again too fearful, they targeted the children.*) [ibid] The *Club of Rome* stressed that the solutions have to be found in fact "inside ourselves" ... and that in a time where it is obvious, that pedagogical intentions are corrupted by given social priorities (political, financial, organisational), rules of competition and individuality, the facts of public rules of consumption, of work- and job regulations, of access-problems to jobs and of unemployment, the fact of public-political perplexity and lacking credibility?

In education the problem of an education that is too narrow, too much concentrated on productivity, has before long been recognised. The worker has to be protected from the functionalism and fatalism of the professional production. If the general education is left to the individual taste it gets accidental and loses its basic function - to create a common interest, a common feeling, a certain consensus (what is the strength of traditional Islamic education!), needed to keep each society alive. So the training of the individual personality has to be integrated into a larger frame of culture with the aim is the social, humanistically trained being. [after Lee p. 13:]

The rationality of communication and action can't be grounded scientifically. Arguments need to be rational and reasonable, that means they have to fit into the local lifeworld, into the "WELTBILD". After Habermas the preconditions for such a dialogue, creating communicatory truth, are [after Masschelein p. 64 and Whyte p. 135]:

- all participants must have the same chance to start a dialogue or an argumentation
- as well they must have the same chance in the discussion to present interpretations, declarations and critique, so that no content is excluded
- there is no difference of power between the participants
- All arguments which pertain to issues under discussion are - as a point of departure - legitimate.
- the participants speak the TRUTH

- the speech act is COMPREHENSIBLE
- the speaker is AUTHENTIC (sincere)
- the situation is APPROPRIATE for these things to be said
- The dialogue must continuously produce agreements which can provide a platform for investigation and practical action.

3.5.3 Logics, intelligence and understanding < versus > reason and virtues.

For Spranger, the capacity of vocational and adult training, the matter-and-facts oriented school, estranged to real life, was too one-sided. He saw the need for a "school of life", where structures and meanings of all cultural fields can be experienced, not just learned. [s. Lee p. 11:]

The school-reforms of the Sixties and Seventies did not make the schooling system of Germany e.g. more human, but more bureaucratic and abstract, more impersonal. The "scientific" orientation of education playing a fatal role in its one-sided orientation towards technical rationality. Stuck with the ideology of progress, the educational duty of schools, including adaptation and resistance, can't be fulfilled. Instead of prospective learning there is a turn back to submissive learning of scientific facts. Science itself overtakes the function of presenting complex facts in synoptic ways, to makes them available for orientation of action. The problem is, sciences do that out of their own perspective of technical feasibility and productivity. [after Schepp p. 125:]

In education the power of the economic-political factors are underestimated. Even adult training is too formal. The participants stay clients, the teacher is the organiser and "information distributor". [after Cordes p. 10:] But adult education is (should be) more about understanding cultural systems than about transfer of knowledge. This brings us back to the difference between intelligence and reason [s. def. chapter 3.5.1:]. Reason is integral, is looking for the meaning of the whole. Intelligence restricts itself to limited cause-effect relations. Intelligence and understanding are the capacity for thinking in terms. Will and understanding (and awareness) are connected. The will can only want, what understanding can grasp. Understanding can imagine, what the will can want. The technical culture is a culture of intelligence and will. Reason on the other side is the capacity to see the whole. It needs terminological thinking as a base - but is transgressing it - and education has to enhance this capacity.

Society does not only depend on objective, functional interrelations, but as much from norms and meaningful action of its members. Social systems get ungovernable, if the rules that their members follow, disturb the rules of function of the society, if the members don't act in ways, that keep the social functions alive. A situation that is clearly given with the economic need of growth and change, exceeding all social and natural capacity for both demands. The ineffectivity of private and political efforts in confrontation with those forces, lead to a strong feeling of impotence and disgust, a retreat into privacy and individual development. Political training is dis-

appearing, participation is decreasing.

While official politics, as well as industry and science, have a preference for scientific-technical solutions, environmental protection still gears for changes in the society. Values and aims are important for discussions on ecology. Action depends on objectives - and development is not the result of a "natural, undetermined" growth, but need a draft, a plan, a rule or a constitution that influences and guides the process of growth and development. Because the human being is a social being, education is always at least partly political education! [after Schepp p. 54:]

The major problem of our time, related, if not identical, with the problem of "underdevelopment", is unemployment. Instead of easing work for all, the economic process leaves no time for those that have work, and no money but lots of time for those that don't have work. Instead of spreading the gained wealth and time, wealth is accumulating there where it exists already, and time is left to those that have no means to use it. The distribution is discriminatory and the result of discrimination, the new class of excluded, serves to create fear, discipline, and even more competition among those that are still in the process. Unemployment is for most people a very bad "free time". Overproduction, and its result, unemployment, might on the other side be productively used for social experiments, for more social dealings, involvement in local politics, environmental protection, neighbourhood activities, cooperation, art - for social learning. But because since over 200 years education trains for productivity ...

3.5.4 The Development of Knowledge Integrated Into the Local Lifeworld: Action Research

Development Science has to know what is really reasonable - so to understand the orientational knowledge and the "values" - to be able to change it in participatory, learning ways. Unlike the natural sciences, even more than the traditional social sciences, it can't "define and delimit" the object of study. It has to grasp reality as a whole. Its priority is to understand reality in its complexity and variability. So terminology and system of development research have to be open. This needs a new freedom of science, the freedom to develop different terms and descriptions of reality [after Anderregg p. 27/28:].

Development science is diagnosis & understanding, communication and consensus. The problematic steps from the first to the last one, what can easily be shown with diagnosis, as a special form of systems description. Medical, therapeutical, educative, organisation-sociological or development-political diagnosis' are descriptions of a foreign system out of the perspective of the describer. One may assume, that with growing experience, the reliability and potential for consensus of diagnosis is increasing. But theoretically we may expect dissidence between different diagnosers as well as between the external and the self-description. Especially the therapeutical diagnosis as an external description (by the therapist) does often have the function of contrasting the self description of the patient or of the

system to be treated, to induce processes of change. The function of diagnosis is so clearly to make the difference aware that exists between the local perception (the view of the patient) and the experts view. The latter needs to have a full knowledge and understanding of the tackled system - but he has not to identify himself fully with it and he does not need to accept it as it is. He is an "outsider" and he needs to be one if he wants to induce change. On the side of the "observed system" that is to be developed, the preconditions for dialogue are the awareness of the problem(s), motive(s) and the will for change. If motives, semantics and aims are too different, a "development project" might still be started, but never lead to the aspired aims. The foreign expert needs to be friendly, to have a positive attitude to the targeted society. But he must not have a "yes-sir-mentality". He needs to be able to start a dialogue, a cooperative search for real problems and true solutions. Not the blind following of either system, not the one he wants to bring in, not the one he wants to change, will lead to "development". The aim is to open new insights and new potentials for action. Not exclusion of ways of thinking and acting, but enlarging both potentials is needed. In such a way systems observation and systems diagnosis corresponds with the ethical imperative of v. Foster (1984):

"ACT ALWAYS SO AS TO INCREASE THE NUMBER OF CHOICES".

Developers, as "adult educators" and "pedagogues" have to be politicians and artists, they have to orient themselves at the historical development potential and to keep in constant dialogue with innovatory social movements. They are catalysers, experts for recognition - not only for the creation of the educatory situation and for teaching. Adult educators are social coordinators, inversing institutions and creating networks across borders. [Daubern in *ibid* p. 53:]

3.5.5 Action Research

3.5.5.1 Definitions

Action research was basically born out of the conviction that a research producing nothing else than books is insufficient. Action research is systematic. It involves a self-reflective spiral of planning, acting, observing, reflecting and re-planning. It pursues action and research at the same time. It is some sort of "natural social experiment", executed by consultancy, change agency, field research. Action research is so cyclic, participatory, qualitative and reflective.

To submit the process of action to the scrutiny of science is needed, because *"it is not possible to understand a social system without changing it. The passive observer cannot learn anything rational about the inner dynamics and conditions of such systems. It is only through an anthropological approach, that is, by becoming a member and making observations over a long period, that the observer can succeed."* [Lewin's (1948) in *ibid* p. 145:]

The difference between Participatory Action Research and Action Science is that *"Action science (AS) focuses more heavily on interpersonal relations and intrapsychic processes ... while "PAR focuses more heavily on social structures and processes."* [Whyte p. 97:] Because reality largely depends on socio-culturally differing "WELTBILDER" and is partly a social construct, *"scientists' theory about your world is not necessarily more valid or true than your own theory of your world. Both theories are social products that can be improved through investigation and testing."* [*ibid* p. 140:] The decisive importance of the local view asks for a lifeworld-science, less heavy in scientific terminology, but able to express its findings in local, natural, everyday-language.

3.5.5.2 Methodology

While "classical" research breaks down its object into dependent and independent variables, controls the variables and test the effects; action research is qualitative (compare chapter 2.3). Even if taking into account different values, interpretations, meanings, even "truthes", it is scientific in so far, as it is principled action based on rational thought. Its procedural analysis follows a clear logic. It uses multiple sources of evidence, triangulates differing arguments, formulates and tests hypotheses, draws conclusions and submits those to public scrutiny and debate.

Action research is adaptive, responsive to situations and people, is depending on choices - is a socio-political process. In a cyclic, spiral process it leads to a growing understanding on the part of those involved.

"The research cycle starts with the identification of a topic or issue to study as well as a review of the relevant knowledge. It proceeds by operationalizing hypotheses or research questions, identifying the sample to study, selecting research methods,

gathering data, and generating findings. Finally, it concludes by deriving and disseminating the implications of the study for theory and practice." [Whyte p. 119:]

As action research starts with the identification of problems to be solved, as seen out of the perception of practitioners, it has to "understand" first the situation and to assess the local view as formed by the particular, local practice context. It builds descriptions and theories within the practice context itself, proposes changes and plans for implementation, initiates and tests them through intervention experiments - that is, through experiments that bear the double burden of testing hypotheses and effecting some (putatively) desirable change in the situation. [after *ibid*:] The changes and methods have to be assessed, again in the framework of local values and, if found valuable, deepened, institutionalized and diffused. As the process is closely related to education, but often restricted to pure information dissemination, to technical training, as especially in agricultural extension. The generation of knowledge has to be done in an open and participatory dialogue, as it has to make cultural critique, the critique of the existing structures and processes possible. The participants, including the "experts", will only learn during the process to ask "the right, the meaningful" questions". This process opens the chance for adults for self-education!

The aim of this process is not primarily theories, "knowledge" and scientific publications, but help for the concerned. This research does make the target group an "object of study", but integrates the social group into the process, as among the major aims of such process are awareness raising and the transfer of research instruments. The process helps to analyse the own situation of the group, prepares, guides and controls action.

3.5.5.3 Preconditions

Researchers in the field of action research need skills that are normally related to ethnography, sociology or (community) development work. *"They must be as well versed in communication and teaching skills as they are in the technique of scientific inquiry, able to transmit information clearly and simply, and to encourage participants to respond critically."* [*ibid* p. 203:] It is understandable that this needs a clear commitment to democratic principles. Moreover he needs a vision of the "good organization" - that is, one based on self-management, development of human potential, power equalization ..., well-developed and proven tools, concepts, and ways of working founded on sociotechnical systems thinking that can be used to (re)design organizations to achieve our visions and values; collegial networks and support structures, to see the researcher role of "co-learner" rather than of "expert in charge of change" and a political infrastructure supporting participation.

Coping strategies [*ibid* p. 144-5]:

- 1 DONT GIVE UP
- 2 ENLIST THE HELP OF COLLEAGUES
- 3 KEEP A POSITIVE ATTITUDE

- 4 BE PREPARED TO COMPROMISE
- 5 BE GENEROUS
- 6 GO PUBLIC
- 7 JOIN A LOCAL ACTION RESEARCH GROUP
- 8 ESTABLISH A REPUTATION FOR SUCCESS
- 9 PUBLISH REPORTS IN JOURNALS
- 10 HAVE FAITH IN YOUR PERSONAL KNOWLEDGE

Change always depends on the agreement and commitment of the affected, be they individuals or social groups or institutions! With PAR a much greater responsibility for analysis and recommendation rests with the client organisation rather than with the consultant. PAR attempts to move the organizations from a definition of current problems and opportunities to a definition of a desirable and attainable future, to action and learning. The capacity for "institutional learning", analogously to the individual potential for education, is the base for change and development!

3.5.5.4 Results of PAR as Community Based Learning

Depending on the respective conditions, PAR will produce three categories of scientific knowledge:

- meta-scientific reflections on the PAR-process
- knew knowledge on specific social situations (case studies)
- academic theories

The principal objective of all is to get an insight on the formation processes of better life- and work places, on social learning, empowerment and democratic participation in development: PAR as learning empowers in three ways. First, it empowers because of the specific insights, new understandings, and new possibilities that the participants discover in creating better explanations about their social world. Second, participants learn how to learn. ... Third, PAR can be liberating ... when participants learn how to create new possibilities for action." That might be the major and most positive aspect of the method, the creation of alternatives, what is conform to the rules of dealing with complex systems, and what is equal to the creation of freedom!

PAR is the only holistic way to understand and test what development objectives can be reached under the given historical, social, cultural, political and economic environment. Which factors enhance a wanted development - which factors block it? - Action research is the only reliable test allowing to differentiate between what is wishful thinking and what is feasible, it is the touchstone for the big international strategies and conventions! It is the "scientific" approach to turn knowledge into action and to learn from action.

3.6 Orientational Knowledge - the Need for a Science that Accepts Transcendental Questions and Answers (ETHICS)

There is a decisive difference between the western, epistemological approach to knowledge and the eastern way, focussing on orientational knowledge. The difference has been beautifully illustrated by Nasr with the allegory of Prometheus versus Pontifex, of rationality versus wisdom [Nasr p. 59]: "The view of the human being as pontifex, as a bridge between heaven and earth, what is the traditional view of anthropos, is diametrically opposed to the modern view of the human being, that sees it as the promethean, worldly creature, revolting against the heaven and trying to assume the role of God. The pontifical human, being nothing else in the here described meaning than the traditional human, lives in an other world, that has as well an origin as a center. ... He is God's governor (KHALIFATALLAH) on earth, to use the Islamic expression, that is accountable to God for his action, the trustee and guard of the earth, submitted under his rule under the condition that he himself keeps faithfully to his central worldly character, having been created after the "image of God"" That concept is probably the base of most religions and is still very much alive with the "quaker idea that there is "that of God" in every man. ... That the good of **fellow human beings** ought to be promoted." [Rose; Dower. p. 37:] The great advantage of western sciences was the restriction of systematic questioning to questions that lead to answers that can be tested. This epistemology led to great progress - in some fields - to increasing problems in others. Popper's falsificationism can't test meaningfulness and finalities. Singular finalities (as profit) that "work" under limited conditions (as for business administration) lead to disaster when they turn into global guidelines. No wonder that all religions have been critical towards accumulation of wealth!

Nasr retraces the origin of western reductionist sciences to Descartes [Nasr p. 59:]: "But with his "I think so I am" Descartes did not mean the divine I that had spoken 700 years before through the words of Mansur al-Hallaj: "I am the truth" (ANA'L HAQQ), the divine self that alone may say "I": It was much more Descartes' individual, out of the gnostic perspective unreal, self, that made his experience and awareness of his thinking the base of all epistemology and ontology and the source of certitude. Even the being has been submitted to that ergo and posed as its effect. If Descartes had to start with the act of thinking, he might have closed with est instead of sum and express in such a way that my thinking and awareness are as such the proof, that God is, not that "I" as an individual, am. With that he would have put himself into a certain perspective of traditional philosophy and would have preserved the central role of ontology inside philosophy.

But that way he made the thinking of the individual self the center of reality and the criteria of all cognition, giving philosophy a turn to pure rationalism and changing the emphasis of philosophy from ontology towards epistemology." A similar critique towards Descartes concept of sciences has been uttered by Albert Schweitzer. Epistemology is too abstract and dead to

deal with life in general and with human action in special as it lacks ethical principles): *"The philosophy of Descartes starts with the sentence: "I think so I am". With this poor, arbitrarily chosen start he goes irrecoverably onto the track of the abstract. He doesn't find the access to ethics and stays caught in a dead way of looking at world and life. True philosophy must start from the most immediate and comprehensive facts of consciousness. That is: "I am life, that wants to live, in the midst of life, that wants to live.""* [Spierling p. 234:]

The most reductionist, that means in this respect the "driest", epistemology has been constructed by Carnap and the early Wittgenstein [ibid p. 363]:

6.4 All sentences are of the same value.

6.41 The meaning of the world must be outside of it. In the world there is everything as it is and everything happens as it happens; there is no meaning **in** it - and if there would be one, it would be of no value.

If there is a value, that has value, it has to be outside of all events and so-being. As all events and so-being is accidental.

What makes it not-accidental, can't be **in** the world; otherwise it would again be accidental.

6.42 For this there can't be sentences of ethics. Sentences can't express higher things.

6.421 It is clear, that ethics can't be pronounced. Ethics is transcendental. ... Ethics and aesthetics are one."

Very logical, very true - very much useless what concerns human life and action on earth. Even Einstein, whose scientific rationalism and logic won't be doubted, said [Furrer p. 424]: "Purely logically derived sentences are totally void in respect to the real."

Still, the success of science, the medical and technical progress, misled other philosophically minded authorities to think the opposite, that action orientation (= ethics) can be grounded scientifically and made worldly [Mach p. 463]: *"If we think about the drudgeries our predecessors had to suffer under their social institutions, their fanaticism; taking into consideration the rich inheritance the present gets of those goods, let's imagine how much of it we shall experience through our descendants, that is enough motivation finally to cooperate enthusiastically and vigorously in the realisation of a **moral** world order with the help of our psychological and sociological insights. If once we created such a moral order, nobody will be able to say that it is not in the world, and nobody will need to search for it in mystical heights or depths."*

What is bad about this idea? It is the fact that a holistic view of the world can't be based on a basket full of reductionist views. Development of socio-cultural models, and much more the development of society, can't be delegated to scientists as it needs aims and orientations that have nothing to do with science. Already in the year 1801 (!), Hegel saw the torn harmony of life as the practical challenge and need of philosophy: *"The proud culture of reflexion of illumination split with religion and put it besides itself or itself besides it. The degradation of religion led to a desegregation between*

belief and knowledge that illumination can't overcome by its own. ... "The more education develops, the more manifold the development of the phenomena of life get ... the bigger the power of the disunion ... the stranger and the less important get the aspirations of life towards harmony (once kept inside religion) to education." [after Hegel in Habermas p. 31]. That feeling has been expressed clearly by Seif Al-Islam Hassan, the Sayid'd representative, to the arab journal Fattat-Gezirat of the 17th of December 1952: "Culture, I detest it, because it is stripped of religion and because cultivated people make fun of religion and pious men" (Al Habashi, 1966)." [Flory et al. (translated from french by the author.)]. Now neither Hegel nor the Islamic leaders were totally against science. But it is the discrimination of other types of knowledge by science that is not acceptable for them. Especially "Guenon does not criticise science for what it reached, but because of its reductionism and the arrogance of science in the modern world. His main reproach against modern science concerned the lack of metaphysical principles and its claim - or probably more the claim of those that assume for themselves the "scientific standpoint" - to be downright the science or way of cognition, while being only one science or one way of cognition that relates only to a very limited sector or reality. Guenon tries to demonstrate, how a science might be developed that is in the contemporary sense exact and "scientific", without neglecting metaphysical principles." [Nasr p. 141:]

Islam and Islamic tradition, as preserved in the shari'a, has not been and is not against science. In fact the opposite is true:

In the name of the merciful and compassionate God.

READ, in the name of thy Lord!

Who created man from congealed blood!

Read, for thy Lord is most generous!

Who taught the pen!

Taught man what he did not know!

[Quran (Palmer (transl.)):Sura 96]

Or especially [Hamidullah, M.: *History of Muslim Philosophy*. 2:1229. In Husaini p. 30]:

**"A WISE COUNSEL IS THE LOST PROPERTY OF THE FAITHFUL;
WHEREVER HE DISCOVERS IT, HE TAKES HOLD OF IT."**

Islamic science, did not reach the moon and change the genes, **but** has to be oriented towards the development of (the Islamic) society. Such science might, if consistently and convincingly worked out, serve as a leading model for the West too. But it would have to drop the unreflected and cheap imitation of western science on the one side - the fundamentalist dreams on the other - to be able to assume responsibility in advising politics on the preferable course for social development.

This is really no argument for fundamentalism. What I say is that science should be given a clear aim - not that it should be

replaced by Quranic studies. Prophet Mohammed said often enough, that he was sent to teach Islam and not to teach agriculture or the like. But what concerns finalities, aims and action, science is the wrong tool [Anderegg p. 22]: "But exactly in their intoxicating belief of the absolute feasibility the sciences and the scientific civilisation reach new limits: where everything seems feasible, the questions, what should be realised thou, where to put limits and where to go on, gain an unforeseen weight. Science stands helpless in front of those questions. It doesn't have criteria, to steer its own activities and in the actual stadium of its development, they, having lost out of sight the complexity of reality in favour of success in the special case, seem not to be able, to develop such criteria." After modern social scientists the aim of religion sounds a bit difficult, but is, in fact, decisive for development [Willke p. 158]: "The coherent formula that steers as well such double contingency [The freedom on what subjects to direct cognition selectively, and on how to act in regard to cognitive results. (the author).] as the multiple contingency of social interaction, is called religion. And religion can steer both realms in a coherent way as both realms do only represent aspects of a nature understood as a unity." For modern sciences it is impossible to reunite those aspects, not so for traditional ways of cognition: "Holy cognition is not in opposition to action, but includes it on the highest level, as it embraces the dimension of love. Today one often sees a difference between vita activa and vita contemplativa. In the modern world where contemplation had to be almost totally sacrificed to a life of externalised action, one has indeed to stress the independence and even the opposition of contemplation to action, as it is understood today. ... The path of action, or what the Hindus call karmayoga, can never include the one of cognition, because the lesser can never embrace the bigger. Because cognition is the highest instrument of spiritual progress, it includes the path of action as the one of love and liberates the humans of the limitations as well of schematic action and reaction ..." [Nasr p. 415:]

The main differences between western (analytical) epistemology and eastern orientational (metaphysical) science, is the exclusion, respectively the inclusion, of knowledge that helps us to direct action in a manyfold way - not only in the logically and technically right way. In the following chapters the needs for and origins of ethics are exposed, as well as Ghazalis hierarchy of sciences and an example of Islamic education, showing ways of integrating technical knowledge with social needs and ethics. The following ancient definition of science, being much closer to the recommendations of Feyerabend, fits such request:

*"SCIENCE IS COMPOSED OF TWO COMPLEMENTARY PARTS,
SAIS AMR, SON OF OTHMAN AL-MAKKI, AS THERE ARE:
THE QUESTION AND THE ANSWER."*

[Khawam (transl. from french by the author).]

3.6.1 Ethics: Knowing the Good - Doing the Good

As chapter 2 on science-s (and the short recapitulation before) showed, epistemological sciences are useless in what concerns orientation, finalities and aims of development [Glaeser, Teherani-Krönner p. 226]: "The realm of religiously founded values was in fact replaced by guiding objectives, suggesting a materialistic-nature-scientific world view and feeling of life. Those "values" are not so much formally founded than factually effective, even if the road to them led through emancipatory phases, explicitly understood as normative (religion of science, humanism, illumination)."

As those "values" and orientations are very fractional, there is a need to reestablish a "holistic" orientation for action and for development:

Definition Ethics: from the Greek TA ETHIKA, the teaching of moral [Aristotle] is the "practical philosophy, as it is looking for the answer of the question: what shall we do?" One answer to the problem of founding moral principles was Kant's Categorical Imperative: "Act in a way, that the principles of your action might be declared generally compulsory." "Ethics teaches to judge the respective situation, to enable the ethically (morally) right action. It educates man to his vocation to accomplish the world by superposing the realm of that what should be upon the realm of the being, what in many cases looks rather utopical. E. examines what in life and in the world is of value (- value), because the ethical behaviour consists in the realisation of ethical values. Those values can be found in each situation as well as in the person. E. serves the raising of awareness on values.

In the life that modern man is forced to lead, ethical considerations and contemplations find a place only with difficulty. The modern man is dull and in a hasty movement. The ethical man is the value-viewing, the wise (the sapiens [The human being as Homo sapiens ought to be wise so!?!] lat. "the tasting") who has the fine tongue, the fine organ for the plenitude of values in life. An undifferentiated awareness of values emerges for each human from the function of its will, as the will can only get active in the direction of a value. [after: Philosophisches Wörterbuch]

The fundamental ethical values are:

- 1: Basic values attached to humans: life, awareness, doing, suffering, force, freedom of will, foresight, capability to set aims.
2. Virtues: justice, wisdom, valour, self-control, charity, truthfulness and honesty, reliability and humility, values of the way to deal with others; [underlined Platon's four main virtues]
3. The special ethical values: love of the remote, giving away intellectual property, the personal values, the love directed to the ideal values of the foreign personality.

In the occidental culture the symbolisation of the good has been expressed in two varieties by two societies, Israel and Greece. Israel rigidly ties the good to one God (as Islam), Greece ties the good to the town, the polis, the agora (market). God and market are functional equivalents standing for the good. They are respectively radical solutions of this problem and for that incompatible with a complex social structure. [after Eder p. 91:] We might take for true what Eder says, if we consider the simplicistic approaches of either of the modern ideologies: market versus religion, capitalism versus fundamentalism, or as Barber expressed it in *Jihad vs. McWorld*. But - if we reconsider the positive attitude of Islam towards sciences, a science as a means for social development, we have to recognise, that "reason and scriptural Revelation are complementary" [Husaini p. 7:], each one has its proper function: "The proper role of scriptural revelation is assistance of reason." [ibid p. 8:] "An Islamic solution to this problem of development consistent with social justice and human liberty is to condition men to the Islamic system of education which brings technical expertise into an organic relationship with the profound ethical system of Islam and subordinates **scientia** to **sharia**. It puts into practice the Quranic belief in the improvement of man through deliberate and relentless efforts to hold in abeyance his greed for material gains, and to awaken his moral and ethical potentialities. An aspect of this is the call to develop creative, altruistic, technical humanism. [ibid p. 67:]

Anderegg's [Anderegg p. 26:] claims are right, that "calling for the moral of the individual scientist (Weber) is surely a good intention, but the crisis of modern sciences can't be reduced to moral categories". Probably the question should not be formulated as either - or but in the way quoted above. Free research and morally guided action should be complementary.

In the Arabic-Islamic society the cleavage between the two models, God versus the market, is not as strict as it might look. The Quran contains many practical, political hints. It combines guidance for the individual with social development. It accepts the multitude of opinions and the democratic search for a consensus. This "communicatory truth" is scientifically of only restricted, local value. Philosophy of science describes this type of truth as "Quinean truth by convention", considering its cognitive value as zero and its function in guiding cognitive principle as purely regulatory. Because of lacking "absoluteness" and informative cognitive value it is not considered as a foundation of knowledge. [after Spinner (1977):] We may easily accept this verdict - as not everything has to be scientific and most important things happen far away from science and scientists. But we can't drop "truth by convention" if we deal with development, that means with political and even with religious matters, what concerns interpretations!

Traditions are most often strongly founded in religion. After Nasr [Nasr p. 112] they do not only deal with cognition, but as well with love and with action. They are the source of the law and the foundation of ethics. "Indeed, ethics out of the frame formed by tradition is meaningless. It establishes as well the principles and norms for the political aspects of social life". Nasr even goes a step further from the critique of science. For

him even theology lost the contact with nature and human history. The unifying view, that relinked cognition with love and faith, religion with science and theology with all disciplines of spiritual striving has been lost definitely and totally; what is left is a world of cardboard categories in which there is no totality left because the holiness is no more at the focus or, in the best case, diminished to sentimental devotedness." [ibid:]

The traditional world knew three principled ways of cognition: **philosophy, theology and gnosis**. The modern world negates not only gnosis, but often even theology. "The Islamic sciences . . . , like other traditional sciences, never sought to satisfy the thirst for the Infinite in the realm of the finite. They were based directly on metaphysics and made no claim to usurp its place. They presented a 'finite science' of the finite and the relative domain of reality and left the quest for the Infinite and the Absolute to metaphysics and gnosis which alone can satisfy this thirst in a real manner. In contrast, modern science has sought to quench this thirst for the Infinite on its own level of finiteness, forgetting the limits which have always been set upon the sciences from on high. And it has led to an explosion of the most dangerous kind which now threatens the very harmony of the natural order. [Nasr p. 237:]

The following quote of Ghazali shows an other way of "heuristics" and "system delimitation". Ghazali explains the need for scriptural knowledge and wisdom in the following parable [al-Ghazali p. 14/15 - "The Quran as the sun of reason":]: "Such is the case with the other theorems on the necessary, the possible and the impossible. Of those there are some, that can't be grasped by the reason immediately, as soon as one presents them to it, but reason has to be seized and excited and made aware about it expressively, as in the case of speculative cognition. What makes it aware, is only the speech of wisdom. As through the enlightenment by the light of wisdom the reason turns in actu into a viewing one, after only having had the potential. The highest speech of wisdom is the speech of the sublime God, and out of its totality the Quran raises as especially wise. . . . The symbol of the Quran is the sunlight and the symbol of the reason the eyelight."

But scripture is not only guidance for the reason; scripture is symbolic transcendental knowledge [Nasr p. 3]: "Scriptural revelation provides man with the necessary and sufficient knowledge of metaphysical subjects (al-ghayb, the unseen) such as the existence and attributes of God, life after death, and the purpose of man and universe. The unobservable aspects of reality beyond the range of human perception, and cannot be proved or disproved by scientific observations or speculative thought. The proper attitude towards these non-demonstrable metaphysical postulates of religion is to accept them on faith without attempting to prove them since they are for the betterment of mankind."

Back to gnosis - knowledge of the Good is not limited to scripture. As Ibn Khaldun said [Husaini p. 87]: "According to the Quran, we can perceive the existence and oneness of God, without the aid of scriptural revelation, by pondering the 'signs of God' in nature like the Prophet Abraham."

Such a language and concept sound very strange and is very

difficult to read, to understand, more even to accept for a modern scientist. But honestly, which scientist did not in his career feel despair on the ways scientific research is steered and themes are selected? Which practitioner does not regard most of the scientific topics (e.g. of PhD-theses) straight away nonsensical? Where did wisdom get stuck in those procedures? If instead of doing history of philosophy we would do some more real and "truth-loving" philosophy, we might get a viable approach. The cognition, understanding and interpreting of those signs of God, his metaphors or codes is not limited to theology. After Jaspers [Karl Jaspers p. 1049:] - in opposition to Wittgenstein - "the coded scripture of the being is to be read with the help of the codes created by humans. I want to understand and know what myths and revelation spoke, even in philosophical alteration. What turned objective in poetry, art, religion, turns into an organon of doing philosophy."
"Even if philosophy at first hand destroys the codes of the myths, as long as their reality contained a moment of untruth and superstition. But the meaning of research is to lead to the true codes. Codes without research are misleading. Universal research has to lead to the borders, where the highest wonder and the most impressive codification is possible." [ibid:]
"The duty of true cognition is, to return permanently to there, from where it started, the increase of the primary view by cognition, the guidance by ideas, that create the synthesis of the otherwise infinitely scattered. That means in research: I'm lost, if I turn into an obedient serf of science for the purpose of executing basically not understood orders, for real cognition I have to stay at the source, from where I can oversee the whole and give orders, or I have to, if I receive them, understand them as my own, because I co-experience their source." [ibid p. 105:]

3.6.2 What did Ghazali Say? The Early Islamic Concepts of Science.

The question "what is science good for, and what relation does science have with religion?" occupied already the minds of early generations of Muslim. One of the first classifications of sciences has been made by Al Kindi (3rd century AH), adopted by Ibn Sina (AH 428), Ibn Rush (AH 595) and Al Ghazali (AH 595). One of the most complete classifications was done by Ibn Khaldun (AH 808). [after Husaini:] Here the classification of Ghazali, as his confrontation with Ibn Rushd was putting an end to the dominance of purely rational sciences over the realm of knowledge [ibid p. 35 ff:]

A) Classification of knowledge by level of obligatoriness:

A1) Individually requisite (*fard 'ayn*) knowledge. Its acquisition is shari'a duty (*fard*) of every Muslim. It starts with knowledge of the five pillars' of Islam and goes to Islamic law and as well into esoterics and mysteries.

A2) Socially requisite (*fard kifaya*) knowledge. It is *fard* for the Muslim community as a whole. Only the requisite (*kifaya*) number of competent people should specialise in each of the required disciplines and vocations. These comprise every science which is indispensable for the welfare of this world'; without them "a community would be reduced to narrow straits." They are agriculture, jurisprudence, medicine, politics and crafts.

B) Classification of knowledge by source:

B1) Shar'iyya sciences (*'ulum shar'iyya*). These are the sciences dealing with the **shari'a**. They are acquired from the Prophets and are not arrived at either by reason like arithmetic, or by experimentation like medicine, or by hearing like language."

Because understanding language, in the form of written texts, is basic for Islam, "Al-Ghazali, like other Islamic scholars before and after him, recognised explicitly only Arabic linguistics and the history and biography of Muslims of the early post-Quranic generations as sciences 'instrumental' in understanding the **shari'a**." [ibid p. 43:].

B2) Non-shar'iyya sciences (*ulum ghayr shar'iyya*). The primary sources of the non-shar'iyya sciences are reason, experimentation, and >> acculturation <<. The permissible (*mubah*) sciences are those which are not explicitly forbidden by the **shari'a** and therefore, are **prima facie** lawful. Such are the rational or 'philosophical' sciences.

C) Classification of knowledge by social function:

C1) Praiseworthy (*mahmud*) sciences. These are the useful and indispensable sciences 'on whose knowledge the activities of this life depend such as medicine and arithmetic.'

C2) Blameworthy (*madhmum*) sciences. These include magic, talisman, dialectical theology, astrology and the like."

The criteria for the discrimination of a blameworthy science are social [ibid p. 38:]:

- 1 When it leads to any harm as talisman and magic.
- 2 When it is harmful to most people and is not genuinely a science. Such as astrology which is purely guesswork and in the opinion of the average man, is not determined either with certainty or even with probability. It is blameworthy because of this ignorance, not because of its knowledge.
- 3 When it is of 'no use at all': genealogical poetry e.g. devoted to the glorification of one's own ancestors ...
- 4 When it does not give the practitioner any real scientific advantage as the study of trivial sciences before the important ones, the obscure before the significant.

D) The main categories of philosophical sciences are:

- 1) mathematical sciences
- 2) logics. Nothing in them is relevant to shari'a matters 'eit-

- her to deny or affirm them'.
- 3) natural sciences or 'physics'. These sciences are also *mubah* and *mahmud* like the two above except with the regard to the twenty major errors of 'philosophers' pointed out by al-Ghazali.
 - 4) theology or metaphysics. 'Here occur most of the errors of the philosophers' because they are 'unable to satisfy the conditions of proof they lay down in logic.' The praiseworthy aspects of this sciences are already dealt with in the Quran and Sunnah; 'whatever evidence is not contained therein is either reprehensible argumentation or mere wrangling!'
 - 5) politics, including economics
 - 6) ethics.

Since these sciences were based in the Islamic civilisation on the scriptures revealed through Prophets and the teachings of pious men, al-Ghazali considered them praiseworthy."

Obviously there is little (so far) that might lead one to think, that Ghazali was totally opposed towards sciences. Let's consider now what were his arguments 'against' science. He commented on them in a metaphorical form in "*The niche of the lights (miskat al anwar)*". [From: Abu-Hamid Muhammed al-Ghazali [transl. by El-schazli]: "*Die Nische der Lichter*" (Translated from German by the author).] He compares the "physical light", the "eye" or "view", with the reason and gets to the conclusion, because of the seven main deficiencies of the view, that **only the light of reason deserves to be called "light"**.

The seven deficiencies of the eye and the advantage of the reason are:

- 1) The eye sees something else, but not itself.
 - The reason understands the others **and** its own properties.
- 2) The eye doesn't see what is far away.
 - The reason doesn't care if something is near or far.
- 3) The eye doesn't see what is hidden behind a veil.
 - The reason advances as far as to the throne of God and to what is behind the veils of heaven. No truth is hidden from the reason.
- 4) The eye sees the outside of the things, but not the interior; the shape but not the truth.
 - The reason proceeds into the inner of the things and their secrets, grasps their truth and essence, deducts out of it their cause, aim and sense, from what, how and for what they are made; from what spiritual moments they are composed and structured, what relation they have to the existence; in which relation they stand to the Creator and to the creatures ...
- 5) The eye sees only a few of the existing things, but not the whole. It doesn't grasp nothing out of the realm of the rational and even many things not out of the realm of the senses, as sounds, odor, taste, warmth, coldness, nor the feelings of the soul as joy, happiness, sadness, pain, pleasure, love, greed, power, will, knowledge and so on and innumerable other things.
 - > The reason uses the five senses as spies. Inside it has other spies, as there are: Imagination, fantasy, thought,

remembrance and memory.

- 6) The eye doesn't see what is infinite. It can only grasp the attributes of the bodies, that are finite.
 > The reason grasps cognition that is imaginable beyond the finite.
- 7) The eye sees the big small, the far near, the quiet moved and the moving quiet (e.g. the sun and the stars).
 > The reason recognises that the stars and the sun are by far much larger than the earth.

Ghazali summarizes the result: "Know that inside the human there is an eye that possesses such a perfection (to say: lacks such deficiencies) and is called reason, an other time spirit and a third time human soul. *"As can be seen, he (Ghazali) didn't disapprove of and didn't despise rationality. In the opposite, his presentation of reason shows, which high respect he had towards it. He is just not an admirer of reason. Analytical thought stops, where the religion and the sacred speak to the human being."* [ibid p. XVII:].

So far what Ghazali said about the reason. What he is criticised for, is probably his next step, where he compares the reason with the revelation. As the reason needs some impulse to get active, there is a higher light needed to move and illuminate reason. This higher light is the light of the revelation, the divine light - The Quran is the sun of the reason!

Ghazali foresaw that certain people would have difficulties with his conclusion, that there is something higher than the reason and said: *"Who is not open minded enough to understand that, should give up this kind of science."* [ibid p. XVI:] He definitely claimed the superiority of revelation, of the Quran, over science - but he **never** classified science as 'useless' or even blameworthy ('madhmom')! He said that *"All prophets are shining lamps, and so are the learned; but the distance between them is immense."* [ibid p. 18:]

As Mohammad is the last and the seal of the prophets, for us is not more left than 'to get to be learned', what is recommended in uncountable ayas of the Holy Quran - and not limited to the knowledge of the Quran itself.

3.6.3 The Ash'arites Versus the Muta'zilites / Prima Causa Versus Causa Secunda [after J.C. Buerge]:

A much heavier impact on the development of science had the disputes between the *mu'tazilites* and the *ash'arites*. While the first claimed that God corresponds to all postulates of reason the latter refused the acceptance of any cause except God. The "sincere brothers" from Basra claimed, that *sha'riya* is medicine for the sick, while philosophy is medicine for the healthy. Ghazali didn't agree on that, based on the errors of the philosophers, that he had demonstrated in the "*saviour from errors*". Certain arguments went even much further, as: "Who uses logic in his arguments is a heretic" ("*man tamantaqa tazandaqa*"). [ibid p. 119:] It was the principle of the trustfulness towards God (*tawakkul*) that was under threat. A comment of Ghazali in his revival of the sciences of the (Islamic) religion shows how serious this was taken [ibid p. 109]: "*The devil prevents you from this (Islamic) confession on one-ness with two things: One is the turn to the free will (IHTIYAR) of the beings, the other is the turn to the lifeless things. What concerns the turn towards the lifeless things, so we mean with it, that you rely on the rain for the germination, sprouting and growing of the crop, on the clouds for the rainfall and the coldness for the concentration of the clouds; on the wind for the upright position and the movement of the boat. All this is joining (to the one-ness of God) and ignorance about the true nature of things.*"

The main argument against the cause-relation based studies, is God's almightiness, that could be seen as restricted by natural laws. The claim of the *ash'arites* was here the same as the one of the church in medieval Europe [ibid p. 108:] "*God can abolish the seemingly ruling natural laws at any time, as they are not laws but rather "God's habits".*"

The concept of "science" changed afterwards totally towards 'religious science'. [Ibn Taimiya (1263-1328) in ibid p. 99 :] "*It is only the science inherited from the prophet that deserves the name science. All other are either unusefull or no science at all, even if they are called so. Each usefull science is necessarily contained in the bequest of the Prophet.*" The same had been said a hundred years before by one of the greatest mystical thinkers of Islam, the andalusian Ibn 'Arabi (1156-1240 AD). In a letter to the philosopher Fachr ad-din ar-Razi her wrote: "The intelligent individual has to study all those sciences, that help, to perfectionate his character, and accompany him wherever he goes. The only science conform to this is the knowledge of God that has been given as a gift and obtained from direct (mystical) view. Medicine e.g. is only needed in a world of sickness and lingering illness. If you proceed to a world, in which there is no sickness, who do you want to heal with medical knowledge."

In contradiction to Ghazalis classification of sciences, the valuation turns now totally to the 'otherworldly' - a turn that even the Prophet had not chosen. He earned his life on earth as a merchant and put some weight on the organisation of the daily, worldly life.

So the combination of *ash'arites* and the invasion of the Mongols put an end to the great Islamic sciences, while the West, after discussing the same problems, proceeded. The enormous progress in the technical field allowed for some progress in social politics as well. But in the end the West has to find out that the dominance of the *fard kifaya* with its specialised knowledge and the almost total neglect of the *fard 'ayn*, giving the individual a direction and social integration, does not work either and leads to destruction and disaster.

3.6.4 Islamic Engineering and Planning as a Socio-Political Process

At the origin and at in the center of Islamic Sciences stands again water - more precisely the lack of water. The aim of the most important "science" was [Nasr p. 210:] to: *... make maximum use of available water ... make this science or art one of the most developed in the whole of Islamic civilisation. ... the Arabic word for geometry is handasah [sharing the same root with muhandis - the engineer] which is derived almost certainly from the Pahlavi handazah, a word denoting both computation and measurement of water canals, or simply irrigation."*

The decisive importance of this science, the potential power it it gave to those that mastered it, made clear from the beginning, that

- a) technical knowledge is only one factor of development, and not the decisive one, and that
- b) a social and political integration (control) of technical development is necessary [Husaini p. 116]:

"Cultural historians and sociologists have pointed out that decline of technology in many civilisations, for example, the water resources systems of the Tigris-Euphrates of the AD fifth,- seventh and, following the Mongol destruction, in the seventh/- thirteenth centuries; took place not for want of technicians and technology but due to socio-political disorganisation. Therefore, the first principle of Islamic political philosophy is that Islamic culture must assume control and direction of the entire socio-cultural system. The Muslim engineer and technologist must be an active participant in national and international political economy decision-making, particularly in matters related to environmental resources management and development planning in general. The Islamic 'integrated cultural mentality' demands 'integrated engineers', some of whom should be engineer-statesmen as implied by the principle of fard kifaya (Chapter 3). This was best exemplified by the scientist-philosophers and scientist-politicians in medieval Islamic civilisation. In the developed countries of the East and West, engineers in general and the generalist-specialist engineers in particular are trained to become engineer-managers, organisers, defenders, and leaders (Chapter 3)."

The engineer has a special responsibility towards society, as he is the one who develops new techniques and applies them. His work is practical use of scientific knowledge - so he is the one

to burden the responsibility of the transfer from theory to practice: "Instead of science, divided into theory, plus minus dominated by metaphysical presuppositions and/or paradigms of revelation - and the practical side, left to the engineer, one orients itself towards a science of action, that's to say the mastering of the dialectical game between knowledge and practice." [Arkoun p. 305:] uba

This "dialectical game" is not only taking place between knowledge and practice, but includes the dialectics between nature and culture, individual and society. And, last not least, where the Islamic world differs from the West: the dialectics between the the real and the transcendental world [Nasr p. 235:]: "An essential feature of Islam, as reflected in its's sciences as well as its philosophy and cosmology, is that equilibrium and harmony with the natural environment is not possible unless there is harmony with the Metacosmic Reality."

3.6.5 Planning - Social Decision Making - Politics

Some Western definitions of planning are listed in chapters 2 and 3. The Islamic concept is not quite different [Husaini p. 115]: "Planning can be defined as the orderly consideration of a project from the original statement of purpose through the evaluation of alternatives to the final decision on a course of action." But what is definitely different from our concepts, is the explicit integration, more even, the dominance(!), of the orientational (*shari'a*) knowledge: "The normative and ideological ends and objectives, and the criteria for selection, evaluation, and decision-making in the process of planning are the relevant realms for **shari'a** and its derivative economic, political, social, legal, and other doctrines. In this sense Islamic environmental systems planning will be comprehensive and not partial. Comprehensive planning connotes the relevance and hierarchisation of the legal, ethical, social, economic, political as well as the engineering or technological ends, objectives, and criteria. Partial planning would imply, for example, engineering-economic determinism, that is self-sufficiency of a benefit-cost ration greater than a certain minimum as long as the project is technologically feasible."

So a "technical development", analogue to the one of the industrial countries is in a way "blocked" by a larger and more social view of development. In addition to the eternal values to be respected, there is a strong political drive for consensus rather than for competition. And consensus is again very limiting for development, as it is a cumbersome and time consuming process [Hussaini p. 113]: "Despite the diversity and differentiation among the decision-makers based on their special interests, functional specialisation, membership in diverse private organisations and public agencies, they must engage in a co-operative search for the optimum solution implied by the Islamic ends and means which they agree ought to be decisive. Co-operative decision making requires a will and commitment for accommodation; that is, the participants freely and willingly choose the ends of one another even if that produces unfavourable consequences for their particular interests. Their Islamic absolute-value

orientation requires them to choose a solution on its own merits, and abjure pejorative 'asabiyya, that is, 'blind support of one's group without regard for the justice of its cause'."

Islamic governments should be strongly democratic (theoretically), respecting the individual. Practically - many are dictatorships, in spite of the clear ideological and historical background. It probably depends on the perspective. Qalif Umar, leader of a world empire, would nowadays probably not be considered a democrat, still the following words are his [Hussaini p. 109]: "By God, he that is weakest among you shall be in my sight the strongest, until I have vindicated for him his rights; but he that is strongest will I treat as the weakest, until he complies with the law."

On the management of human resources there exist fundamentally Islamic procedures. Al Mawerdi's recommendations on the capacity of ruling (political science as *fard kifaya*) [Muatassime p. 801]: Physical capacities: Fully disposing of the senses of view and hearing - and of the gift of speech! Moral qualities: Justice in its full extent, the degree of wisdom needed to govern people and to direct matters, valiance and courage to protect the Islamic countries. Intellectual capacities: A large knowledge bound to the intelligence of the hart and of the spirit: "The degree of science needed to practice ijtihad (interpretation, exegesis) in the matter of decisions to be taken or of sentences to be pronounced.

Ibn Taimiya (1328 ad) adds the competence and loyalty: "The competence (*qawa*) requires a technical "strength" and a strength of character. Loyalty "consists in defending the public function against its proper moodiness and those of its relatives in order not to get entangled in the abuse of confidence and nepotism: "Every man vested with authority over the Muslim who nominates a functionary because of friendship or relationship is cheating God, his Prophet and the Muslim" recalls kalif Omar to his son." Ruling, consulting, giving advice should not be taken easy by Islamic scientists and engineers, as the sanctions are quite heavy: "The one giving a bad council before dying will not enter the paradise."

3.6.6 Islamic Education

The objective of Islamic education are not so different from ours. It puts less emphasis on individualism (having to deal with very individualistically minded people!), but it states much more clearly the dependence of the individual from the social group: "The aim of specialised education or vocation is to develop some skill, trade, or knowledge in order that the individual may earn his living while enhancing the common good." [Husaini p. 42:] Islam is not per se fatalistic, refusing any personal responsibility: "Socio-cultural rejuvenation depends ultimately on indigenous change and efforts. 'Shurely God changes not the condition of people, until they change their own conditions.'" [Quran 13/11; 8/53] But in Islamic countries, not denying contradictory evidence, the principle of consensus mostly dominated over competition. So the aim of Islamic education was to teach and learn the knowledge of orientation - and

not causal-analytical methods! The emphasis of all education was and still largely is (in rural communities) on the teaching of religious guidelines! The cultural framework is largely comparable with other Asian cultures of Buddhism and Kuntutseanism, as there as well the focus of teaching is giving an orientation to life, to transfer social and spiritual values [Husaini p. 61]: "Engineering education must be developed to conform to the social-economic, technological, and environmental conditions and requirements of each country in a way designed deliberately to foster regional co-operation especially in higher education, research and development."

So far the ideological aim. As to be expected, reality is different. In most of the Third World countries the technology-centered, reductionist training starts to dominate over holistic education [ibid p. 137]: "The existing scientific and technological institutions at the periphery, in the so called Third World, transfer ready knowledge, separated from its integral cultural context. In those countries the scientific methods are increasingly accepted; they exist side to side with the archaic ways of thinking." And that creates more problems than it solves. And that is an important factor for development assistance. Not only is the way of doing education (didactics) inefficient, but as well it creates new and badly integrated social strata [ibid p. 69:]: "Historically, Anglicised and Gallicised elites in the underdeveloped countries have often been a deculturalised minority; in their knowledge and aspirations, aliens to their own cultures and nations."

So the recommendations of Hussaini, as "metaphysical" as his (and the author's) approach may seem, are targetting the core problem [ibid p. 50]: "Each of the sciences comprising environmental engineering systems planning has two distinct facets." "In the light of our review of Islamic philosophy of knowledge and education, it is imperative that we distinguish between the value-impregnated and the value-free; the ethically charged and the morally neutral; the universal, rational and ideological realm of the disciplines comprising environmental engineering systems planning. The Islamic approach must establish the relation and hierarchy between the shari'a - or ideology - susceptible and universal rational sciences."

"The individually obligatory knowledge should be acquired first before gradually embarking upon specialisation, that is, the **fard kifayah** sciences obligatory from the community's viewpoint. Among the praiseworthy specialised sciences, those for which there is a social demand must be acquired in preference to the trivial and obscure or too highly specialised sciences. Social utility, requirements, and **kifaya** in a dynamic time-space context rather than individual interest and private benefits should be the criteria for manpower development. Al-Ghazali deplored the fact that abandonment in his times of these principles and priorities led to a situation wherein no Muslim physicians could be found in many towns while there was an oversupply of lawyers and jurist who specialised in obscure and socially unnecessary details of Islamic law." [ibid p. 41:] As the present situation shows (s. chapter 4.5.2.1), recommendations alone are not sufficient to change things.

3.6.6.1 An Example of Traditional, Integral Training

The following example on the training of a Saracen bowman shows, that orientation of action can't be separated from technical training, not for a bowman - much less for an engineer! The same has been the aim of Nasr's book [Nasr; S.H.: *Cognition and the Holy*" (p. 417)]: "Nobody can be trained in a certain artisan skill without possessing certain moral qualifications and without being obliged to observe certain ethical virtues. If the teaching of artisanal techniques depends on the moral qualifications of the pupil, the master considers as apt or not, how much more is this valuable for sciences, that are of divine character at the end and that are not given at their free disposal to the humans."

The following two pages treat of the duties of the master and the novice in archery, dating from the 14th century [Latham & Paterson: *Saracen Archery* - by [Taibuga al-Ashrafi]]. It shows clearly how strongly the technical training was socio-culturally integrated and how strongly this type of teaching and learning is focussed on orientational knowledge.

The duties of the novice:

"Mark and carefully retain the fundamentals as expounded in our work, for practice will prove them to be sound. If you are wise, you will practise patiently and persistently, for anything hard can become easy with practice."

Didactical steps: Use a light bow and draw without arrow. Grasp, lock and draw. Nock arrow. Practise on drum. Use more powerful bows (5 consecutive steps of training). Practise on but without mark. Shoot into the great void.

"During all this training he should go and consult master archers and show them how he shoots, asking them to point out his faults and how to eliminate them. He should regularly watch how first-class bowmen shoot without taking part himself and endeavour to assimilate good points either from what he himself can see to be good performance or from their own conversation. These he should put into practice on his own, and when he has acquired mastery and considers his shooting to be as perfect as that of other archers, and when his view is confirmed by what full-fledged archers who have seen his shooting have to say about him, he may join them. In his conversation with such persons he should be polite and gracious, adopting an attitude of self-abasement and humility, and should shoot with them as they deem appropriate until he becomes conversant with their customs and drill. During this time, furthermore, he should seek useful advice from persons he considers qualified to give it. When he outclasses someone else, he should not exalt himself above that person nor despise him nor provoke him, but rather make modesty his rule and observe silence and good manners. Finally, hard and regular practice is a religious bound duty to be performed by every archer whether he be a teacher (mu'allim) or learner (mu-

TA' ALLIM).

ii

It is established in authentic tradition, that the Prophet said, "THE ANGELS ATTEND NO HUMAN SPORT SAVE ARCHERY". Archers should therefore be aware of the exalted station of angels who attend them and should rank them as guests and respect them, for the Prophet said, 'if a man belief in God and the Last Day, let him do honour to his guest.' Going to the shooting range (marma), then should be regarded by the archer as going to the mosque, and he should consider those with whom he consorts there as leaders of men and persons of the highest standing. Likewise he should think of his training in archery as training in religious knowledge. He should therefore make a practice of first performing a lesser ablution and set about his business, praising God with tongue and hart as he makes for one of the gardens of paradise with the peace of God upon him and with dignity of bearing. When he reaches his destination (i.e. the range), he should enter politely, greeting all those present with the words, 'Peace be upon you!' He would do well also to perform to rak'ahs in an act of worship. It is not a matter of saluting the actual place, but rather a key to safe-keeping, success, and accurate shooting; for if proceedings are opened with an act of worship, they will be worthy of a happy issue and will be blessed with God's good direction and success. The archer should next say a private prayer and ask God - exalted be He - for guidance and good direction, and, in asking for guidance, remember to ask that you be guided in the right path, and in asking for good direction, remember to ask that the arrow be well directed to the mark.'

"But even so, he will still not have a complete grasp of all there is to know about shooting, and he will never be too old to learn. Authorities on archery say that, no matter how much knowledge of the art of shooting a man may acquire and no matter how long he lives, he will not achieve complete mastery."

The Duties of the Master and Teacher:

It is the duty of the master to guarantee an appropriate behaviour of his pupils, to teach those a "respect of life": "Has to determine if the novice is a Muslim; will shoot no other Muslim, nor any non-muslim enjoying treaty rights, nor any dog, nor any four-footed animal, except in hunting or unless it be something which must of necessity be destroyed, nor anything that will involve him in an act of injustice."

As to a master's duties, he should train his pupils, bring them together in unity and concord, spur them on to work, reprimand them only in private, and labour to the end that they may strive to learn and ever reverence the place dedicated to archery, wherein none should be allowed to utter any profanity, inasmuch as it is a place of worship, and places of worship belong to God.

Proceedings should be opened with the formula 'IN THE NAME OF GOD'. Upon loosing [technical term, means releasing the string], the formula 'GOD IS GREATEST' should be pronounced, and, after that, God's

blessing upon the Messenger of God, his family and his Companions should be invoked. Where it is merited, the master should compliment a shooter to encourage him. He should teach his pupils all that is good and at the same time restrain them from all that is bad.

A master should be taciturn and of dignified bearing and commanding presence, yet not haughty. He should be stable and patient and not too hasty with his answers. All kinds of learning may be observed in all mankind, and there is no one who does not have some share in God's bounty. It is desirable that a master should have the strength of an elephant, the spring of a lion, the boldness of a leopard, and the cunning of a fox; that he should have for his colleagues the affection that a dog has for its master; that he should exercise the patience of a cat. He should make the sword his companion, the lance his friend, the shield his fortress, the dagger his secret weapon. He should display great tolerance and be indulgent. The beginning of all things is piety, which is a man's capital stock. These, then, are some of the qualities which a teaching master should possess.

As regards the qualities required of a novice, some of these have already been mentioned. The foundations upon which they all rest are humility, hearing attentively and obeying that which is pleasing to God Almighty and His Messenger -
 may God bless him, his house
 and his Companions,
 and grant them
 peace!
