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THE HYPO- AND THE HYPERSENSITIVE BEING

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Abstract: Awareness of a person's own action is strongly related to a person's conscience. An unscrupulous being blocks off his awareness and does not care about the consequence of his doing. Such a person is an autocrat. He is hyposensitize. His ego is inflated. On the contrary, a person of excessive awareness, of too much forbearance, can become timorous. He is hypersensitive. His ego is depressed. The autocrat with his oversized ego sets off toward his goal with uninfluenceable direction and reaches his goal well, even overshoots it easily if nothing hinders him. The forbearing person, the hypersensitive, operates leniently and, as a result, achieves only part of his desired or deserved aim. A person who is under-sensitive, or who blocks off awareness, can exert a will which is many times larger than the will a lenient person can exert before they become unstable and, then, no longer being able to strive toward their goal. These facts are demonstrated with a very basic circular cause-effect-cause model. The mathematics to describe the model's behaviour is elementary. *Copyright © IFAC 2002*

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1. INTRODUCTION

The lower a person's awareness is with which he realizes and rates his doing, or the more he blocks off self-reflection, the more straight forward and effectively his will works. This is a functional verity. The fact exists whether the person's doing is considered by the environment to be ethical or corrupt, whether it is in line with the society within the person lives, or whether he is a crook. The verity is universal. It is a Natural Law independent on moral, social, or religious notions. The opposite is equally true. The higher a person's awareness is with which he perceives and rates his doing, or the more self-critical, the more subtle his reflection is, the more cautious and ineffectively his will works. The person of too much sensitivity for his own actions can fall into a depression.

As the autocrat is socially and politically a public danger, whereas the timid person rather lives socially in the back ground, public emphasis is given to the autocratic behaviour.

Awareness - as defined - is equivalent to the feedback signal within a person. When action is in its process, the feedback signal tells continuously what portion the person already attained of the goal he wants to reach. - The consequences of feedback is the topic of the presented essay.

The New Webster's Dictionary gives several definitions for the term feedback. Three of these are:

(a) the use of the output of a system to control and correct discrepancies in the operation of the system.
(b) response following an action.
(c) a partial return of the end product of any process to its source.

All three notions are embedded in this study.
It will be found that the stronger the feedback is suppressed or - what comes to the same - the less it is felt, the greater the will or power can be with which a person pushes himself toward his goal.

But such behaviour involves danger. Firstly, there is the possibility that the person becomes unstable within himself and looses the capability to strive toward his goal. This happens when he wants to exert too much will.

His greed for will can become such that he ruins the chances of success. Secondly, with too much exerted power it is easy to overshoot the mark with the consequence that the environment opposes to the bold action when the inflated person's daring behaviour becomes recognized. This is the case when revolt is setting in.

A very simple functional model verifies the operation of the feedback signal, i.e., the awareness, and the consequences by hindering the perception of this signal or by not being able to sense it.

The same model serves to describe the outcome when a person's awareness is excessive. Sensitivity can be so overwhelming that the person cannot act anymore with his full capacity. The goal then cannot be reached anymore to its best extent. The person might even collapse, e.g., in despondency or depression.

2. THE DESCRIPTION OF THE MODEL

Fig. 1 depicts the basic structure of an individual's functioning in regard to the notions to be investigated. It is a feedback-loop producing self-control which, in turn, provides awareness. Self-control, or awareness, is caused via the feedback signal. This signal also can be called eigen-response based on responsibility. The purpose of the loop's configuration is to reach the goal u despite the entering disturbance (or disturbances) d from the environment with which the person is related to (exogenous) or from disturbances coming from inside the person himself (endogenous).

The goal u can be called self-realization, because whatever a being does, the action always is in regard of the realization of the person himself: **Proximus sum egomet mihi**, I am myself the next.

In order to approach the goal u a will is necessary. This will is indicated with the symbol G. As every action to be executed needs time, an element describing the time-dependency of acting is incorporated. This is the transfer function F_t. More about this function later.

The feedback signal $[-F_b\ x(t)]$ compares continuously the currently reached goal attainment $x(t)$ with the desired goal u. The difference, that is what is not achieved yet, is named $\varepsilon(\tau)$. ε- stands here for "error"; it is expressed in equation (1). The person's intention is to make the error e as small as possible in order to come to his goal u as close as possible. For this operation he needs his will G.

$$\varepsilon(\tau) = u - F_b * x(t). \qquad (1)$$

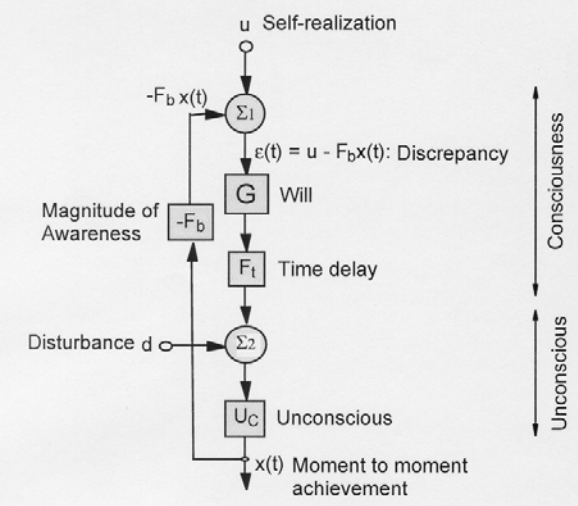

Fig. 1: Functional model of the individual.

u Goal self-realization (assumed to be constant),
G Will or power for self-realization,
$\varepsilon(\tau)$ Difference (error) between goal u and actual attainment x(t),
F_t Package, describing time delay,
F_b factor of awareness, feedback factor,
U_C Unconscious
d Disturbance signal (assumed to be constant),
$x(t)$ Time dependant goal attainment,
Σ1, Σ2 Summing points of variables

In equation (1) it is assumed that the goal u does not change as a function of time. The goal self-realization (u), does not show time dependency $u(t)$, it is just u. For easier reading, the notation of time, (t) for $x(t)$ and $\varepsilon(t)$, will not be carried along - although time dependency exists because the process goes on in time. It functions over time. Thus, equation (1) becomes a simpler notation, equation (2):

$$\varepsilon = u - F_b * x \qquad (2)$$

The term F_b, the transfer function of x, is a factor. It determines the magnitude of the feedback signal x. F_b can make x smaller or lager before it becomes compared with the goal u. In other words, the error F- within a person depends upon his **awareness**.

The loop, that is the entire person, becomes disturbed mainly via the environment the person lives in

(exogenous disturbance). The disturbance signal is called $d(t)$, or also simply d. For simplicity, d is considered to be constant and - also for simplicity - of equal magnitude as the goal u. (Indeed, d can be smaller or larger than u.) This disturbance d becomes positive or negative depending on the **effect** it has on the person. A positive effect upon the signal d means help; or an addition to the distance on the way to the goal u; whereas a negative effect subtracts from the effort toward the gaol. A negative d-effect pushes x further back on the way to its goal.

In order to attain the goal u as accurately as possible, the feedback signal $-F_b x$ must be -x, i.e., F_b must be +l. This fact will be shown in Fig. 2. (There are other means in the human being to approach u faster than with the time delay Ft alone - this is derivative action - called anticipation dε(τ)/dt, but this feature is not considered herein; the focus is on the awareness factor F_b only.)

To begin with, the time factor F_t is disregarded. In other words, F_t is put to +l. The transfer of the power G through F_t is, therefore, instantaneous and unchanged. Later, a time-delay will be incorporated for a somewhat more sophisticated - and more realistic view, for the dynamics of the loop, i.e., for its time dependency. To put Ft equal to +1 is equal to the end-state of an action which was processed through the loop. It is the final attainment after a goal u was set. It is the steady state.

The purpose of the loop in its total value comes to light when it is expressed mathematically and represented graphically. Then it becomes intelligible. This representation follows. (Because the human brain can perceive only situations which happen immediately, at the instant, because it cannot perceive continuous circular functioning of cause effect cause behaviour, it is the mathematical representation which gives insight into the time-functional action.)

3. THE MATHEMATICS OF THE LOOP

The description of Fig. 1 is the following. At every instant when action is in process, the momentary attainment x is composed of everything which comes - pictorially spoken -"vertically down" in Fig. 1. This x is composed of three parts:

$$x_1 = GF_tU_cu$$
$$x_2 = \pm U_c d$$
$$x_3 = -F_bGF_tU_cx$$

thus,

$$x = x_1 + x_2 + x_3$$
$$x = GF_tU_cu \pm U_cd - F_bGF_tU_cx$$

Rearranged, x becomes equation (3):

$$x = \frac{GF_tU_c}{1 + F_bGF_tU_c}u \pm \frac{U_c}{1 + F_bGF_tU_c}d; \quad (3)$$

Equation (3) says that the goal attainment x is a function of the desired goal u, the influence of the disturbance signal d, and of all the bits and pieces of the loop, that is Fb, G, Ft, Uc, and the summing points Σ1 and Σ2. The attainment x is a composition of two parts, of the goal u and the disturbance d.

$$x = x_u \pm x_d$$

It is advantageous to consider first the two parts, x_u. and x_d, separately; x_u when d is zero, and x_d when u is zero.

The signal u is always positive for the person himself. The goal u is what a being wants to attain. Therefore, u shall be +l, or 100%; without any ethical value! (Ethics is a subjective term which depends on attitude, culture and religion. Nature has no ethics.)

The signal d is more critical. Its effect can be positive, (+1), or negative (-1), or any value between (+1) and (-1) - or even lager than ±l. lf the effect d has on the goal striving process is negative , d is to be taken negatively.

First, d is set aside by putting d = 0 in equation (3). Thus, equation (3) becomes equation (4), our first concern. Ft in a steady state position is set to +l. And also Uc will be set to +l, because it is not a parameter of interest.

$$x_u = \frac{G}{1 + F_bG}u \qquad (4)$$

This equation (4) is the expression which is to be investigated in order to explain the essay's meaning.

4. THE INVESTIGATION

4.1 *NORMAL SITUATION*

In normal situations, in biological and technical operations, F_b is equal to +l. Then the negative feedback x is a correct measure of the momentary attainment. With this condition, equation (4) changes into equation (5). In this equation the goal u is put to +1, or 100%.

$$x_u = \frac{G}{1 + G} \qquad (5)$$

In Fig. 2, curve A demonstrates this extremely important expression (5).

a) The curve A tells that the higher the will G is, the higher is the attainment x_u; but the curve x_u as a function of G is by no means a straight line. The final attainment x_u is not proportional to the will G.

b) With G = 1, the attainment x_u is 50%. With four times this will, with G = 4, x_u is only 80% and not 4 times the attainment of G = 1.

c) With increasing G, the curve flattens out. The higher the reached attainment x_u is, the more will G is needed for an additional increment of x_u. This fact is a natural law every sportsman and musician knows well. The higher one is up the ladder of success, the harder it is to achieve a further improvement, a further increment Δx_u.

d) It is impossible to attain 100% of u, of what one is striving to. In order to attain 100% goal, the necessary will G would have to be infinitely large. (Infinity - by the way - cannot be perceived, not even imagined, with our brain! The two words, infinity and eternity, should not be used in science, except as abstract term in mathematics.)

lt is the feedback signal -x which flattens the curve. - But why is feedback so important? It is needed to fight the influence of disturbances d, if disturbances occur; and they are always around. What is a disturbance's influence? Let's take the formula (3), but with F_t = 1 and F_b =1, and make it equation (6).

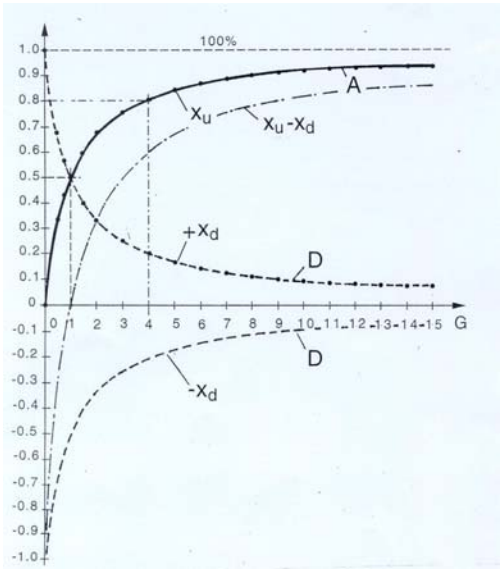

Fig. 2: Goal attainment of self-realization, xu, and effect of disturbance, xd, as a function of the will G. Feedback Fb = 1

$$x = \frac{G}{1+G}u \pm \frac{1}{1+G}d \qquad (6)$$

With u = 1, and d also +1 formula (6) becomes formula (7).

$$x = \frac{G}{1+G} \pm \frac{1}{1+G} \qquad (7)$$

lt can be seen that the two parts, when added together with a positive influence of the disturbance, become +l.

$$x_u + x_d = +1 \text{ or } 100\% \qquad (8)$$

The effect of a positive, of a helping disturbance d, is such that the sum of x_u and x_d is together just 100%

(This implies that x_u and x_d have the same effect and equal magnitudes). The dimension of d, and the dimension of the influence which d has on the person, must not be the same. It is the effect the disturbance d has what counts. The negative d-effect damages the self-realization x. This damage has the opposite effect than x_u. And vice versa: the positive effect of d increases the goal attainment. But in both cases, the higher the will G is, the larger x_u becomes and the smaller is the influence d has on x_d ! In the expression of x_d, in equation (6) the factor G is only in the denominator. G "pulls" the influence of d down, makes it smaller.

Without any will (G = 0), the influence of the disturbance d is ±1 00%. x_u becomes equal to x_d ! The disturbance comes fully through, nothing of the wanted self- realization u will be attained. The rule is: no will G, no gain x_u, **Ex nihilo nihi fit** - Nothing comes from nothirig. Self-will is necessary for self-realization! And self- realization means to exist.

For example, with a will factor G of 9 the attainment x_u is 90%, and a positive influence of d, $+x_d$, is only 10%. Both together, x_u PIUS x_d, make 100%. In Fig. 2 the curve x_d, which is

$$x_d = \pm \frac{1}{1+G}$$

is marked with D. At weak will G = 1, $x_u = +x_d =$ +50%, and $x_u + x_d =$ 100%. But with $-x_d$, $x_u - x_d$ becomes 0. Life is such that x_d is mainly negative! Therefore, the curve marked with $x_u - x_d$ in Fig. 2 is definitely domineering.

4.2

Our main interest is now the following: What is the goal attainment when the feedback signal x becomes smaller or larger in its amplitude, i.e., when the factor Fb becomes smaller or larger than +l? With Ft = 1, formula (3) becomes formula (9).

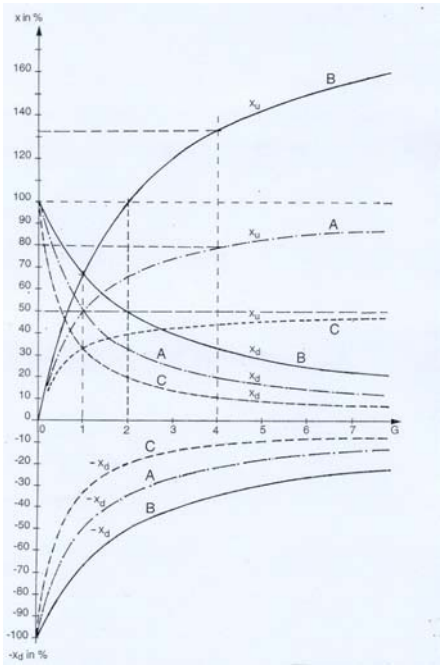

Fig. 3: Goal attainments x_u and effects of disturbance x_d as a function of G and with awareness factor F_b as parameter.

$$x = \frac{G}{1 + F_b G} u + \pm \frac{1}{1 + F_b G} d \qquad (9)$$

Looking at the part x_u with u 1, the expression for x_u is equation (10).

$$x_u = \frac{G}{1 + F_b G} \qquad (10)$$

The parameter F_b is now the important variable. It shall be made, firstly, smaller than 1, say 0.5. The feedback signal F_b, which tells how much of x has already been achieved, becomes obstructed. Only half of it comes back. The awareness of what the person is doing (for his own self-realization, indeed) becomes reduced. The response, or the responsibility is only 50%. The autocrat does not want to realize or cannot realize fully what his attainment really is, Le., what he is doing. He just wants to exert his will G in somewhat uncontrolled action. With $F_b =$ 0.5, equation (10) becomes equation (11).

$$x_u = \frac{2G}{2 + G} \qquad (11)$$

Fig. 3 depicts the goal attainment x. for this situation. It is the curve B. For comparison, the curve A of Fig. 2 is incorporated. The goal attainment x_u of B becomes larger than x_u of A. For G = 1 it is now 67% instead of 50% as it is in Fig. 2, and for G = 4, x. becomes 133%, and no longer only 80%. The person can easily overshoot his goal! With a will G = 2, 100% of the goal is already attained. The absolute maximum which can be attained (with G = "0) is 200%. Curves A (x_u and $\pm x_d$) are for a "normal" person of $F_b =$ 1; curves B are for an autocratic person of B 0.5, and curves C are for an oversensitive person of B = 2. The explanation for B 2 follows.

The interpretation is-. Reduced, faint, perception of x_u, of the doing, or denied awareness, increases goal attainment far above 100%. The egoist can overshoot the mark. Disregard self-control, disregard what you do and your achievement goes marvellously up! This is the way power hungry people act. They don't care what they do. They do: period. And very so often, they can become corrupt. An autocrat generally is a despot. **Toute grandeur est dans l'assaut**; Platon.

What is now the problem concerning the effect of disturbances? The effect of d on x is as equation (12) indicates.

$$x_d = \pm \frac{2}{2 + G} \qquad (12)$$

The effect of d on x becomes almost doubled compared with the case for $F_b =$ 1. x_u also is about twice the amount compared to the situation when $F_b =$ 1, i.e., at normal sensitivity. Being insensitive brings goal attainment, but also higher effect of disturbance. In the social world the benefit for exerting bold power

is double- edged; disturbances which work against the execution of will very often occur.

What now, if the contrary happens: hypersensitiveness instead of hypo sensitiveness?

For a person who is hypersensitive, F_b = 2 shall be taken. Then formula (9) becomes equation (13).

$$x = \frac{G}{1+2G}u \pm \frac{1}{1+2G}d \qquad (13)$$

Again, looking at x_u only, and with u = 1, the expression (14) occurs.

$$x_u = \frac{G}{1+2G} \qquad (14)$$

The goal attainment x_u of the hypersensitive person is shown in Fig. 3 as curve C. The maximum attainment, i.e., at very high will, is only 50% of u. Too much sensitiveness is detrimental to self-realization.

If a disturbance d becomes involved as - say a psychiatrist who wants to help - the patient takes only half of the therapist's signals. The help d is divided by about 2G and not only by G as in Fig. 2. A person suffering from depression - because he is oversensitive -, does not promise much success for "curing" - unless he is capable to reduce his awareness, to be able to become less mindful. Otherwise the goal to achieve remains an unattainable wish.

All three curves, A, B, and C, are common in that they start at G = 0. When there is no will for one's realization, the disturbance takes control and does it for the disturbed person by 100%! A hint to drug addicts where the negative effect of d has its say, (- x_d)!

The ratio, disturbance $\pm x_d$ divided by x_u, is for all three cases the same, namely ±VG. All three kinds of persons suffer (or benefit in case of a $+x_d$) the same proportion for the same G. It seems that this might be a nature's axiom. No being shall sacrifice more attainment due to a disturbance, whether it is bold or gentle. (This statement has to be reconsidered further down.)
One is tempted to allocate the person with the characteristic B to a dastardly dictator, and the person with the characteristic C to a highly introvert "noli me tangere" being. A dictator's behaviour with a feedback signal even smaller than 0,5 might be an outrageous tyrant, an introvert with a feedback transfer factor of larger than 2 might be a psychopathic patient with endogenous depression.

In social interaction with other people, boldness as well as timidity, both can have a positive effect as well as a negative one. It depends on how an individual senses the influence coming from interaction. But interaction with a second person, which is a matter of bilateral information exchange, is not considered herein.

But our opus is not finished here.

5. CONCLUSION

This extremely simple model already demonstrates social behaviour of remarkable importance.

Of the three definitions taken from the Webster's Dictionary, the one which says response following an action" is definitely related to the awareness of what one is doing (b). But the other two, (a) and (c), fit perfectly the model Fig. 1 as well.

Without feedback, the output x depends fully on the will. And when this case is applicable, history is ready to present innumerable samples: Caesar, Nero, Hannibal, Popes, Napoleon, Stalin, Hitler, but also founders of religions. - And if a butcher would feel what he does to mother cow when he kills her baby to make sausages of its flesh, his F_b would be considerably larger than 1. To fulfil the daily butcher's slaughter quota, his professional F_b must be zero.

It can be said that if we recognized what we do to our fellow man (and woman) and all other creatures, we could dislike our own self. From this standpoint it would be justified to call somebody who's F_b is much larger than 1 not only as timid, but rather as insane. In order to live, killing life is compulsory - therefore a F_b Of 1 or somewhat smaller than 1 is necessary for survival. Surviving means killing, done in need for food, for self-defence, or for the plain reason of aggressive disposition.

Although the model Fig. 1 is of utmost simplicity, the circumstances already become rather involved. This little essay is a hint to feel that behind our "reality" is hidden an enormous functional complexity.

Referring to the scope of this conference, 1 dare to say, is Mathematical Modelling and Investigating of Beings and Their Social Interactions - in a time-functional sense.

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