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The Elementary Conditions of Regulative-Informational Interactions

Each epoch has its own distinctive traits. They appear in different domains of human life: in economy, social relations politics, ideology, intellectual culture, language, etc. Each epoch has its own particular concepts, terms, names in the realm of intellectual culture and language. For example, in contemporary philosophy there is a wide-spread use of such terms as the subject, personality, subjectivity (before the majority of people were lieges, believers, etc), regulation, control, self-regulation, information (before such words as knowledge and understanding were used, and even earlier the word „soul" had been indispensable). I do not mean to say that the word information has nowadays made a word like knowledge obsolete; I only want to say that such a tendency can be observed at present.

Thus, the word „information" is gaining ground today. And its meaning is defined by regulation and self-regulation. i.e. subjectivity or a set of features of a certain autonomous system which enables this system to optimize the conditions of its existence, to increase the frequency of favourable external interactions and to reduce the frequency of unfavourable interactions. Here I want to consider the elementary conditions of systems and interactions of this type, subjective, regulating (self-regulating) and informative systems and actions.

I cannot arrange the set conditions which I am going to discuss below according to their importance, I treat them as equivalent with regard to their significance although I cannot substantiate this equivalence at the moment. The set of conditions and properties of regulative-informative situations which I am going to introduce below is probably not exhaustive either.

I denote these elementary conditions and properties of the subjective (regulative-informative) situation with the following names: (1) commensurability of heterogeneity, (2) incommensurability of velocity, (3) incommensurability of energy, (4) „axiological" differentiation. Let us consider now the meaning behind each of these names.

1. COMMENSURABILITY OF HETEROGENEITY

The commensurability of heterogeneity of two systems (subsystems) coupled with one another through regulatory interaction constitutes the necessary condition of the effectiveness of such an interaction. We shell explain this principle referring to R. Ashby's scheme of a certain „game" between two systems, A and B. A shall be the attacking side in our game, and B shall be on the defensive. We shall see in what conditions self-defence on the part of B is absolutely impossible, when it is partly possible and when absolutely effective self-defence is possible. Let us begin by introducing four relations between the possibilities of action (attack) on the part of A and the possibilities of counteraction (defence) on the part of B.

Variant I

A/B	1.	2.	3.	4.
I.	a	—	—	—
II.	b	—	—	—
III.	c	—	—	—
IV.	d	—	—	—

Variant II

A/B	1.	2.	3.	4.
I.	a	b	—	—
II.	b	c	—	—
III.	c	d	—	—
IV.	d	a	—	—

Variant III

A/B	1.	2.	3.	4.
I.	a	b	c	—
II.	b	c	d	—
III.	c	d	a	—
IV.	d	a	b	—

Variant IV

A/B	1.	2.	3.	4.
I.	a	b	c	d
II.	b	c	d	a
III.	c	d	a	b
IV.	d	a	b	c

A may be treated as the environment of system B or as a more or lees malignant or benevolent enemy. And B is a system which, say, has some „instinct of survival" which cannot be always realized, it has four possible actions at its disposal: I, II, III, IV with corresponding effects (contents) a. b. c. d. So it turns out that for B this set of meanings of A's actions is such that a denotes B's victory (a is a life-and health-giving factor) whereas the remaining meanings (b.c.d) are fatal for B. B reacts to A's offensive with the means of action at its disposal: columns 1. 2. 3. 4.

Let us now consider the four variants introduced above. We may notice that in the first variant columns 2,3 and 4 are empty which means that B can react to any of the four possible moves by A only in one way, by constantly repeating 1. 1. 1.... It follows that in the case of V.I B has no means of self-defence and is at the mercy of A. Thus if A initiates move I then B will win, but if A makes any other move B will lose. B's fate does not depend in any way on its own actions; B is not a subject in any degree because its means of action (reaction) are inommensurably poor in comparison to the means of action at A's disposal. The situation changes in favour of B when we pass on from V.I to V.II and V.III. In the case of V.II only two assaults are dangerous (II and III), the two remaining ones can be repelled. In V.III the situation is even better for B because only one assault of A (II)cannot be repelled. Finally, in the case of V.IV B can be its own master because it has the means to defend itself against assault, if it has a clear idea of the situation and responds appropriately, if its system of information and decision-making does not fail.

Hence, in order to cope with the set of possible and actual dangers it is necessary to be in possession of diverse means that are commensurable in relation to the set of these dangers. The same can be said about the relation between controlled and controlling systems: in order to control efficiantly the heterogeneity of means at the disposal of the

heterogeneity of means at the disposal of the controlling system must be commensurable to the heterogeneity of the controlled system.

2. THE INCOMMESURABILITY OF VELOCITY

The second condition pertains to the necessary differentiation of the velocity of the signal carrier (the carrier of information) and the carrier of the signalled action, the carrier of action which is anticipated by this signal (information). In short, the carrier of information must be faster than the carrier of the signalized action.

The problem seems to be quite obvious. Light can play the role of the carrier of information controlling the subject's activity (e.g. defensive action) only because it is reflected from a stone approaching my head it reaches my eye sooner than the stone reaches my head. If there was no difference in velocity (or if it was not sufficient) light would not be able to play the informational— regulative role.

Thus, the elementary, necessary condition of the occurrence of any signalling-regulative processes is the differentiation of the velocity of physical interactions. Coupled interactions differentiated with regard to the velocity of their diffusion must be related to a certain system (an objective system, i.e. one that is capable of receiving in a proper order the two kinds of interactions and of using the earlier interactions as signals of later interactions and as regulators of their actions in relation to the latter), they must come together in this system in an appropriate way.

The above account produces a tripartite situation: objective system (S) — signalling interaction (I) — signalled interaction (O). I must always reach S before 0. This difference in time always has a certain minimum value. If it is too small then S will not manage to respond adequately, that is, it will not manage to make use of the received signal before the coming of O. Of course, the liminal value of the time difference between the signal and the interaction depends on the structure of S and the speed of its processing of information received and on the speed of its reactions.

The speed of reactions of a system of a given type is produced in an evolutionary, historical or constructional way depending on the conditions of the secure existence of a given type of systems. This problem deserves a separate study. I shall confine myself here only to a brief remark. Each system functions in a world full of dangers of a certain type, each is likely to make errors in its behavior. Furthermore, each kind of error (deviation from the correct „direction" of action, from the norm) has its own maximal time of safe tolerance. In the old days a coachman could take a nap for an hour and find his vehicle in the middle of a field. After an hour he would wake up and rectify the error made by his horse. Thus, the time of safe reversibility of this kind of error was considerable. But getting used to having a nap at the driving-wheel of a car would be extremely dangerous because the time of safe tolerance of error in driving a car is much shorter than in the case of a horse carriage.

3. ENERGETIC INCOMMENSURABILITY

The energetic incommensurability of the signalling action and the signalled action is another elementary condition of the realization of signalling-regulative actions. The carrier of the signal (information) must consume less energy than the carrier of action that it signalizes. The above example of stone and light can also be used in this case. If the energy of the light reflected from a stone flying towards one's head were comparable with the energy of the stone itself than the light would not be able to perform its signalling function of the approaching danger (the stone) because it would become itself a destructive factor.

In other words, the elementary condition of the possibility of informational-regulative situations is the differentiation of the force of physical interactions. In the world of interactions of equal force no informational-regulative processes are possible. That is how things are in the existential, objective domain.

The same requirement must be fulfilled on the part of the subject. The subject must be equipped with two kinds of inputs — the inputs of strong interactions and the inputs of weak interactions: this duality must entail the duality of effectors, i.e. the duality of means of strong and weak (signalling, communicative) interactions.

The more sensitive are the subject's receptors, or, in other words, the more efficient its informational inputs, the less energy consuming can be the carriers of informational, signalling interactions. And, conversely, the more insensitive are the channels of reception, transmission and processing of signals (information), the more energy consuming must be the cariers of these signals. It seems to be quite simple: someone with a god hearing will receive information communicated even in the lowest whisper, someone whose hearing is defective must be spoken to in a loud voice, someone who is stone-deaf must be given a prod before he can be spoken to.

What I have said above has same interesting and significant application to social phenomena, to the circulation of information to social systems. Well-functioning social system clearly fulfill the condition of the energetic incommensurability of the carriers of signals and the carriers of signalled interactions. The former (weak) are characterized by low energy consumption whereas the latter (strong) by high energy consumption. However, when systems of communication (between the government and the people, between different social groups) begin to fail, when the sensitivity of informational inputs, the capacity of informational channels, the efficiency of information processing and decision-making decline, then the sources (senders) of information begin to use stronger and stronger means of transmission which consume more and more energy. Signals become more and more energy-consuming until the whistling uses up all the steam so that none is left to run the engine. In such cases signalling uses up all the energy of a given system, e.g. a social system. That is what happens at the time of social revolutions.

This problem should be considered in yet another way. Namely, the sine qua non condition of actions of any steering subsystem fed by a source of low consumption of energy is its coupling with a driving subsystem fed by a source of high consumption of energy. This statement contains an obvious truth: a system devoid of a sufficiently powerful drive does not function, does not move; a boat that does not move cannot be controlled even by the most perfect of rudders. Well, most probably, these two sources of feeding (strong and weak, driving and steering) are separated in the conditions of normal functioning. However, in some situations, when the steering subsystem — on account of its exceptional inefficiency — requires extraordinary feeding, the energy of the driving system can be used to feed the steering subsystem. In extermely pathological situations (mentioned above) the entire energy of the drive may be used for running the steering subsystem which cannot — then — function because it has no drive.

From what I have said above it may appear that the approximation of the value of steering energy (Es) to the value of driving energy (Ed) is a symptom of the malfunctioning („disorder") of the self-steering system. This „disorder", this pathological state may exhibit different degrees of intensity: (i) the comparability of the two values (Es Ed) is already a sign of disorder; (II) their identity (Es=Ed) is a disorder of the second degree; (III) disorder of the third degree consists in the prevalence of steering energy over driving energy (Es En) which can be observed in social systems in which there are more managers than workers; (IV) the fourth degree of the disorder consists in the re-

versal of normal relations, when the incomparability of the two values is reversed: Es is incomparably greater than En; (V). Finally, the situation of utter paralysis of the steering subsystem which has absorbed the entire energetic sources of the driving subsystem: in such a situation Ed=0, and the steering subsystem either explodes since its network cannot accommodate such a great amount of energy, or it cannot function because the controlled subsystem is deprived of the energy to act and so it cannot receive and carry out any „commands" from the steering subsystem.

From this point of view one should consider the developmental tendencies of our world. It seems to me that the world tends towards the increase of the energy-consumption by steering systems, logistic systems; in our world the production and transmission of signs absorbs more and more energy; the consumption of energy in this domain increases not only in absolute terms but also in relative ones (in comparison to the energy used in the production of things). This subject deserves separate study, I can only suggest it here.

4 „AXIOLOGICAL" DIVERSITY

„Axiological diversity" is another elementary condition of the existence of controlling-informational situations. Two kinds of differentiation are meant here: (a) the differentiation of interactions into those which are significant for the life and health of the system (subject) and insignificant (neutral) ones, which may correspond in part to the division into strong interactions (with a high consumption of energy) and weak ones (with a low energy-consumption), and (b) the differentiation of the significant interactions into favourable, positive (+) and unfavourable, negative (—) ones.

The differentiation of the first kind (a) makes the controlling-informational interactions possible; weak interactions (indifferent in relation to the life of a system) alone can be the carriers of signals (information). The differentiation of the second kind (b) makes the controlling-informational interactions necessary. As I have suggested above the idea is to increase the frequency of external positive (+) interactions and to reduce the frequency of the negative (—) ones through the appropriate behaviour of the subject. Thus, if the differentiation of the type (a) gives rise to the possibility of controlling-informational interactions then the differentiation of the type (b) makes this kind of interaction possible.