

THE PHENOMENAL-PERCEPTUAL FIELD AS A CENTRAL STEERING MECHANISM

by Wolfgang Metzger (1969)

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It requires some courage to speak on consciousness to an American audience, for the phenomena any study of consciousness must rely on are too questionable for them. Strictly speaking they only consist of a sum of verbal reactions whose relation to the underlying observations as reported by the informant is highly complicated and whose reliability in any case remains uncertain.

Theoretically, all contents of consciousness have a certain chance of manifesting themselves somehow in overt nonverbal behavior. But American psychologists in general do not trust very much in the value of behavior as representing what goes on in the mind of a subject. So many try to get along without any knowledge about consciousness except for sensory discrimination which can be represented without uttering a single word, simply by running to the left or to the right in a choice experiment. As for the rest, they consider a human being to be a "black box" that after suffering certain impacts from the outside at a certain spot of its surface reacts on its surroundings at another spot. They seem to feel safe only in studying the familiar S-R relation.

But Europeans who cannot abandon their old love also have their difficulties with it. The phenomena of consciousness are, we might say, quite reluctant about being brought into a consistent system. To give an instance: from physical as well as physiological knowledge it follows undeniably that processes underlying those phenomena must go on in the cerebrum, that means, within the skull of the subject. But on the other hand, no subject can be found who is ready to admit having found the effects of stimulation of any sense organ within his skull. In extreme cases - as in auditory or visual sensation - they are not even localized at his own body, as e.g., in the region of the mediating sense organs, but far from it - as a color (yet as an afterimage) at the opposite wall, or as a noise even beyond the room, somewhere outside.

From a previous era, when some of you were still occupied with conscious phenomena, you will remember the way in which H. v. HELMHOLTZ and J. v. KRIES attempted to solve this dilemma. They introduced a hypothetical process by which they believed sensations were transferred from their original place within the skull to that place in the surroundings of the body where they were actually found by the observer. I refer to the assumption designated as the projection-hypothesis in the sense of an exteriorization of elementary sensations - which, by the way does not, in principle, differ very much from the projection hypothesis used in the psychoanalytic sense, that refers to feelings, emotions, and intentions, as projected from the subject into other persons.

The dilemma intrinsic to this assumption, which at first seemed to be insoluble, consists in the following:

- 1) The process of exteriorization must, for its greater part, take place outside the organism and therefore cannot be a physiological process.
- 2) On the other hand, physical processes of such a kind are not known and it is most unlikely that they will ever be found.

But S-R psychologists also had their difficulties. S-R relations have not always proved to be as simple and unambiguous as was first supposed when WATSON and his friends began preaching the gospel of objective psychology nearly sixty years ago. There are many different responses that can be called forth by one and the same stimulus. And on the other hand, there are many stimuli that can be followed by one and the same response. Auxiliary concepts such as 'covert behavior' - i.e. a behavior that is not objectively observable and therefore must not be an object of behavioristic psychology - could not be dispensed with, and these were soon followed by TOLMAN's 'intervening variables' and by the 'hypothetical constructs' of MacCORQUODALE and others.

From the very first it seemed to me most probable that at least a great many of those intervening events or factors which had to be postulated in order to develop a consistent theory of overt behavior could be immediately ascertained as observable contents of consciousness. In this way it appeared likely that the wide gap between stimulus and response could at least partially be filled by observation and we could hope that by these means some light would fall into the darkness of the behavioristic black box after all.

There were two more facts that encouraged some of us to take up again the inquiry into consciousness. First a methodological fact: The role of speech or verbal behavior as a means of communicating subjective phenomena can be reduced to the extent that must be tolerated in every science. The method is simple. Instead of taking some other person as the subject of examination, the psychologist himself has to assume the role of the subject, while assigning the role of experimenter to his assistant. When doing so, the information of the psychologist is first hand information, just as that of the physicist when observing the hand of a voltmeter. True, no second observer can look at his phenomena as such. But this methodological deficiency can be overcome by repeating the observation by another person under exactly the same conditions. While obviously the observation of single sensations (such as the reddish hue of a color) cannot be "repeated" in this fashion, this repetition and verification by another observer is quite possible with regard to organization, structures, and structural characteristics, as Oskar GRAEFE has shown. And even reliable measurement has been shown to be within the realm of consciousness by STEVENS, EKMAN, and others.

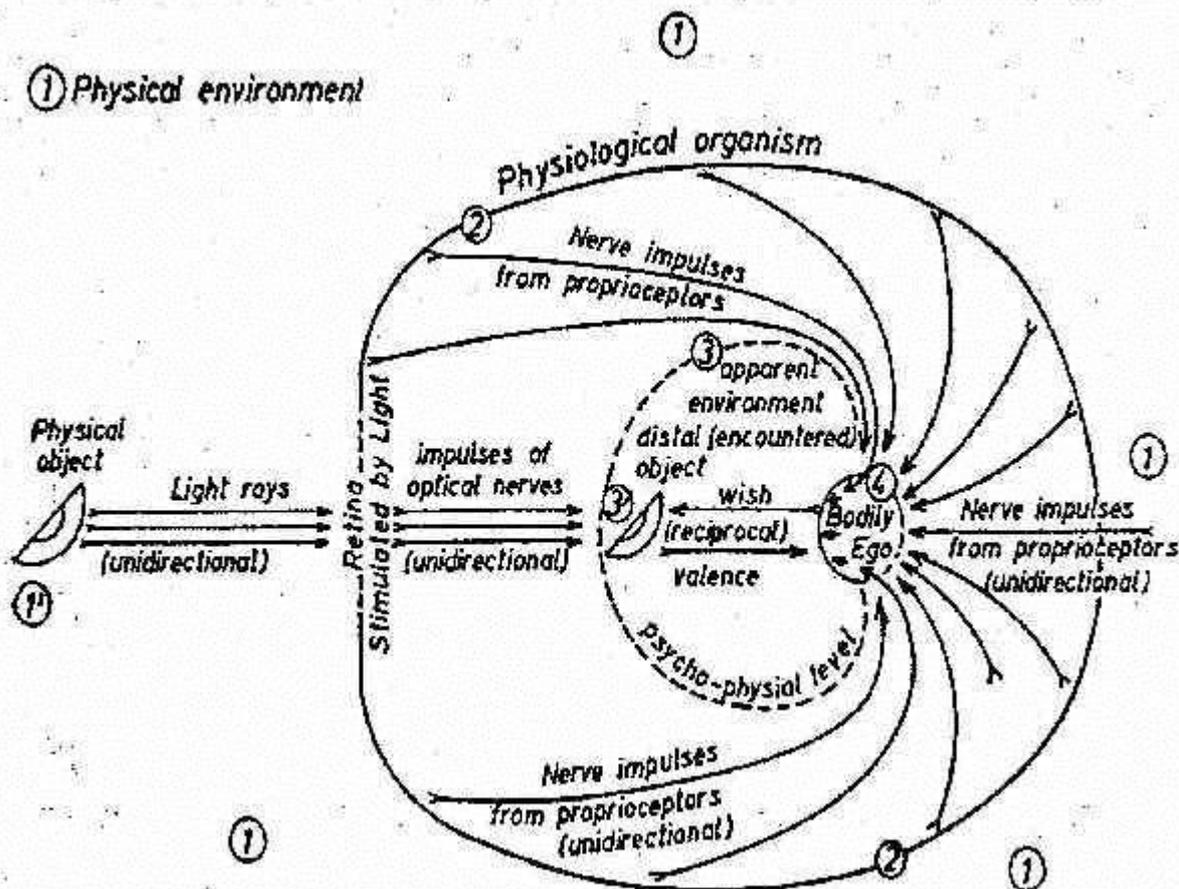
Besides this methodological justification there is another achievement by fundamental reflection on consciousness, which has produced a new situation. Forty years ago, in 1929, Wolfgang KÖHLER succeeded in demonstrating that the projection hypothesis need not be necessary, if we assume that not only (1) the image of the objects but also (2) the image of the subjective bodily ego and (3) the image of the relations between the object and the subject, are correlated with cerebral processes of a corresponding dynamic structure and distribution. This is, indeed, the only assumption about conscious phenomena that is consistent with itself, and with the scientific world concept, as it is generally accepted.

The non-identity of 'distant stimuli' or, expressed more logically, of the source of stimulation with the conscious phenomenon must also be assumed for the observer's own body exactly as for other perceived objects. As soon as this is recognized, the whole dilemma of sensory processes

and the localization of objects and their qualities turns out to be a mere fallacy. For 'inside' in this connection refers to the organism which as such is no conscious phenomenon but rather a complicated source of 'proximal' stimuli - while 'outside' refers to the bodily self, which is in no way identical with the organism but is itself an 'image' or percept, i.e., a complex of sensations emergent upon the total excitation originating from the diverse proprioceptors of the organism together with the images of parts of his own body as seen by the subject himself. (See Fig. 1, from METZGER, *Psychologie*, 4th ed. 1968, p. 283.) Seen in this way, the apparent relations between perceived objects and the subject exactly correspond to the objective relations between the "distant stimuli" and the organism. Instead of being localized within the ego, seen objects appear to be opposite or vis-a-vis the ego, just as complexes of distant stimuli are opposite or vis-a-vis the organism. (This means, by the way, that secondary processes of 'objectivation of an original purely subjective experience, as they are developed in neo-Kantian literature, e.g. by Ernst CASSIRER, need not be assumed.) I know these statements are highly redundant. But I have learned from experience that without a relatively high degree of redundancy these matters will never be understood. So I shall go on describing some consequences of what I said above.

FIGURE 1

Relationship between physical world including physiological organism (= Macrocosm) and phenomenal-perceptual world including experienced bodily Ego (= Microcosm)



- 1 = biophysical environment of organism
- 1' = physical object, reflecting light rays
- 2 = physiological organism, as part of the physical world

3 = apparent (perceived) environment of bodily Ego

3' = apparent (distal) object or percept, representing the physical object

4 = bodily Ego. as part of the phenomenal-perceptual world, representing the organism

What results for the problem of voluntary action if we apply to it the outcome of the line of thinking followed so far? What happens if, e.g., a person lifts his hand and puts it on the table again? In order to avoid misunderstandings, we must keep in mind that the fact of "two worlds" applies to every single trait or content of experience and therefore is also valid for my own hand that I feel, see, and influence by my will, whose behavior we are now going to analyse. In this case, too, it is indispensable to discriminate strictly between the "objective" arm as a member of my organism, and the conscious image of it, which is a part of my bodily ego that I can feel and see. As was said already, only this image can be influenced immediately by our voluntary intentions. This discrimination follows conclusively from the fact that, on the one hand, by anesthetizing the afferent nerve tracks originating in a subject's arm and by simultaneously letting him shut his eyes the arm disappears for the subject while for another observer it is just as perceivable as before; and on the other hand, if a subject loses his objective arm by an accident, his limb may persist being a more or less clearly perceptible part of the bodily ego in the so-called phantom limb experiences. In the first case the phenomenal, in the second the anatomical member of the two normally associated counterparts is lacking. Furthermore, the decisive fact of two-ness is necessarily also valid for the relations between the acting subject and the actions following from his intentions as compared with the processes going on at the same time within his organism as a result of efferent processes between his brain and its anatomical extremities. My intention to lift up my right hand, e.g., can only be directed to the phenomenal hand as a part of my phenomenal bodily ego but never directly to the anatomical part of my organism that is related to the former and bears the same name. Only by assuming this can the totality of phenomena involved in voluntary action be accounted for without contradiction. To these belongs, among others, the discrepancy between the region of the bodily ego on which our will immediately acts, and the region of the organism that, at the same time, is subject to innervation. As Julius PIKLER has shown long ago, the former region lies unmistakably within the hand itself as a part of the bodily ego, whereas the latter just as unmistakably lies within the muscular system of the upper arm and the shoulder of the anatomical organism. In general, from the control of movement of the phenomenal arm there follows a secondary control of the arm as a part of the organism which corresponds to the former with admirable accuracy. But this precise reduplication of the phenomenal motion by the objective motion is in no way a matter of course; on the contrary, it borders on the miraculous. Nor does it work in every case. Under certain conditions it fails. This is the case, among others, when a person acts in a dream, in the hallucinations of motion due to affections of the brain by psychoses, lesions, or poisoning, as well as in the illusory movement of phantom-limbs after amputation. In this connection an observation I made sometime ago while awaking from a very lively dream may be of interest. I had been rather active in that dream and when I began to wake up my right arm was above my head. My theoretic interest awoke more quickly than my body, so I could observe what now happened. The arm above my head dissolved without moving, while another arm came into existence resting on my stomach, an arm which obviously had objectively been there all the time.

This duplication of the environment as both a physical world of stimuli, distal and proximal, and a phenomenal world of percepts - and also of one's own person as both a physiological organism and a bodily ego - as has been said above already, also refers to the mutual interaction between a person and his environment. But as can be recognized from the prevailing use of the terms 'stimulus' and 'response' in experimental psychology as well as in physiology and ethology, this

reduplication has not been taken into account in most cases. In practice we are compelled by the facts to differentiate the concept of stimulus into two clearly distinguishable sub-concepts. The first sub-concept of stimulus means the physico-chemical processes that act on the receptor-cells of the organism; the second is a little more intricate, as we shall see immediately.

The response of the organism to a stimulus in the first sense may be of two different types. The first type consists in an organic change or process (such as the production of saliva or the contraction of the pupil), frequently without any concomitant conscious phenomena. In the second type of response two phases must be distinguished. In the first phase, something happens in the phenomenal world (a new percept appears, an existing one changes or moves or disappears etc.). In the second phase this new phenomenon acts upon the ego or subject, e.g. attracts his attention or scares him away. It may also invite him to handle it in a certain manner. For these characteristics of percepts (not of stimuli in the first sense!) Kurt LEWIN introduced the German term "Aufforderungscharakter", which was translated into English by "valence". This action of a percept on the ego may also be called stimulation, though not in a physiological but only in a psychological sense. In everyday German, we also use for this the term "Reiz", the literal translation of stimulus (as in "ein reizendes Mädchen") while in English, expressions such as 'attractiveness', 'appeal', are preferred. One thing must be kept in mind: the events I have just been dealing with occur between the percept and the ego within the phenomenal world and not between the physical surroundings and the organism; in other words, not between stimuli in the first sense and receptors. If, notwithstanding, it is customary in behaviorist psychology to call "stimulus" a female, or an enemy, or a mate, or an offspring, or some prey animal, it must be clear that in doing so the objective level of physico-chemical and physiological processes, with which it was supposed to deal exclusively, has been left behind.

We must treat the concept of response in exact analogy with what has been said above. This term also has two meanings. In the first sense, it refers to the changes in positions of various parts of the phenomenal bodily ego, including any preceding changes of attitudes, emotions, and intentions; in the second sense, to the execution by the extremities of the organism of the intended movement which, as we have already mentioned, does not occur when a person dreams and therefore must logically be distinguished from the response in the first sense.

I come now to my crucial point, namely to the question: what is the use of this duplication of the world into a physical and a perceptive one, of the person into an organism and a bodily ego, of stimulation into configurations of physico-chemical impacts upon receptors and valences affecting the ego, and of reaction into intended changes of the bodily ego and motions executed by parts of the organism? What relevance can all this have? It is extremely improbable that so highly complicated an organization could have developed during evolution and preserved without a considerable survival value. And it seems to me that this value can clearly be demonstrated.

We begin with the action side of the picture. Here we find a striking similarity to the well-known technical servo-mechanisms, e.g., the mechanical steering of a large vessel. To illustrate this by the simplest parallel: Instead of a direct connection between the steering-wheel and the rudder there is a two-step connection. The first step connects the bridge with the steering machine, the second the machine with the rudder. Instead of the wheel it suffices to have a small lever that can be turned easily, while the hard work of turning the heavy rudder through highly resistant water is done by the machine according to the information given it by the lever.

The phenomenal arm as perceived by the subject which is dependent on his will corresponds to the lever as handled by the helmsman. The arm as part of the organism corresponds to the rudder, and the musculature bringing the organismic arm into the position prescribed by the motion intended for the phenomenal arm corresponds to the steering-machine that moves the rudder according to the position of the lever.

It is true there is a difference between the nervous and the technical servomechanisms, which I will try to point out now. Mechanically it is possible to fix on the shaft of the first lever a second one that indicates the actual position of the rudder and its deviation from the intended position, coinciding with the first lever when the intended position is reached by the rudder.

In the neural mechanism there is no second lever. The lever is constructed in such a way that it indicates the true effect of the intention to move at the same time. This comes about by the following trick. This lever - we mean always the arm as part of the bodily ego - cannot move independently from the "rudder" viz. the arm as part of the organism and therefore cannot run ahead of it. That means that even the least "pressure" acting upon the "lever" puts the organismic arm in motion, and the lever is brought into its intended position by the activity of the organismic arm in moving to the intended position. This, of course, presupposes that the reactions of the "steering machine" are extraordinarily quick, in other words, that it reacts to minimal dislocations of the lever, and practically without delay. Some years ago I discussed this principle of construction with a group of specialists in cybernetics and, according to their judgments such a construction is theoretically possible. Considering the variety and variability of active human (and vertebrate) motion, its advantages are obvious. Perhaps under the conditions of human action it is the only one that works.

So far I have discussed a rather simple but relatively unnatural case, a case in which the subject is alone with one of his limbs and the intended position of this limb is fixed arbitrarily by the subject. In order to transfer the idea to a more important situation, viz. the subject's interaction with other things or beings, above all with those objects which serve to gratify his needs or to carry out his intentions, we have to take a glance at the other side of the matter, at the side of the object. Here, too, the analogy of orienting oneself in his surroundings by using a periscope is obvious to the engineer. This periscope differs from the normal type by the fact that the observer does not look outward through a set of lenses and prisms but observes an image that is projected on a plane inside the whole system just as is the image of the sun in the well known Einstein-tower at Potsdam. But this image differs from the image of the sun in the astronomical device in that its parts are more than a mosaic whose elements reject light more or less apart from any dynamic interaction. In consciousness these parts are units dynamically segregated from each other and coherent in themselves, tightly packed within a narrow cerebral field, one of them being the unit representing one's own ego. Hereby, dynamic interaction of a nature not yet sufficiently known becomes possible between these units corresponding to the organism and the objects of its environment, interaction that is unmistakably lacking in the space between the physiological organism and its physical objects but is necessary for a meaningful and biologically beneficial interaction between the person and his environment.

The function of the phenomenal world, then, would be to make possible just those dynamic interactions and to transfer them to the organism through an intricate system of circular conductors that allow for the necessary feedback in such a way that the organism itself is made to behave "with regard to" the objects encountered in its environment and relevant for its survival.

The following considerations aim at developing some of the fundamental features of this idea. They start from three facts that are characteristic both for the satisfaction of needs and for the execution of intentions. I shall try to make these clear by a second diagram (Figure 2) in which you see various symbols for phenomenal objects related to different needs at the upper left, the phenomenal ego with some patterns of action correlated to these needs at the lower left, and on the right the subcortical centers of needs.

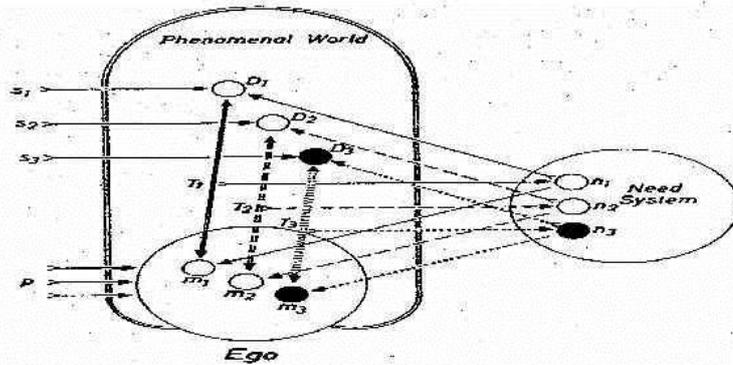


FIGURE 2 Relations between need-system, perceptual system, and action-system

- s_{1-3} = Impulses from sense-organs, underlying the perception of drive-objects (d)
 - D_{1-3} = Drive-objects within the perceptual field
 - p = Impulses from Proprioceptors, building up the bodily Ego (E) within the perceptual field
 - m_{1-3} = Motor action-schemes
 - n_{1-3} = Needs
 - = Latent need, neutral object, dormant action-scheme
 - = Aroused need, outstanding (valent) object, activated action-scheme
 - ⇒ ⇒ ⇒ = Nervous impulses from sense-organs underlying phenomenal objects, including the bodily Ego
 - ⇒ ⇒ ⇒ = Nervous impulses from need-centers to phenomenal field conferring a valence to the pertaining drive-objects
 - ⇒ ⇒ ⇒ = Nervous impulses from need-centers to pertaining action-schemes, underlying their "readiness for action"
 - $T_1 \updownarrow T_2 \updownarrow T_3 \updownarrow$ = Tensions (attractions or repulsions) between Ego and drive-object
 - ⇒ ⇒ ⇒ = Inforcement of successful activity
- The relation between bodily Ego and action-schemes is oversimplified and needs further elaboration

Now, when the tension of a need (n_1) increases above its threshold, or when the time of execution of an intention approaches, several things happen.

- 1) Given certain circumstances, a pattern of action (m_1) is activated and put into readiness within the phenomenal ego. Therefore, the system of needs exerts an influence on the motor or executive system - which is quite plausible.
- 2) In the phenomenal environment the objects (D_1) that correspond to (or, more exactly, the IRMs by which they are characterized as such) - or the objects to which a given intention refers - are accentuated. They begin to attract attention. That means that there is also an influence from the centers of need on the system of perception. The objects to which a need refers seem to be activated by something like resonance. Whether these objects are determined by heredity, or by imprinting, or by conditioning - or are established deliberately by an intention - does not make a difference.

The two effects just described do not exist independently from one another. Rather

3) the field between the phenomenal ego and the phenomenal object of the need or intention is being polarized, so that attracting or repelling forces come into existence between them. These are experienced more or less strongly as appeal or threat, and are often irresistible. This polarization of the field between the phenomenal object and the subject underlies the directed component of all instinctive or intentional behavior, without which no activity can ever reach its aim. The interrelations between the subject and the object, as described above, become themselves a steering mechanism, in which - in the case of attraction - the place of the phenomenal object represents the value aimed at, the position of the subject the actual value, and consequently the distance between them represents the difference between these two values by which the human steering machine viz. the muscular system is set in motion so that in the physical world the distance between the organism and the object diminishes and finally disappears.

In the case of negative polarization or repulsion, the situation is somewhat different. Repulsion merely causes flight or retreat of the subject, that is, an increase in the distance between the subject and the object, until the threat becomes subliminal. In this moment the whole affair is settled and nothing more happens. (It seems to me to be significant that - as has been observed repeatedly - repulsion goes on along the force lines originating in the threatening objects even if another direction of movement would be more suitable.)

But let us return to the case of attraction. Here the approach toward the object is but the first phase of the whole process. At its completion, in the moment when the distance disappears, a second phase is immediately initiated viz. the execution of the innate or learned pattern of performance - or the intended activity - which up to this moment was ready for action but had been blocked, is now set free. Not until then could the tension caused by the need or intention be definitely released - provided that the object is appropriate. If this is the case, the much discussed reinforcement takes place, that is to say the connection between the pattern of the object and the pattern of action by which the accentuation of the object in the field of perception and the subsequent polarization will be intensified later on while at the same time it will be restricted to a class of objects that will become more and more sharply defined. This coupling and its storage I have localized hypothetically in the region of the center of need. But possibly this hypothesis will have to be revised some day.

I shall drop the subject at this point, hoping that in the not too far distant future a cybernetician who is better than I will succeed in developing a more detailed model from which inferences can be drawn that are open to experimental verification. But it seems to me to be pertinent to add some remarks on the epistemological standpoint that is implied in these considerations. The standpoint in question is *strict critical realism*. True, this construction contains a dogma, i.e., an assertion that can neither be verified nor disproved. I mean the assumption that behind the world of the immediately given, behind the world of percepts, the presumed reality of the naive realist, there exists another world that to the phenomenal world has the relation of the original to its image but in itself is metaphenomenal or transphenomenal. That means that by its very nature it evades every direct observation and is therefore excluded from scientific thinking by positivism. However we are compelled to grant its existence as the link *X* by which the experiences of all subjects, or more generally living beings equipped with distance receptors can be coordinated, or, to put it more exactly, by which the existing and demonstrable coordination of their experiences can be explained. Without this coordination any formation of coherent groups and cooperation

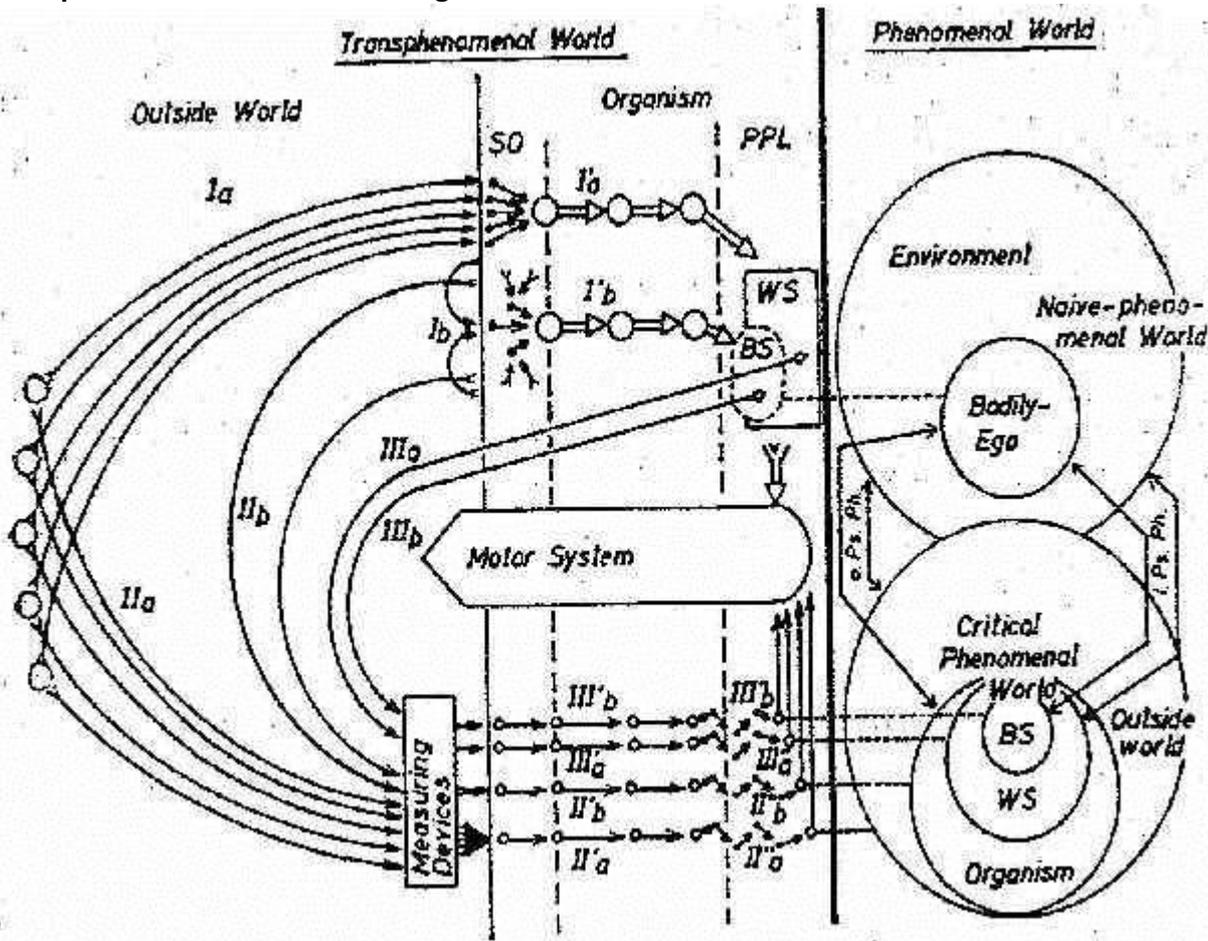
would be impossible, if we do not return to the absurd assumption of preestablished harmony in LEIBNIZ's sense.

Without the assumption of this coordinating principle neither a theory of perception consistent in itself nor a theory of social intercourse and supra-individual grouping would be possible. And without the supplementary assumption that the world, as immediately given, is constituted by processes that go on within our own - transphenomenal - organism, no consistent pathology of perception is possible, as we shall see a little later.

First I have to add that both diagrams I showed you before were only partial representations of the critical realistic construction. In order to exclude any misunderstanding I shall now exhibit the complete diagram as it can be found in a contribution by Norbert BISCHOF to the first volume of the large German handbook of psychology.

FIGURE 3

Diagram representing the relations between phenomenal world, transphenomenal world, and critical phenomenal world according to the critical realistic view



SO = Sense Organs , PPL = Psychophysical Level (in the cortex)

WS = World Scheme, BS = Body Scheme

oPsPh = Outer Psychophysics

iPsPh = Inner Psychophysics

Roman Numbers

I = Perception

II = Physical Investigation

III = Neurophysiological Investigation

Subscripts

()a = Referring to Outside World resp. World Scheme

()b = Referring to Organism resp. Body Scheme

Strokes

no stroke = Physical Transmission Processes

one stroke ' = Perceptual Processes

two strokes " = Rational Processes

'Scheme' is used here in the Sense of a Cortical Dynamic Structure corresponding immediately to a 'Percept', an 'Image' or a 'Perceived Object' (including the Ego) in the Phenomenal World.

This diagram differs from the foregoing ones in various respects. First: all elements that refer to the steering function of the field of perception are omitted. Second: the so called psychophysical level of the cerebrum and the world of perception were represented as coinciding in the first and second diagrams, while in BISCHOF's scheme they are separately represented as parallel, somewhat better corresponding to the present state of our knowledge. To the left, within the transphenomenal organism, the cerebral body-pattern (Körperschema after Paul SCHILDER) appears inside the cerebral world-pattern. To the right, beyond the double line that separates the physiological from the phenomenal, the phenomenal bodily ego appears inside the phenomenal surroundings which is identical with the reality of the naive realist. Third: BISCHOF's diagram contains some hint to the connection existing between the tendencies of the bodily ego and the state of the motor system within the transphenomenal organism which for the sake of clarity had been omitted in the preceding diagrams. But the fourth and decisive feature of this third diagram of BISCHOF's is that on the side of the conscious phenomena - to the right - below the representation of the naive-phenomenal world it also contains a representation of the critical-phenomenal world in which, corresponding to the above discussion, the bodily ego and the whole world of perception appear inside the organism and the organism within the physical environment which, together with the organism, is *thought to be* the transphenomenal reality.

While the naive-phenomenal world of the immediately given (above) originates directly from the unselected simulation of the sense organs, including the after-effects of preceding stimulation stored in memory, the critical phenomenal world (below) in its distinctive features originates from "scientific findings" - above all from the observation of coincidence between pointers and lines on the scales of various measuring instruments - which are also sensory phenomena but a kind of such phenomena that are preferred in science because they have proved to be most invariant against any kind of disturbance in transmission. This makes them the most reliable basis for theoretical reflection. The critical-phenomenal world that is constructed on this basis is the quintessence of the scientific picture of the world. Or, to put it more exactly: the world as it looks to the scientist who is relatively the most advanced among his colleagues for the time being at any given phase of scientific development. This "world as it looks" sometimes changes rather rapidly, while the "world as it is" is much more permanent. It contained atoms and electrons when nobody thought of them, it never contained a matter like phlogiston, and the number of planets has not increased in it since the 16th century, when nobody dreamed of the existence of Neptun or Pluto. This is one of the reasons why the philosophical reduction of the "world as it is" to the "world as it is believed to be" (by the scientist), a reduction that belonged to the main endeavors of the neo-Kantian philosophy and is still maintained e.g. by K. HOLZKAMP, is finally not possible. There is still another reason. The impingements upon our organism by which our phenomenal world comes into existence must stem from a transphenomenal world. They cannot come from the stock of

scientific knowledge we have drawn from the totality of our everyday and systematic experiences. It is true, this stock of knowledge may substitute for the transphenomenal reality in our discussions concerning the world. But if reality corresponded to this simplification, it would be inconceivable how anything new and unexpected should ever occur or appear in our phenomenal world. In other words, it would be incomprehensible how every spot of our phenomenal world could be so obviously open to ever-changing influxes coming from a sphere X that cannot lie in it, as Oskar GRAEFE has contended against the phenomenalism of Kurt LEWIN.

Our own actions, too, must have effects on a transphenomenal reality and cause changes there. Otherwise it would be inconceivable how these actions can, together with their effects or consequences, appear in the phenomenal worlds of other persons, and that these consequences need not be observed there at the same time but their observation can be separated from our own activity by time intervals of any length. This possibility presupposes an X that preserves the effects of my activity long beyond their existence in my own phenomenal world. To give an instance: I may build a footbridge in the desert; and another person may find it and pass over it many years later.

There remains the naive-realistic objection that the world immediately experienced by us as supporting us is characterized by such traits of firmness, stability, and independence from ourselves that it appears to be an unreasonable demand that we should consider it as a correlate of ever changing cerebral processes, processes that occur within our own organism. But this objection is invalidated by the fact that the independence of the outer environment from the subject is only very approximately true. Let me mention briefly the facts that can be understood only by assuming that their immediate correlates are to be localized within our own organism:

- 1) The change of view, i.e. of the mode of apperception as a means of mentally modifying the outer environment.
- 2) The occurrence of strictly psychical phenomena, as feelings or moods etc. outside the subject, in the extreme instance in so-called FREUDian projection.
- 3) The exterior localization of dreams, apparitions, phantoms, and hallucinations, yet even in the so-called eidetic phenomena, after-images etc., not to forget the objects of thought and their motivations within the thought process.
- 4) The structural discrepancies, as, e.g., in camouflage.
- 5) The metric deviations, as in visual illusions which are not a laboratory affair, i.e. not an affair of paper and pencil but a universal phenomenon found in any tri-dimensional object as soon as we make the measurements necessary to discover them.
- 6) The modifications, distortions, alterations of the outer world - including one's own body - during psychoses, poisoning, and cerebral lesions, which have been frequently described.

What concerns the two fundamental and indispensable theses of critical realism, namely

- 1) that the world of what is immediately given is of an organismic nature, and
- 2) that there exists a transphenomenal world which, among other things, embraces our own organisms and becomes the means by which the perceptive worlds of different observers are coordinated,

we may finally say: The second at least is not verifiable; but the multitude of findings that can be derived from both and understood by them is so immense and so various that they are absolutely

sufficient to get the facts in focus that are postulated in the above statements, even in the face of great demands concerning their trustworthiness.

SUMMARY AND CONCLUSIONS

The phenomenal world has been described in my presentation as a central steering organ in the sense of cybernetics.

In this organ, duplicates of the outer objects and the organism can interact in a way which, as a consequence of their very nature, is not possible for the originals. This interaction is transferred to the effector organs by circular processes so that the organism is enabled to move in its environment just as if it were immediately controlled by field forces, which do actually not exist there.

Thus the phenomenal world must be considered as *the* decisive intervening variable in behavior as observed from outside.