

INFORMATION METABOLISM AS A MODEL OF HUMAN EXPERIENCES

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(Received in final form 5 January 1999)

This paper presents Kępiński's concept of "information metabolism", which attempts to describe processing of the information as an analogy of energy metabolism. It is a biological model based upon the structural organization of the cell. The following terms: control center, boundaries, functional structures, centers of elimination and centers of energy are considered here. The model is complementary to computational models, which are helpful in research and theoretical studies, but not useful in interpersonal contacts. The model of information metabolism aims at explanation of relations between psychological and somatic processes and helps in understanding of psychotherapeutic processes.

Keywords: Information processing; information metabolism; model of experiences; interpersonal relationships

This paper presents the model of information processing, created by Kępiński (1970). In a series of nine books Kępiński applied the concept of information metabolism to describe psychopathology. Most of these books were edited during his incurable disease and published after his death in 1973. They attained a status of instant popularity in Poland. Although the political isolation of Poland kept Kępiński's ideas from being presented in English, at a time when they were being published in Polish. The concept of information metabolism was later discussed in English by Struzik (1987a, 1987b). It was also applied in elaboration of a model of states of consciousness (Kokoszka, 1987–88, 1993) and a rationale of general theory of relaxation (Kokoszka, 1992, 1994) in papers in English, and in preparation of an integrating model

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of mental states (Kokoszka, 1997), and of psychotherapeutic relationship (Kokoszka, 1996) in books in Polish.

This paper aims at a concise presentation of the information metabolism as a model helpful in the understanding of human experiences. The model is complementary to the computational models of information processing applied in cognitive psychology. These models include neurophysiological processes such as working memory, production memory and declarative memory, storage, retrieval, execution match, encoding, performances, whereas information metabolism focuses on mental phenomena.

THE NOTION OF INFORMATION METABOLISM

The model of information metabolism was first presented by Kępiński (1970), who argued that technical models characterize human beings in a dualistic manner—thus implying that mental processes govern somatic processes in a mechanistical way and explain very little about the psychological aspects of life, *e.g.*, experiences, creativity. He considered biological models to be closer to the psychological reality than technical ones.

The term “energetic-informational metabolism” was used by Kępiński (1970; 1979) to denote life; more specifically, two processes without which life would not be possible. In the initial phases of phylogenetic development, energy metabolism dominated, but it always coexisted with information metabolism (*e.g.*, processing of information concerning sources of nourishment). As development progressed, information metabolism gained greater importance and, in extreme situations, all available energy may be utilized for information processing.

The information metabolism model is based on an analogy of the structural organization of the cell, and it attempts to describe information processing as an analogy energy metabolism. According to Kępiński (1970) the “metabolism of information” (*i.e.*, processing of information) has:

- its own boundary analogous to the cell membrane;
- a control center analogous to the cellular nucleus;
- a system for information distribution and processing analogous to the endoplasmic reticulum and lysosome;
- a source of energy analogous to the mitochondria.

At the basis of the theory lies a need for the input of information which varies with time, as is acknowledge by other theories of information processing. Kępiński's view was based on a generalization of Carnot's

principle, which states that the organism is an open system and its negentropy rises or falls as a result of processes described by the laws of self and species preservation (Struzik, 1987b, p. 107).

BASIC STRUCTURES AND FUNCTIONS OF INFORMATION METABOLISM

Control Center

Information metabolism occurs within a defined space and time. It has control center (CC), *i.e.*, ego or "I", and functional structures enabling the reception, processing and assimilation of information, as well as the normal regulation of the organisms own activities. Information metabolism is determined by the phylogenetic and ontogenetic past of an organism, but it is also involved in pursuing aims which extend into the future. It creates individually varying pictures (*i.e.*, functional structures) of the outside world, which although objectively uniform are perceived as unique and different by each individual.

Functional Structures

The term "functional structure" is used by Kępiński for schematic representation of perception and of activity.

System of Values

Decision making is recognized as one of the basic features of life; it has different degrees of freedom in different organisms. The hierarchy of values governs the mechanisms which select and filter the information reaching any particular decision making level. The system of values has three levels (Kępiński, 1977b).

The first level is biological and it is concerned with all that is described by the concept of biological programming (*i.e.*, all that man is born with and can control to some extent). It is determined by two basic biological laws: self and species preservation. Depending on how well they are established one can speak of greater or lesser dynamism in the life of an individual.

The second level is emotional and it determines the emotional attitude (*i.e.*, "towards" or "against"). It is characterized by the formation of complexes, which are emotional centers where an individual's emotional relations

meet with the environment. These centers are usually formed around an important person from childhood and influence a persons' emotional relationships in later life. Complexes can also arise in connection with traumatic situations and can shape an individual's attitudes towards similar situations when they are occurring. Complexes become fixed by repetition.

The biological and emotional levels are located below the threshold of consciousness, meaning they are automatic. They shape a "real hierarchy of values", ("I am really like this") based on fixed and automatized tendencies, habits and attitudes.

The third level is socio-cultural and it determines how an individual projects himself into the future, ("I would like to be like this, these are my goals, this seems most important to me"). This level is conscious and consists of an individual's aspirations, ideals, and cultural models. It refers to the hierarchy of values in one's own social environment.

The real hierarchy of values is more important in the process of decision making, but final decision are determined by all levels of the system of values, including the ideal hierarchy. Therefore, an individual's will can control his or her behavior to a certain degree.

Maintenance of Order

Order is the essence of the structure. The preservation of structure and order in the metabolism of energy does not require, at least not any conscious effort on the part of the organism, for this is taken care of by physiological mechanisms. Their preservation in information metabolism mechanisms. Their preservation in information metabolism is connected with a continuous effort focusing on the proper selection of information coming from the outside and inside of the organism and on the choice of proper forms of reactions. This integrational effort is largely unconscious (Kępiński, 1979). They are conscious when they take shape in an act of will.

Autonomic Psychological Activity

An individual has his own mental activities. "Daydreaming is something which is most "mine"-one has an absolute power over it, while having no power over reality". (...) The act of daydreaming (...) belongs to the same sphere of experiences as thinking, planning and dreaming in sleep. The limiting influence of the structure of the real world is much stronger in the first two phenomena (thinking and planning) and much weaker in the third (dreams). This freedom is much greater in daydreaming, one is sovereign

ruler over one's world of dreams. In the case of sleep the situation is reversed". (Kępiński, 1979, pp. 178–181).

The Sense of Reality and the Feedback Between an Organism and its Environment

One of the rules governing information metabolism says that the world around us is changeable; yet the organism is stable (Kępiński, 1979). Any change in the structure of the exchange of signals within the surrounding environment provokes an orientation reflex, which is accompanied by the feeling of anxiety. The force of vegetative and emotional reactions to an outside stimulus depends on the force and the unusualness of the stimulus and on the present state of consciousness. The reaction is exceptionally strong when the signaling system is in a state of low selecting ability (*e.g.*, in sleep); which can be shown as a scale of values changing with the situation, and causing that one set of signals reach the organism more easily than another.

The degree of total integration of functions of man's nervous system is proportional to the state of consciousness, *e.g.*, awareness to the surrounding environment. In the state of wakefulness man is in the strong feedback relationship with his surroundings and the perception threshold for exteroceptive stimuli is lower and for interoceptive stimuli it is higher, whereas in sleep the feedback relationship with the surroundings is diminished.

A MODEL OF INFORMATION METABOLISM

A metaphor of information metabolism expresses that human experience and behavior cannot be explained by technical a model of information processing. This process in humans is influenced in a significant way by the subjective meanings of information which were shaped during the life history of the individual person. The unique set of experiences contained in the functional structures of the system of values includes, especially on its emotional level, subjective emotional complexes. In some situations, these complexes cause human behavior to be directed by subjective feelings, rather than by objective logic. For this reason, the model of information metabolism in human beings seems to be a more adequate notion than that of information processing. In essence model of a information metabolism, applied by Kępiński, enables the differentiation of the main elements in the structure of human experiences, which are analogous to the structures and functions of the biological cell, which listed and presented on the Figure 1 below (Kokoszka, 1996):

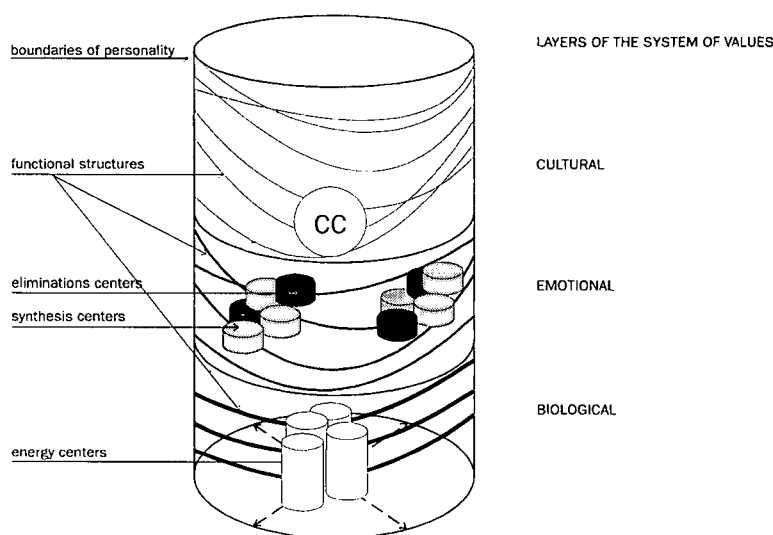


FIGURE 1 Graphical model of information metabolism described by Kępiński.

1. Central Point – “I”, or control center (CC on the figure). This structure corresponds to a universal experience of being the subject of one’s own psychical activity. It controls one’s own activity, similarly, to that of the nucleus, which governs the biological cell activity.
2. Boundaries (the whole cylinder on the figure) are considered in the sense of representing self-identity as means of enabling the discrimination of one’s own limits and the differentiation of one’s self from other people and from the external world.
3. Functional structures shaped earlier in life maintain order in space and time and the layers of systems of values. Creation of this structure may be compared to the centers of synthesis of biochemical compound in a biological cell. The amount, complexity and plasticity of functional structures increases along with the development. It is illustrated by the relatively small number of the strong and rigid structures (thick lines) on the biological level and the increasing number of thinner structures on the emotional and socio-cultural levels.
4. Energy centers necessary for preservation of metabolism of information, *i.e.*, proper stimuli reception, selection and integration; as well as decision making.
5. Elimination centers of an where useless and unimportant information is removed.

PSYCHODYNAMIC-COGNITIVE MODEL OF INFORMATION METABOLISM

The psychodynamic approach, based on psychoanalysis, applies in practice concepts of: self, internal object and transference as helpful conceptualizations of phenomena and processes taking place in psychotherapy. The self and the object are mental representations of oneself and of other significant person, shaped during the life of the individual by one's unique experiences. The mental records of these experiences and life events may influence the current perception of other people as well as of oneself. The analysis of relationship between self and "object", *i.e.*, a subjective pattern of an important person experiencing, which is shaped mainly in relations with parental figures is the most important in the individual psychotherapy. The patient's feelings, thoughts and behaviors toward therapist which are not reaction to the realistic interactions with him or her, but manifestations of activated experiences toward significant persons in past (mainly in childhood) displaced on the therapist, are considered as transference. The similar processes may take place in everyday life, but it is difficult to recognize them. The neutrality of a psychodynamic therapist, whose real feelings, attitudes and opinion are not known by the patient, helps in recognition of transferential fantasies and feelings, what usually does not take place in other conditions. However by those processes which take place simultaneously on many levels of organization of psychical processes including conscious and unconscious, as well as verbal and non-verbal communication.

According to the psychodynamic-cognitive model of information metabolism (Fig. 2) self and object may be defined as functional structures constituting respectively, internal, mental representations:

- of one's own person, *i.e.*, self
- of "important person" *i.e.*, object.

For a greater clarity, the fluctuations of the control center according to sleep-waking rhythm (Kokoszka, 1993) were omitted on the previous model, but included on this one. However, the fluctuations according to short, ultradian rhythms are not considered in this paper, and they are illustrated only by arrows on the horizontal plane (they were discussed in the paper by Kokoszka, 1993).

The interaction between two persons, including the relationship between the patient and the therapist are illustrated on the Figure 3.

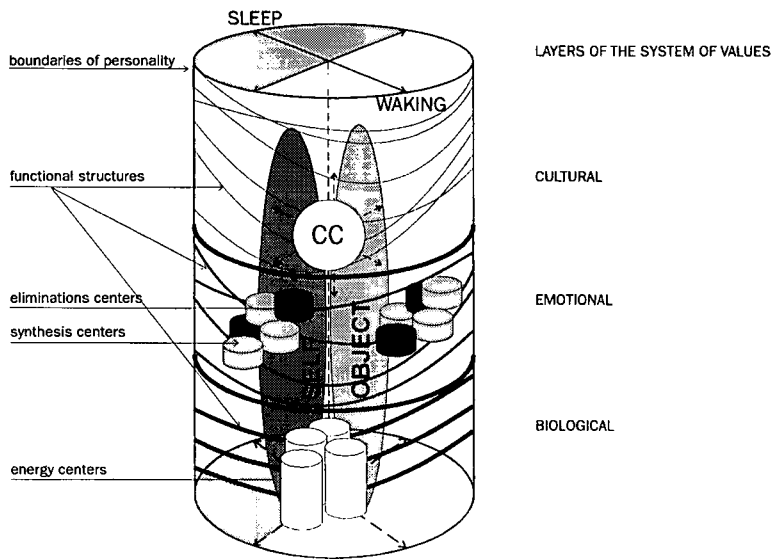


FIGURE 2 Psychodynamic-cognitive model of information metabolism.

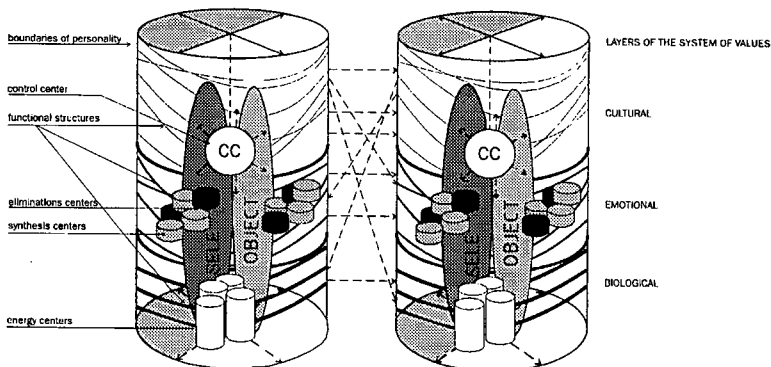


FIGURE 3 Information metabolism in interpersonal contacts.

THE STRATEGY OF UNDERSTANDING OF THE EXPERIENCES OF OTHER PERSON ACCORDING TO MODEL OF INFORMATION METABOLISM

In practice, in order to understand the other's experiences according to the information metabolism one should ask oneself questions regarding the following (Kokoszka, 1996):

Control Center – To what extent can the other control oneself? Does his/her control center actually find itself within the scope of his or her

consciousness and within one's own ability to think logically? In my contact with the other is there any type of interference on the part of my own ability to control myself?

Boundaries – what are the boundaries of the other's self? To what degree can the other differentiate between the product of one's own mental life (e.g., fantasies, beliefs) and the realities of the external environment? How are the boundaries of my self in the relation with the other? To what extent is the other able to function in an autonomic way; and to what degree is his or her internal representation of one's own self separated from the internal representation of the object (important person)? Am I not identifying with the other too much. Am I not isolating myself from the other?

System of Values – What are the "real" and "ideal" hierarchy of values of the other? In what manner is the metabolism of information determined by the other's own specific meaning of specified stimuli resultant of: firstly, biological make-up – on the biological level of the system of values; secondly, "emotional complexes" on its emotional level, thirdly, personal social experiences shaping socio-cultural level of the system of values. Moreover, it is essential to ask "What is relation between the other's hierarchy of values and my own?

Functional Structures – What are other's patterns of behavior? How does the other experience himself or herself, how does he or she experience others? How does these compare to my own patterns of behavior?

Psychical Energy – What is the energy potential – "ego strength" – of the other? What types of problems is the other capable of confronting, and what types of problems are rather difficult for him/her at this time? How is my own "ego strength" at this time? With what types of problems am I able to work?

Elimination System – What is the ability of the other to cope with his or her problems? Speaking in metaphor, what is his or her ability to "metabolize" his/her own problems. What are my potentials of "metabolizing" problems, which are similar to those of the other?

The issues presented here should be understood conceptually according to the individual's life history which shapes individuals functional structures and to the his or her current situation as well as to plan for the future.

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