

THE FOREIGN OBJECT PRINCIPLE AND ITS GENERALIZED NET INTERPRETATION

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Someone once said that certain people are breathing in order to live and others are living in order to breathe. Or maybe the saying was that some are eating so as to live and others are living so as to eat. No matter what the statement was, both of the possibilities are right. A human being *breathes* by means of lungs, *transports* the air to each cell with the help of one's blood, the cells *process* the inhaled air and the needless is returned and extricated in the environment again by means of the lungs. Similar is the situation with the food a person nourishes. Hopefully, the dejection of the unnecessary or recast material is performed at a place different from the place of receiving the nutritive material.

The first of these procedures takes place for seconds or minutes, the other needs hours to be performed.

A reader of the lines above, having in mind the *received* information, may *react* by ignoring this paper, but may as well read what is following and even *share* with the author one's opinion.

What is common for all the described processes in the human's body? This is the idea that a certain (material or not) *foreign object* is *perceived*, *processed* in one or another way, and as a result another (material or not) object is *produced*. It is being isolated in another (for instance the surrounding) environment and it appears in it in the form of "foreign object".

Up to now we laid the foundations of illustrating a new principle holding for the abstract theory of the systems [1,2], that can be conventionally named "The principle of the foreign object".

Every system receives and proceeds foreign objects and produces other objects that being excreted outside prove to be foreign objects for the outward environment.

In the case of biological systems, this principle can be expressed in the following way:

"Every biological system unit functions due to an imported substance (foreign object) and as a result from its work other substances are being isolated, being foreign objects for the surrounding environment."

An abstract system is a proper one, if it is not an empty system or if it is not the whole universe.

For each proper abstract system we can assert that it holds foreign objects, they are processed in it and the excreted substance is foreign for the outward systems.

On Fig 1 is given a Generalized Net (GN, see [3]) having the following sense:

Token α enters place l_1 with initial characteristic "a description of a given abstract system" and token β enters place l_2 with initial characteristic "a description of the universe around the given abstract system".

Here we shall not discuss the problem even the universe is equal for all given systems, or each system has own universe that is the collection of all objects related with the system. It is convenient to assume that the universe is outside the given system and both do not have common elements.

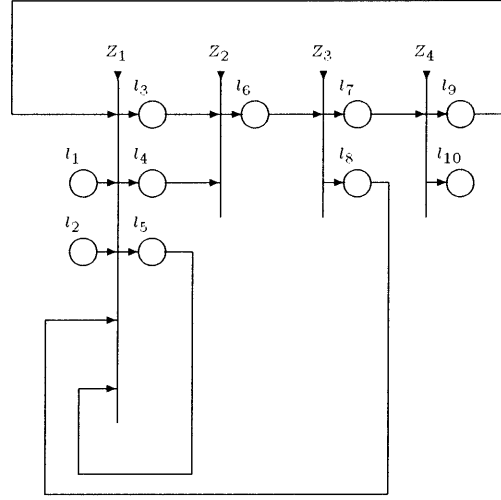


Fig. 1.

The first token goes to place l_3 with characteristic “current status of the system”, while the second one splits into two tokens. The first one (let us mark it by β^*) enters place l_5 with characteristic “current status of the universe” and the second one (let us mark it again by β) enters place l_4 with characteristic “description of the alien object that will contact with the system”. The first (β^*) token will stay only in place l_5 , while the second token (β) unites with token α in place l_6 with characteristic “current status of the system instantly after its interaction with the foreign object”. After this, token α splits to two tokens: token α that enters place l_7 with characteristic “current status of the system as a result of its interaction with the alien body” and token β that enters place l_8 with characteristic “description of a new object generating by the system, that is an foreign object for the universe”. If the time of the system life is over, token α leaves the net via place l_{10} with final characteristic “final status of the system as a result of its interaction with the universe”. In the opposite case, token α enters place l_9 without a new characteristic.

In a next research we shall discuss more complex processes related to the way how an abstract system is functioning as a result of its interaction with the foreign bodies.

We can see from this example that our model will function no matter whether the absorbed foreign object is of material or ideal nature.

We can add to the GN one more input and one more output position. A token with initial characteristic “criteria for estimating the abstract system behaviour after absorbing foreign objects” will enter through the input position. From there the token will transfer to the second position and will continue cycling there throughout the GN functioning.

According to the characteristics the first token will obtain in the model, they can be classified as follows:

- elementary (trivial) - if the foreign object that enters a system is not able to change

essentially its status - according to the criteria indicated as an initial characteristic of the third token;

- essential (non-trivial) - if not being elementary.

In a subsequent article we will discuss the exhibitions of the Foreign Object Principle in different (physical, astronomic, chemical, biological, social and other systems, as well as in the area of the Artificial Intelligence - the expert systems, machine learning, genetic algorithms, neural networks, etc.) Now we will only note that the Foreign Object Principle in a certain sense occupies the middle between the Interaction Principle and the Feedback Principle [4].

If we have a system and have a more global view on it, we will understand that it, what acts for a foreign object in this certain system, is in fact (a part of) another system that is in interaction with the first one or influences it. Vice versa, if we drop a level lower than the given system and thus we can trace the beginning and the end of a system feedback, we will determine that the beginning of the feedback is:

- (a) a foreign object extracted from the given system and going into another one;
- (b) another foreign object that enters the system described.

This fact is finds illustration in the GN-model given above.

In future intuitionistic fuzzy estimation of the GN-models components will be studied and properties of these models will be discussed.

References:

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