AUTOMORPHISMS IN THE PHENOMENOLOGICAL DOMAINS.

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Abstract
It is known that automorphisms are defined for the classical structural categories. In the present note the notion of automorphism is examined for the phenomenological categories introduced by the author in two previous papers.

1. Introduction

The notion of ismorphism refers either to the maps among the objects of a category, or to the maps among the functors of two categories (functorial isomorphisms). In this paper only the isomorphisms among the objects of a category (inside a category) are considered.

The classical definition of isomorphism for the maps (morphisms) among the objects of a structural category is accepted also for the phenomenological categories. Two principles are guiding the extension of the theory of categories and functors to the phenomenological and structural-phenomenological domains [1]:

> a) to preserve all what is possible from the classical theory of the structural categories and functors;
> b) to respect the principle of feasibility, i.e. the possibility of physical - informational action or realisation in the reality of existence.

In this paper only structural and phenomenological categories will be considered. The structural categories are used for reference. The problem of automorphisms for structural-phenomenological categories is let aside.

An ***automorphism*** is an isomorphism of an endomap [2]. An endomap, or an endomorphism, for instance, in the category of sets, is a morphism for which the domain and the codomain are the same. *In general, the automorphism, is an isomorphism between an object and itself.*

A phenomenological category is a collection of phenomenological objects where every object is a phenomenological sense or a set of phenomenological senses [1] [3].

2. The case of the structural category of sets.

In a structural category of sets, every set, as an object of the category, is a collection of elements. We consider only finite sets. Let **C** be the category of sets and **A** an object (set) in this category. The simplest automorphism is the *identity morphism* $\mathbf{1_A}$

$$\mathbf{A} \xrightarrow{\mathbf{1_A}} \mathbf{A}$$

but there is a lot of other automorfisms,

$$\mathbf{A} \xrightarrow{\mathbf{f}} \mathbf{A}$$

the number of automorphisms being in general [2],

$$n \le |\mathbf{A}|^{|\mathbf{A}|}$$

where $|\mathbf{A}|$ is the number of elements of $\mathbf{A}$. Therefore, for a set of two elements the number of automorphisms is 4. For such a case, the four automorphisms are shown in Fig. 1.

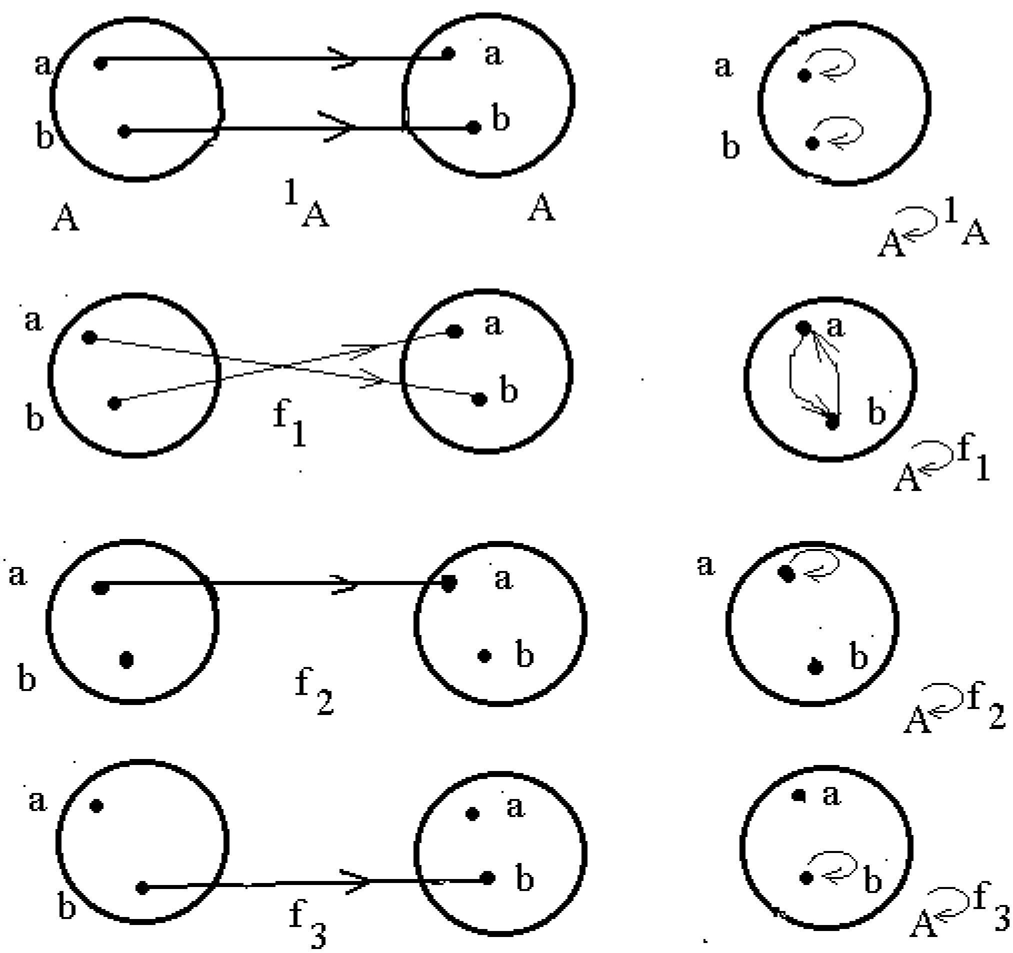

Fig.1

There are also other morphisms between **A** and **A** which are not isomorphisms, i.e. automorphisms.Two examples are presented in Fig.2. The examples of Fig.2 are not isomorphisms because these have not inverse morphism, an essential condition for an isomorphism.

The four automorphisms of **A** in Fig.1 are forming the set of all automorphisms of **A**:

Aut(**A**)
A ==-> A

where **==->**means a *set of morphisms*, i.e. automorphisms in this case. The maps from **A** to **A,** that is $\mathbf{1_A}$, $\mathbf{f_1}$, $\mathbf{f_2}$,$\mathbf{f_3}$are forming this set.

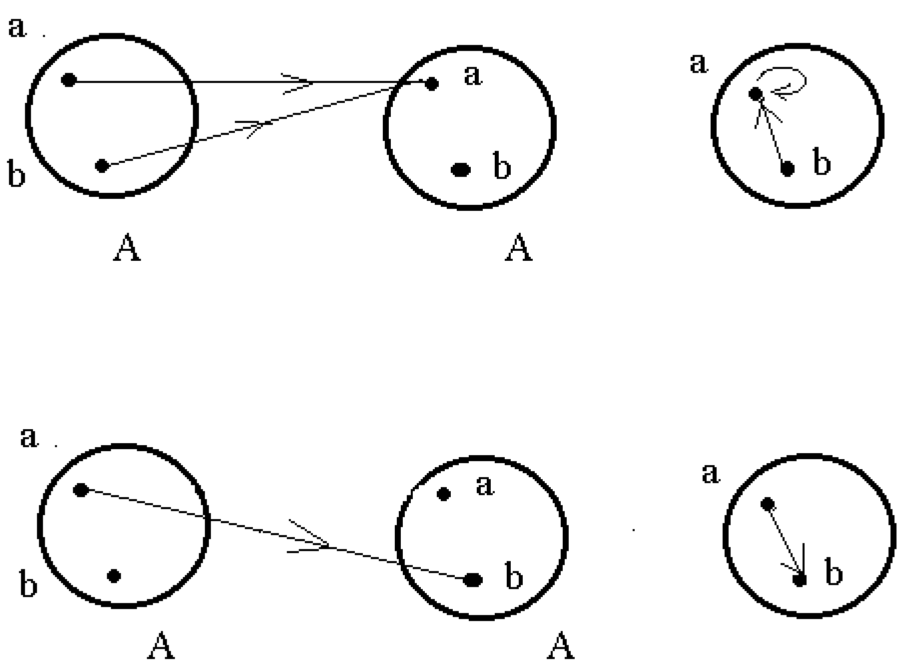

Fig. 2

An automorphism in the category of sets is called a permutation, because the object resulted after the application of this automorphism is, as may be seen regarding Fig.1, a permutation in **A** (the result of $\mathbf{f_1}$ is a permutation of a with b). The 'new' object is still **A** , but **A** with its automorphism, for instance $\mathbf{f_1}$. Such objects are forming *the category of permutations* [2].

3. The case of phenomenological categories.

The phenomenological categories were introduced in [1]. The objects of a phenomenological category may be sets or not. In the first case, the elements of the set are phenomenological senses, in the second case the phenomenological object is not a set, but a phenomenological sense.

Let the phenomenological category of the entire existence[3] symbolized by $C_{phe!1!}$. Its substance is called *informatter* [3]. It may be defined as a phenomenological topology [4]. It is not a space with distances. Still the "points" of this topology may be close or not to each other. The phenomenological category of the entire existence contains the **fundamental set of existence <1>** which is the infraconsciousness of existence, that is the orthosense or the phenomenological information <to exist > [3].

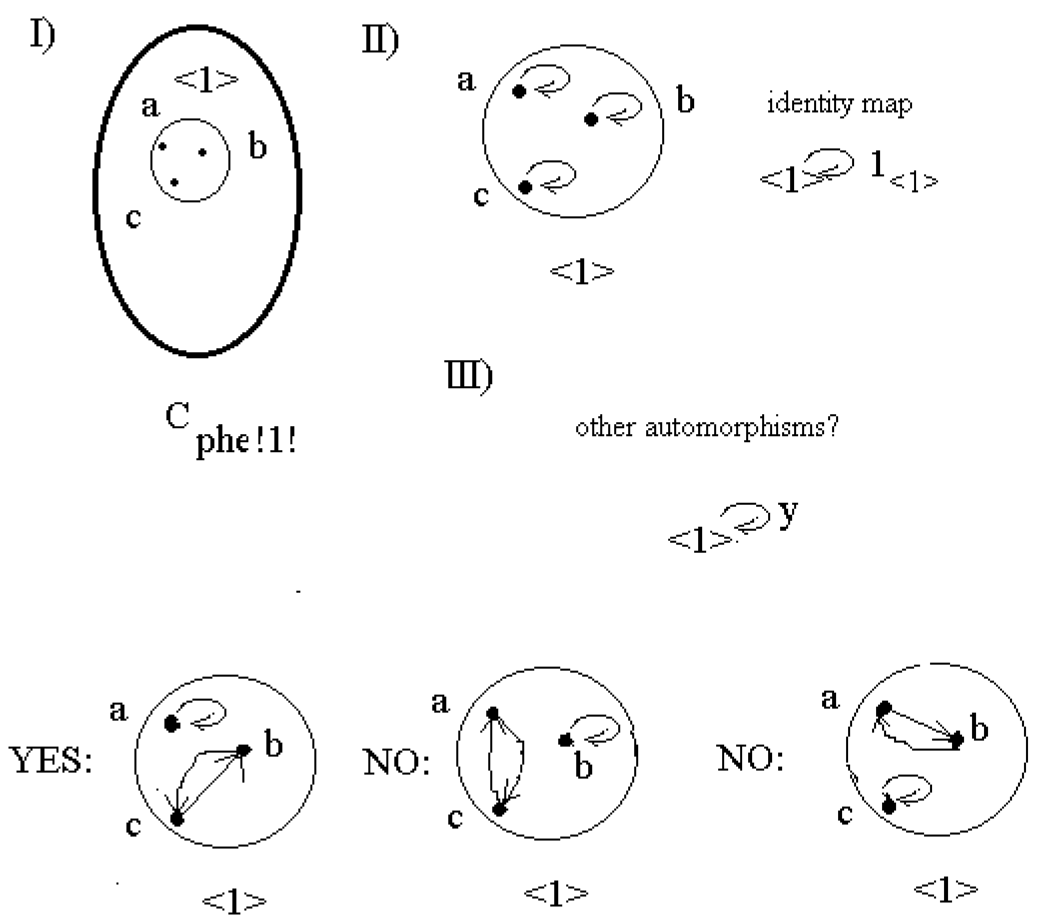

Fig.3

This fundamental set has three elements: a) *to exist in itself*, expressing also the unity of the entire existence; b) *to exist from itself*, which contains the autofunctor [3] that generates families of orthosenses for building universes and the Fundamental Consciousness of Existence; c) *to exist into itself*, which brings back, from a universe, informations on the happenings in that universe in order to become new orthosenses in informatter.

<1> is present "everywhere" in $C_{phe!1!}$, in every of its "points", it is a part of every other orthosense, i.e of every other "point" of the phenomenological category of existence.

<1> is a *set with three elements*. This set is a phenomenological set of the larger category of existence as mentioned above. Having three elements (Fig.3) it might have up to $13 < 3^3$ (= 27) automorphisms if we judge the things after the structural model. The condition of plausibility for the phenomenological domain may show that, ***not all*** of the 13 automorphisms are possible.

The most essential automorphism is the identity map because of the indestructibility and 'permanence' of **<1>**. Because of the nature of **<1> ,** all the three elements of it are ever present and what may be changed is only due to permutations. If we admit some form of chronos, which may be envisaged as a time without duration, as a tact (like that of a computer) in the deep existence of informatter, a permutation, that is an automorphism, can not never displace (permute) the sense **a) *to exist in itself*** which is like a fixed star. This puts a restriction on the permitted permutations. In Fig.3 the identity map (II) satisfies this restriction. In the cases III, only the left automorphism satisfy, but not the other two. The first (marked with YES) is a plausible automorphism, but not the other two (marked with NO) which are not plausible in the reality of existence. Other cases (IV) are shown in Fig.4.

IV)

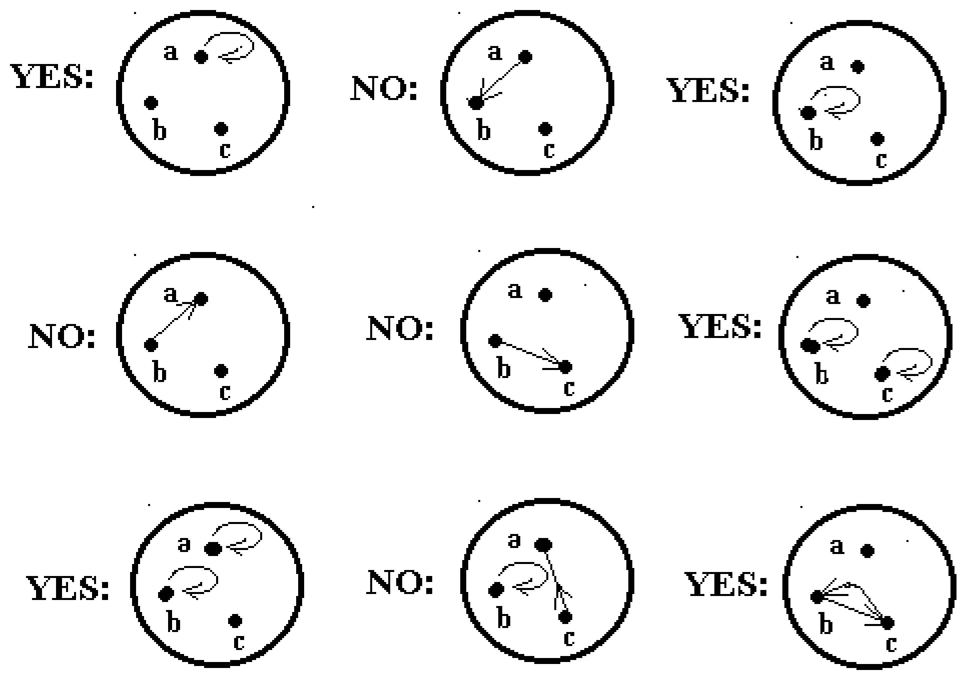

Fig.4

The examination of all the 13 possible automorphisms for the structural case, shows that only 4 are plausible, in the case of the phenomenological set with three elements, for physical - informational realization.. Therefore the number of structural and phenomenological automorphisms **n** is always

$$\mathbf{n} < |\mathbf{A}|^{|\mathbf{A}|}$$

where $|\mathbf{A}|$ is the number of elements of **A.**

The important fact is that *the notion of automorphism may be used in the phenomenological domain,* but only with the restrictions of physical and informational plausibility.

If the phenomenological sense **a)** is a fixed star, only the permutations of **b)** and **c)** are permitted. It seems that **b)** has normally a pole position because it is a generator of new orthosenses (the deep phenomenological senses are also called orthosenses) for the generation of new universes; as such it may be named *Indra orthosense* after the similar role played by Indra in Rig-Veda. The orthosense **c)** that may be named *Agni orthosense,* because of the role of Agni is to bring back informations from an universe to the deep existence. It may change its position with **b)** and to occupy the pole position. The chronos may produce such permutations for changing the Indra action with Agni action.

Another remarkable fact is that *the automorphisms of the fundamental phenomenological set of existence are very important for the dynamics of the deep existence and of the entire existence*. These automorphisms have a physical and informational content, they are part of reality.

What about the other orthosenses that are not part of **<1>** ? These are not sets. One might consider that such an orthosense is an element of a phenomenological set with only one element, but the 'free' orthosense in orthoexistence (deep existence) disappears from itself if it is not maintained, for instance, by its coupling with orthoenergy [3].

Therefore, a 'free' orthosense **S** might have only one automorphism (identity morphism) $\mathbf{1}_S$ as long as it is maintained in its 'free' state, but also morphisms to other orthosenses, which proves that it is an object, in itself, in a category, or it might have a complete disappearance which is neither an automorphism, nor a morphism , but a special property of this object.

We are obliged to make a difference between a *'free' orthosense* and a *'coupled' orthosense*, but the problem of coupled orthosenses is not considered here. As was shown above, a 'free' orthosense can not be considered as a set.

The Indra orthosense **b)**, when in pole position, may generate 'free' orthosenses.By using its autofunctor it may couple a generated **category** of orthosenses with orthoenergy [3] . Perhaps, this might happen *when after* gaining the pole position and generating free orthosenses, it is acted by an automorphism of **<1>** which returns **b)** to **b),** maintainig its pole position**,** as may be seen, in some cases, in Fig. 3 and Fig. 4.

4. Conclusions on phenomenological automorphisms.

In [1] were defined phenomenological morphisms for phenomenological categories. In this note phenomenological automorphisms were introduced and they proved feasible for the *fundamental phenomenological set of existence.*

As it was shown in [3] the philosophical background of the fundamental phenomenological set of existence, of its three elements and of their dynamics (by automorphisms and autofunctors), the notions of orthosense, informatter, orthoenergy, free and coupled orthosenses a.o. are based on the orthophysical philosophy of science [5] and of a common paper with Menas Kafatos [6] concerning fundamental principles in the philosphy of science.

References

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