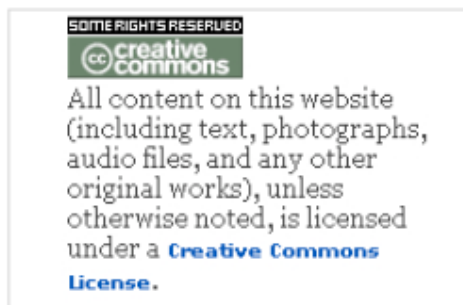


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A systemic approach to question complexity: the systemic scores

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Abstract

The objective of the systemic scores approach is to question the complexity of a system and its context with a simple method. It proposes a way to look for systems in contact with a first one we study and to point out several aspects of these systems (which all are failed ones in this paper). The four causes of Aristotle are used to point out these latest aspects. They are represented as a note. Each note is located at a given level of a staff. The higher a note is the more it represents a system which is (geographically) far from the first system we study. Thus, a systemic score represents a succession of possible explanations or contributions to the occurring of a system's dysfunction.

Key words: systemic, cause, Aristotle, ideogram, score, complexity.

Introduction

This paper borrows the notion of score from the music. The systemic scores approach proposes a way:

- to point out several aspects of a system (the objective is to bring a simple holistic view of it, or, in other words, to show different views which are gathered together);
- and
- to look for some systems in contact with the first one we study (the objective is to "contextualize" it).

We used two tools in the systemic scores. The first one is based on Aristotle's works about causes (Physics, book II, chapter 3 and Metaphysics, book A, chapter 3) [1] [2]. The second one results from the concept of systemic ideograms [3].

Then, first we are going to present the four causes introduced by Aristotle and the systemic ideograms we proposed in 2005. Next, we will give an example of a systemic score and finally we will provide a short discussion.

1. Background of the systemic scores approach: the four causes of Aristotle and the systemic ideograms

1.1. The four causes of Aristotle

They represent four aspects of a system. The causes are the material, formal, moving (or efficient) and final ones. We propose to consider that:

- the material cause deals with the elements of a system, i.e. what the system is made of;
- the formal cause is related to the shape of the system or to the set of interactions between the elements (i.e. what explains the type of shape we observe);

- the moving (or efficient) cause deals with the designing, building, maintaining and possibly repairing process of the system;
- the final cause is about the functions which are carried out by the system.

1.2. The systemic ideograms

The concept of systemic ideograms is used in systemic scores to help the user to find, for each cause, possible differences between each failed system we examine and a usual system which works correctly. In other words, the aim is to provide ways of looking for possible causes (in the Aristotle meaning's) which could induce or contribute to the dysfunction of the first system we study.

According to the concept of systemic ideograms, there are three possible movements which correspond to the three basic kinds of difference between two systems:

- an upward movement corresponds to "X has more ... than Y",
- a sideward movement corresponds to "X has not the same properties as Y",
- a downward movement corresponds to "X has less... than Y".

2. The systemic scores approach: presentation and illustration

2.1. Presentation

According to our musical metaphor, in a systemic score, the equivalent of a note is a disc-shaped set of the four causes (cf. figure 1).

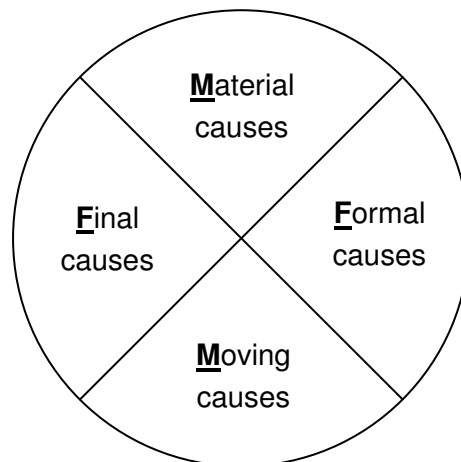


Figure 1: representation of the four causes as an "Aristotelian note".



Each set (or note) is located on a staff at a given level. In our representation, the higher a note is the more it represents a system which is (geographically) far from the first system we study. Thus, a systemic score represents a succession of possible explanations or contributions to the occurring of the dysfunction of the previous first system. We distinguish the activating systems and the contributing systems. The first ones induce the dysfunction and the second ones provide conditions which make easier the occurring of the dysfunction.

All the systems in contact with the first system we study and which may induce or contribute to the dysfunction we examine are looked for. We begin with the description of the first system itself that we put (as a note) just under the staff. Afterwards, we increase gradually the scope of examination in increasing the space of possible interactions between the first system and other systems. These interactions induce or contribute to the occurring

of the dysfunction. Then we put on the staff (from its lowest level to its highest one) the systems we find.

2.2. Illustrations

An example to illustrate the method: the occurring of a flat tyre.

In our representation, a set of four causes which corresponds to an activating system will be transparent  and if it is a contributing system, it will be filling in a grey matter .

Notice that two cases have to be distinguished. Before having a flat tyre, is the tyre stationary or not? With the second condition, we will be able to find the two last notes of the systemic scores of figure 2.

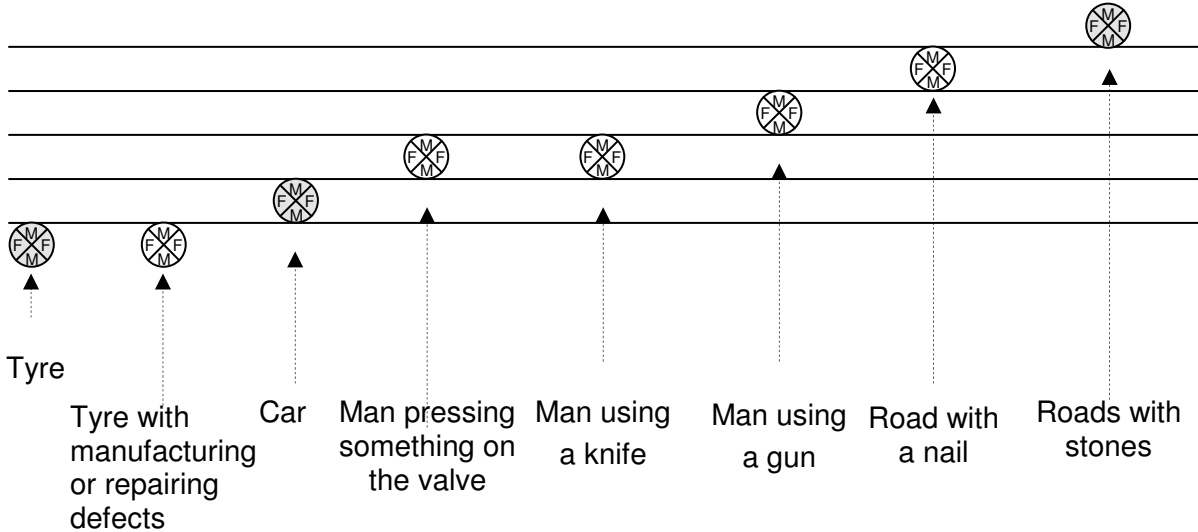
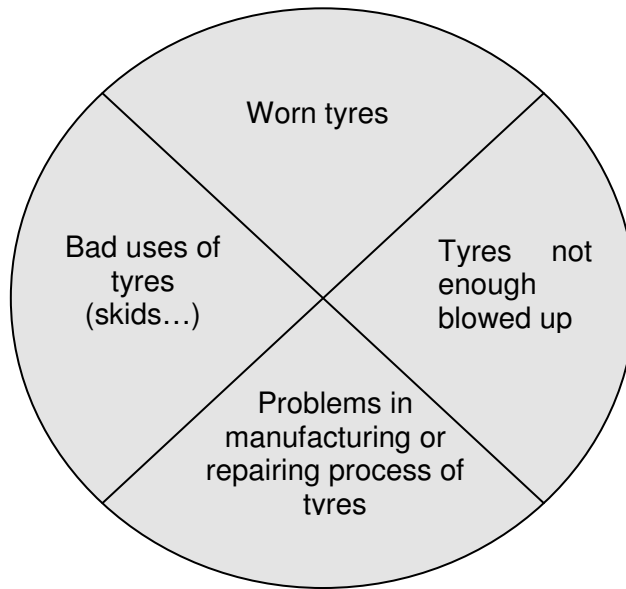


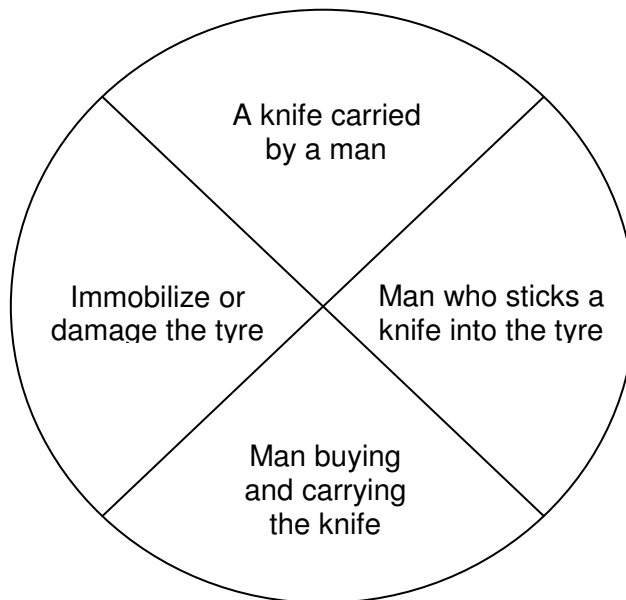
Figure 2: a staff with “Aristotelian notes”: a systemic score of the occurring of a flat tyre.

We just give a few examples of causes for three of the “notes”.

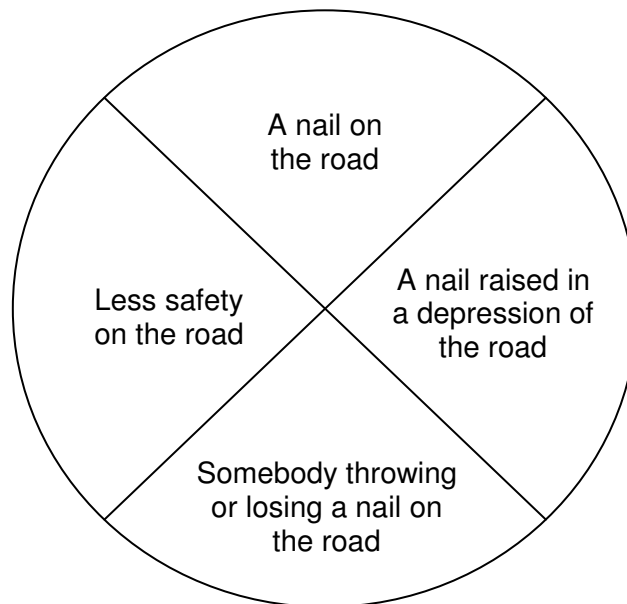
The “tyre” note:



The "Man using a knife" note:



The "Road with a nail" note:



3. Discussion

3.1. Some difficulties to build a systemic score

We do not represent some actors as a note. In our example, for instance, the designers are not taken into account since the system (the tyre) does not exist yet and, in a similar way, the repairers since the system (the tyre) does not work correctly during this repairing period.

About causes, Aristotle indicated that perhaps moving cause and final cause are in fact the same ones (Physics, book II, chapter 7). It is why we propose to define the final cause as the functions which are really carried out. And we introduced in the moving cause the functions which are specified during the design process.

3.2. Some limits of the systemic scores approach

It is impossible to guarantee the exhaustiveness of the notes and inside the notes the exhaustiveness of the causes.

The systemic scores approach is just a questioning method!!

3.3. A simple way for linking and contextualizing a system

The systemic scores approach belongs to systemic approaches which deal with linking and contextualization. Edgar Morin [4] and some other experts in systemics indicated that these two concepts are important if we want to understand better the complex thinking. The linking is a way to preserve a global view of different aspects of the same object, instead of studying them separately. The contextualization is a way to understand better and act on an object (or system) by connecting it with some other objects (or systems) of its context.

In this paper, we used a very simple example (a flat tyre). The objective with the systemic scores approach was to propose an easy way to "implement" the notion of linking. In this way, we gathered together the four causes of Aristotle in an "Aristotelian note". With the concept of systemic ideograms, we presented a way to help a user to look for possible explanations or contributions to the occurring of bad functioning of systems.

Conclusion

The systemic scores approach is a questioning method. The aim is just to help the user to examine some possible explanations or contributions to the occurring of a system's dysfunction. Nowadays, it is an experimental approach which has to be testing widely before being really used.

To finish, let us ask some questions:

- is it possible to specify the meaning of the intervals between two notes on the staff in a vertical way and in a horizontal one (in this case, we would get something rather similar to the notion of rhythm)?
- is it possible to develop the concept of distance from a geographic point of view to a temporal or action one?
- if we try to increase the level of a note, does it induce the removal of the note i.e. the problem itself?

References

- [1] Aristote, *Physique*, Translation of Pierre PELLEGRIN, Editions Garnier Flammarion, Paris, 2002.
- [2] Aristote, *Métaphysique*, Translation of Marie-Paule DUMINIL et Annick JAULIN, Editions Garnier Flammarion, Paris, 2008.
- [3] Vautier J.-F., «Idéogrammes Systémiques / Systemic Ideograms», *Res Systemica*, 2005, **5**, 1-10.
- [4] Morin E., «Pour une réforme de la pensée », *Entretiens Nathan*, Editions Nathan, 2006.