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Technotope: A Framework for Designing Interiors

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Abstract

Some researchers proposed the analysis of products' system by analogy with the system constituted by living beings. Thus, there appeared the technotope framework and a series of associated concepts: interactions (coexistence, challenge and syntechnosis) and connections (physical and semantic). The authors set out to verify the validity of this framework and its ease of application. They also investigated how the principles of structuring (coherence or contrast) worked within the technotope. Both real interiors (from the participants' homes) and ideal interiors (designed for display by professional designers) were used in the experiments. Finally, it turned out that the technotope framework is efficient and easy to apply, being a useful tool for designers. In the case of real interiors, the principles of structuring the interiors acted relatively at a low level on the technotope's interactions and connections. Much stronger was the action of structuring principles in the case of ideal interiors. Of the connections, the physical ones have rarely been used to achieve coherence or contrast. In contrast, semantic connections were found significantly in the resulting coherences and contrasts.

Rezumat

Unii cercetători au propus analiza sistemului produselor prin analogie cu sistemul constituit de fiinţele vii. Astfel a apărut tehnotopul şi o serie de concepte asociate: interacţiuni (coexistenţă, concurenţă şi sintehnoză) şi conexiuni (fizice şi semantice). Autorii şi-au propus să verifice validitatea conceptului de tehnotop şi a uşurinţei sale de aplicare. De asemenea, autorii au investigat modul cum acţionează principiile de structurare (coerenţa şi contrastul) în cadrul tehnotopului. În cadrul experimentelor, s-au utilizat atât interioare reale (din locuinţele participanţilor), cât şi interioare ideale (concepute cu scop de prezentare de designeri profesionişti). În final, a rezultat că tehnotopul este un concept eficient şi uşor de aplicat, fiind un instrument util designerilor. În cazul interioarelor reale, principiile de structurare ale interioarelor acţionează relativ redus asupra interacţiunilor şi conexiunilor tehnotopului. Mult mai puternică a fost acţiunea principiilor de structurare în cazul interioarelor ideale. Dintre conexiuni, cele fizice au fost utilizate rareori pentru realizarea coerenţei sau contrastului. În schimb, conexiunile semantice s-au regăsit în mod semnificativ în coerenţele şi contrastele rezultate.

Keywords: technotope, product design, interior design, design technique

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1. Introduction

Unlike animals, which live in specific natural environments for each species, the common persons live most of their lives in an artificial environment created by themselves. An important feature of the artificial environment in which human beings live is that it is populated by artefacts that help meet their needs and, in addition, artefacts allow them to live in natural environments where they wouldn't survive without these objects [1].

Ecology is the term used when analysing the connection between living organisms and their environment. Besides its primary meaning, due to the intense focus of the mass media on a specific ecological issue, the common man associates the concept of ecology with environmental protection. Of course, scientists and educated people know that ecology is the science that studies the interactions between living organisms and their abiotic environment.

So, ecology is the study of the interactions of living elements between themselves and also with their environment, together establishing a system. By extension, the term ecology has come to be used to study interactions from any system in which living beings may or may not be present. Starting from the idea that the environment that contains a population of living things is called a biotope, then the environment that contains more objects made by man in an at least functional connection is called a technotope [2].

Another use of the term technotope, but with a different meaning can be found in the paper written by Perrein and Guilloton [3]. The authors analysed the evolution of some butterfly species in the racecourse area of Mespras (Loire-Atlantique), erroneously considering that, being a man-made environment, the hippodrome would be a technotope, when it was actually a biotope, but with a strong anthropogenic conditioning.

Out of all possible technotopes (office, school, restaurant, etc.), the dwelling is the most significant, because here is where the average person spends most of her/his life. The dwelling offers safety, comfort and many ways of communication [4]. With the rise of telework, more and more people have chosen to work from home, avoiding commuting, adopting a flexible work schedule, and combining work activities with domestic ones. For all these reasons, man invests a remarkable amount of money, time and emotions for the permanent improvement and adaptation of the dwelling to her/his own needs and ideals. That's why the dwelling is probably the most interesting technotope to study.

2. Analysis of dwelling ecology from various perspectives

2.1. Dwelling ecology as an ecology of relationships between family members through the intermediation of different rooms

The concept of analysing dwelling as an artificial environment according to the theory of ecology is not new. Several decades ago, a group of researchers from the University of Utah [5], using ethnography means, have studied a total of 147 families in terms of interactions inside their homes. The study was carried out with the help of a young representative of each family, who at the time of the study was a marine in the navy. Unlike current practices, the study focused on relationships between family members, the family being the "biocoenosis". Researchers have found that there were a number of common practices in using the house, regardless of family characteristics, but also that there were differences, which allowed them to identify two main types of families in the context of home use. The study also revealed that the kitchen, bedroom and bathroom are the most relevant spaces for studying the ecological relationships between family members.

It is worth noting that the artefacts were missing from this ecology, except for the default doors, which, through their open or closed position, favoured or not inter-human relationships. Thus, the door artefact became a means of communicating with other people. Because there were other artefacts that supported inter-human communication, in this case inter-familial communication, they were not relevant within this ecology.

2.2. Dwelling ecology as an ecology of non-electronic information relations

Apart from the electronic information system designed to control the active products in the house, there is also a non-electronic information system, namely "miscellany of to-dos, bills, invitations, appointments, school correspondence, schoolwork, etc. that must be routinely handled, arranged and dealt with in the smooth running of a family home" [6].

In the vast majority of cases, the non-electronic information system is organizational because it sorts domestic chores and activities and considers their allocation to various family members living in that location. This system coordinates the place where information is stored and how information reaches the family member who needs it.

Analysing the organizational systems, Taylor and Swan [6] concluded that mothers are the ones who manage these systems and thus become the coordinators of family life: they take children to and from school, manage the schedule of family members, etc. Their conclusion was that the non-electronic system should consider the heterogeneity of organizational products and allow connection to the electronic subsystem of the dwelling.

Unlike the work activities (which have a motivation well-established across all operations), home activities are not supported by clear motivation (outside the family needs) and many times they are made in isolation. This disparity is attenuated and, in best cases, eliminated by domestic routines [7]. Thus, the non-electronic information system supports and organizes domestic routines.
Studying domestic routines, Crabtree and Rodden [8] concluded that in a house exist: ecological habitats (places where means of communication are located to be easily accessible to all), activity centres (where the media is manipulated, consumed and transformed to perform other activities) and coordinated displays (where means of communication are accessible to all for the purpose of coordinating activities).

Domestic routines help residents to carry out daily activities through the least problematic manner. By practicing a certain routine, the resident claims ownership of a given area and the other residents will respect the property, especially during performing the routine [9]. It is worth noting that ownership of space comes not from the routine itself, but from the products used that are in that particular space.

Possible future dwelling development directions are "inclusiveness (family members), enjoyability and recodification (of products to be unisex)" [10]. The last-mentioned direction is related to the fact that there is currently a certain gender-based assignment of tasks. Many specialists agree that the dwellings of the future will evolve from existing dwellings used by average people and not from dwellings created in laboratories for experimental purposes. "New technologies will be brought piecemeal into the home; unlike the 'lab houses' that serve as experiments in domestic technology today these homes will not be custom designed from the start" [11].

This approach is useful for understanding the functioning of the dwelling from the perspective of the non-electronic informational means and the practice of different routines. The problem is that it is difficult to generalize an individual's routines at the level of a market segment. Furthermore, the

structure of an informal communications system can be extremely diverse, with large family-to-family variations, and the word "miscellany" used above is highly significant. Thus, a designer's systematic approach in the industrial design area cannot be supported by such a highly variable ecology.

2.3. Dwelling ecology seen from the products domestication

Another way of establishing a dwelling ecology is through the process of products' "domestication" [12, 13, 14], how the products are adapted to the home and human needs. As a result of product domestication, the moral economy of the household is obtained – an economy of meanings of products [15]. Without challenging the value of the term of economy of meanings, it can be said that the term ecology of meanings can work just as well, perhaps even better, since the term ecology emphasizes the idea of relationships.

Appropriation is the phase in which the object is imagined by the future owner in her/his own home, being used and offering satisfaction. This phase also includes the moment when the owner brings home the object she/he has just bought. At this stage, the object acquires significance, due to its own characteristics, but also from the time and money investment made by the owner [14]. Objectification is the phase where the owner places the product in a visible place, the product obtaining visual prominence. This placement in space, or the consideration that the object deserves a place in the visible space, is a signal given by the owner about her/his own value and her/his place in the world. Incorporation refers to the integration of the object in the dwelling as a whole through a process that takes time. The object loses its novelty character and becomes part of the entire dwelling. Conversion is how the object in the dwelling is represented outside it, or for example how the owner speaks about the object.

A remarkable aspect of the product domestication is that the change in products significance during the appropriation has a subjective character [15, 16], depending on the features of the owner and impossible to foresee by the designer, manufacturer or marketer. Another factor influencing the change in products significance is the moral economy of the household, another element outside the area of influence or effective knowledge of the designer, manufacturer or marketer.

Using this framework, Finnish researcher Paavilainen [17] studied 17 dwellings in the Helsinki area. She discovered products about which the owners could not say anything regarding their domestication, as if these products did not exist, and this proved a disadvantage of this approach. Another interesting conclusion was that the owners ignored the significance of high-tech products, such as: cars, computers and mobile phones. Furthermore, it has been discovered products that were not replaced by more advanced ones since their disposal would be difficult and onerous.

The prospect of domestication does not link products directly between themselves, but through the relationship with human beings - a subjective relationship as it has been shown. If the semantic connection proposed by the concept of domestication is both general and objective, the significance given by the domestication process is subjective and difficult to obtain through the product design. Also, the time factor has an active contribution, impossible to forecast by the industrial designer.

2.4. Products ecology

The idea of an ecology of man-made objects structured in different habitats has concerned the design specialists for some time. One of them was Giulio Carlo Argan, an influential Brazilian theoretician, who believed that the designer, in addition to other equally important aspects, should also pay attention to the world of products seen as a system, both when designing a new product, as well as at a future time, preferably an ideal time, when the product will continue to exist [18].

The comparison between the system of living beings and the system of man-made objects constituting a product ecology was the focus of other theorists and specialists, like Klaus Krippendorff [19]. He underlined that the scale of human artefacts is larger than of the living beings. For example, a skyscraper has a larger height than the length of a whale. The comparison is debatable, because the whale is a single animal and the skyscraper is a system of artefacts. Another questionable observation made by Krippendorff was that the products displayed in museums changed considerably their functions during their lifespan, while living beings changed little during their lives. Actually, the comparison should be made between products from science museums and stuffed animals from specialised museums. If the comparison is performed properly, it can be observed that also the stuffed animals changed their function in their new state. Another disregard of the living world made by the German author was the view that the products are configured in a far more complex ecology than the natural ecology of forests or hives. Finally, Krippendorff correctly recommended that designers should not ignore the ecological relationships between products, as they are of cardinal importance for their survival in human habitat.

Starting from the existing relationships within a natural ecology, Krippendorff distinguished the following interactions between two product species A and B [19]:

a) Cooperative interactions, when an increase in the numbers of A increases the numbers of B.
b) Competitive interactions, when an increase in the numbers of A decreases the numbers of B.
c) Independence, when the change in numbers of A is not correlated with the change in numbers of B.

Krippendorff's approach to consider the world of products as an ecology is a fair one, despite some criticisable considerations. The German author does not clearly identify the forces underlying the ecology of the products. Also, the classification of interactions between product species based on the reciprocal relationship of growth, decrease or independence of the number of individuals presents the disadvantage that the decrease or increase of the number of individuals can be influenced by other factors - systematic or conjectural.

2.5. Technotope

Also, in the context of the analogy between the natural environment and the man-made artificial environment, another approach is the straightforward transposition of the central concepts and principles of ecology itself in the field of artificial environment ecology. The central concepts of ecology are biotope and biocoenosis. The biotope is a living environment, with unitary conditions and sustaining a biocoenosis. Biocoenosis consists of all organisms belonging to a specific biotope. The structure of biocoenosis is completely determined and self-regulating. Biocoenosis is organized on three types of interactions: a) trophicity; b) coexistence; c) symbiosis. Trophicity is given by the property of living matter to maintain its specific structure using food. Based on this property, trophic chains are formed. Coexistence occurs between living creatures that are not on consecutive levels in the food chain. Symbiosis is the close association between two living creatures (called symbionts) based on mutually beneficial relationships.

Starting from the idea that the same dynamics animates the system of living beings and the system of artificial objects, Andrei Dumitrescu [2] proposed new concepts to be used in the study of relationships between products for the benefit of the consumer and the designer. In the case of central concepts of ecology, the prefix used is “bio” (the word used for living in ancient Greek). Considering that the defining feature of artefacts is their man-made creation, the prefix “techno” (craft, skill in ancient Greek) has been used.

Technotope is a certain artificial environment, with unitary conditions inhabited by products that made up a technocoenosis. Examples of technotopes are: a specific room in the dwelling, office or the interior of a particular means of transport, etc. *Technocoenosis* is made up of all artificial

artefacts associated with a particular technotope. Technocoenosis is organized on three types of interactions (product relationships): a) challenge; b) coexistence; c) syntechnosis.
The *challenge* arises between products that meet the same human need. To meet a certain need, one may have one, two or more products available. The reasons for choosing one product or another can be related to performance, quality, prestige, aesthetic features, etc. In most cases, the superiority of one product over another (especially in terms of performance) leads in time to the disappearance of the inferior product. Examples are: goose quill was replaced by the fountain pen; the writing machine - by the printer, etc.

Coexistence is present between products that meet different human needs. Their state of "peaceful" coexistence stands out when it comes to replacing them because they have either been faulty or worn-out. Before being disposed of, the question arises: Is there a competitive product in technotope that satisfies that human need equally well? If it exists, then this second product would replace it first and there would be no need to buy a new product. And so, it would not only disappear from technotope the actual product but also its product category. If there is no concurrent product then the product will be replaced immediately or with some delay with a product of the same category, depending on the stringency of the need it meets.
Syntechnosis is the direct connection state between two or more products in order to meet a human need. The connection can be at the constructive or functional level or at both levels. There are different degrees of syntechnosis - from full dependence to total independence. In the case of total dependence, products can only be used together and sometimes they are perceived erroneously as a single product (e.g. lamp and electric bulb). A case of partial dependence is the syntechnosis in which a product can also be used independently, but the second product can only be used in syntechnosis with the former (for example, the computer and the printer). The case of total independence is related to the joint use of products due to functional links (table and chair) or symbolic (festive dining table sets), but the components of the syntechnosis can also be used separately.

Regardless of the relationship between products, there are several types of connections that can be used in the analysis of a technocoenosis, but two are particularly useful: a) physical; b) semantic. *Physical* connections between products can be mechanical (for example, between the tap and the sink on which it is fixed), thermal (between the stove and the pot), electrical (between the socket and the plug), optical (between the wall lights and the wallpaper). *Semantic* connections are made in the consumer's intellect and associate products with similar ways of use, similar contexts of use, etc. Perhaps the best examples of semantic connections based on similar contexts of use are those of a ritual nature, such as festive dinners, when best china sets are taken from drawers, shelves or boxes.
It is obvious that the three types of interactions proposed in the technotope approach are similar to those proposed in [19]. The term challenge has been chosen against competitive because challenge expresses a more intense confrontation, which may even result in the disappearance of the product category. The term coexistence has been used to the detriment of independence because it is closer to the meaning proposed in the ecology of living beings. Also, the term syntechnosis is the reflection of symbiosis in the artefacts, and it clearly highlights the close, even organic, link between products, which goes beyond mere cooperative interaction. In addition, the term cooperation suggests a conscious positive involvement, thus associated with human rather than product. It should also be noted that the semantic connection has, to a certain extent, similarities to the incorporation phase of the domestication of the products. The newly acquired product is embedded in the domestic world also considering using connections, usage context, etc.

3. Assessment of the technotope elements

The technotope framework was appreciated by the authors as a compelling framework, useful in assessing the environment (especially the interior of the dwellings), but also in providing in-depth

information and inspiration for the designer in the design process. In order to overcome the authors' inevitable subjectivity, the technotope framework should have been analysed and evaluated on objective basis. In addition to other questions, the key questions that were sought for an answer over time were:

- Is the technotope framework viable and easy to apply?
- How does the technotope framework help the designer?
- Are the three types of interactions (coexistence, challenge, syntechnosis) viable?
- Are the connections (physical, semantic) viable?
- Can the principles of aesthetic structure (coherence and contrast) be found in the interactions and connections of the technotope?

Finally, the analysis and evaluation process had two phases.

3.1. Phase one

In the first phase, a form was developed to assess the relationship of the product with the technotope where it is located. It was considered necessary that through the form, the respondent to indicate: the product, the technotope, the main and secondary needs associated with the technotope, the relative importance of the product in the technotope, the composition of the technocoenosis (i.e. the other products in technotope) and then evaluate, by marking, interactions, connections and (visual) similarities of the product with the other elements of the technotope. Then by elementary calculations, the respondent was able to determine how integrated and connected the product is in technotope. Finally, the respondent was invited to take a picture of the subject technotope.

Table 1: Blank form used in phase one

Product:				
Technotope:				
Main needs associated to technotope:				
Secondary needs associated to technotope:				
Product relative importance: (*primary or secondary*)				
Technocoenosis composition:				
Products	Interaction	Connection	Coherence	Adequacy (*col. 2 x 3*)
0	*1*	*2*	*3*	*4*
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
Total	Σ =	Σ =		Σ =
Comments:				

It has been assumed that by multiplying the marks obtained by connection and coherence the design adequacy will be achieved. The higher the sum of the adequacy, the more the product design is in harmony with the design of the other products of technotope. Therefore, it is advisable to analyse the smallest marks in the adequacy column to see which features need to be improved or if the other product is not properly integrated into technotope. The proposed questionnaire was developed in Romanian and is presented in Table 1. The marks that could be given were as follows:

- Interactions (-1 - for challenging products, 0 - for coexisting products, 1 - for products in syntechnosis (independent or partly dependent), 2 - for products in syntechnosis (dependent).
- Connections (2 - physical connection; 1 - semantic connection; 0 - no connection);
- Coherence (2 - coherence in all features, 1 - coherence at most features, -1 contrast at most features, -2 contrast at all features).

In order to verify the effectiveness of the form, an experiment was organized in which persons not involved in the design of the form or the elaboration of the technotope framework were invited to complete a form after a brief, but constant, training. Each participant photographed the technotope that she/he was going to analyse and handed over the photograph with the completed form. There were 48 people (32 women and 16 men) aged 20-22, all bachelor students at a technical university in Romania. Completed forms and photos were reviewed by a competent designer. Products from the following technotopes were analysed: living room (31.25%), office (16.67%), bedroom (16.67%), kitchen (10.42%), bathroom (4.17%), etc. After analysing the collected forms, the following conclusions were reached:

- The method was applied correctly by all participants.
- The product, the technotope, the needs and the relative importance of the product in technotope were correctly indicated / evaluated by all participants. No products were wrongly identified.
- The number of products identified in technocoenosis was between 6 and 18 (mean = 10.06, standard deviation = 1.89).
- Sums on the columns of interactions and connections had low values, which would have meant that the products analysed are too little integrated and connected to technotope, a situation justifiable by the fact that interiors were not designed by professionals;
- It was appreciated that the value of the amount in the fourth column correctly indicated the adequacy of the design of the product in technotope.
- The rows of comments varied between 0 and 11, and 29.17% of the comments were missing or too short.
- The table provided information about a single product.
- It was considered that this first tabular approach is not appropriate, and the research should be resumed.

3.2. Phase two

Further, the authors proposed a new form that will allow a more systematic approach. Also, the new form should investigate properly whether the principles of coherence and contrast work within the technotope framework. If confirmed, then technotope framework could be used in the interior design. Two lines of action have been proposed: the first focused on real interiors, consciously or unconsciously designed by their users, and the second on ideal interiors conceived for display by professional designers.

In the first line of action, 27 Master students from a technical university in Romania were invited to participate and started by photographing a room of their choice from their dwelling. 10 kitchens, 9 dining rooms, 4 bathrooms, 3 bedrooms and 1 office were photographed. An example is displayed in Figure 1.

Then, they were asked to complete two tables in a spreadsheet: the first one was intended to evaluate the interactions and the second one for connections. The generic table used for the evaluation of the interiors is shown in Table 2. P1, P2 ... are the products of the technotope, and the user has only to fill in the white cells with the codes corresponding to challenge, coexistence and syntechnosis (first table); respectively physical connection and semantic connection codes (second table). The spreadsheet automatically calculated the number of interactions and the number of connections. No completed table has been discarded, regardless of the quality of the interior or the number of errors committed in completing the table.

Afterwards the authors corrected the tables completed by the participants to the experiment. There were few mistakes discovered (0 - wrong coexistences, 3 - wrong challenges, 1 – false syntechnosis, 4 wrong physical connections, 8 wrong semantic connections (6.95% of the total)), which proved that the technotope and the associated concepts can be easily applied and with very few errors.

Table 2: Table used to evaluate technotopes in third phase

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1										
P2	0									
P3	0	0								
P4	0	0	0							
P5	0	0	0	0						
P6	0	0	0	0	0					
P7	0	0	0	0	0	0				
P8	0	0	0	0	0	0	0			
P9	0	0	0	0	0	0	0	0		
P10	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	-

Challenges	Coexistences	Syntechnoses
TOTAL	TOTAL	TOTAL
0	0	0

Figure 1. Example of a “real” interior.

Figure 2. Example of an “ideal” interior.

The second line of action started with the selection of 35 interior design photos, considered by the authors to be “ideal”, respectively award winning interior designs and interior designs presented in the showrooms of the best companies in the field. In order to avoid a biased selection, the colleagues of the authors were invited to choose the most beautiful interior designs. The interior designs selected most often (23) were the subject of the experiment. An example of an ideal interior

is presented in Figure 2. Using spreadsheets like that displayed in Table 2, the authors identified the interactions and connections between the products in those technotopes. Next, the interactions and connections were analysed from the aesthetic perspective of the coherence or contrast between products linked by interaction or connection. Also, interior designs have been analysed to find out whether the designer had used coherence or contrast as a principle of design. There were 8 coherent interior designs, and 5 built on contrast, the rest being considered neutral. The results of the analysis are presented in Table 3. (For example, the value of "0.48" represents how many challenges were used to create coherences in the real interiors. Please note that there might be more than one challenge in an interior.) Also, Table 3 presents the results of the analysis of the 27 proposed technotope by the students (the original tables being corrected by the authors). (Obs.: Examination of student photos has in no way revealed the action of a coordinating principle like coherence or contrast.)

Table 3: Analysis of interactions and connections from coherence / contrast perspective

Challenge		*Syntechnosis*		*Physical connection*		*Semantic connection*	
Coherence	*Contrast*	*Coherence*	*Contrast*	*Coherence*	*Contrast*	*Coherence*	*Contrast*
Averages for real interiors							
0.48	*0.93*	*0.67*	*1.26*	*0.59*	*0.77*	*0.74*	*1.81*
Averages for ideal interiors (considered entirely)							
1.57	*1.04*	*1.26*	*1.39*	*0.48*	*0.48*	*2.87*	*2.70*
Averages for ideal interiors (designed based on resemblance)							
1.88	*0.13*	*2.25*	*0.00*	*0.50*	*0.38*	*4.75*	*0.13*
Averages for ideal interiors (designed based on contrast)							
0.80	*3.00*	*0.40*	*2.80*	*0.20*	*0.40*	*0.80*	*6.40*

It can be noticed that in the case of real interiors, the average values were relatively small, and a correlation between interactions and connections on one hand and the principles of coherence and contrast, on the other hand, could not be concluded. However, the contrast principle has acted more strongly in real interiors (contrast average values were higher in all four situations). Generally, averages in ideal interiors were higher than real ones, except for physical connections that had low values in all situations, so they are insignificant. Again, considering the general case of ideal interior designs, there was no predilection for coherence or contrast. Things changed when considering designing separately on the principle of coherence or contrast. Average values were higher and even very high for semantic connections. They pointed to a strong link between interactions and semantic connections on one hand and the principles of coherence and contrast on the other, which means that at the conscious or unconscious level designers have considered the relationships between the products of technotope, with the exception of physical connections.

4. Discussion

The form designed by the authors and used in the first phase indicated that the technotope was a framework useful and easy to understand and use, but the form had a low efficiency for the study of interactions and connections. In addition, that form analysed the technotope from the perspective of a single product.

The spreadsheets developed in the second phase underlined once again the clarity and usefulness of the technotope framework. Then, these tables allowed an efficient analysis of interactions and connections. During this phase, the contrast was more evident than the coherence. The reasons were varied, including that the contrast was easily achievable, and it offered a dynamic character, enlivening the interior design. Coherence can be boring, and a good example constitutes the monochromatic schemes used for interior designs.

In the ideal interior designs presented during the second phase, the contrast and coherence appeared

more often because these had been designed in a particular manner and were not the random result as it happened with the real interiors, which, on one side were the result of the actions of a person less interested in the beauty of the interior design, and, on the other hand, it was the result of numerous acquisitions and changes which happen thorough the time. It can be stated that, when purchasing a new product, the criteria of aesthetics are less considered by the average person.
In the ideal interior designs, when the analysis was conducted on interiors designed in accordance to a principle (coherence or contrast), the principle acted the same way for interactions and for connections. In the case of syntechnosis, it was an unanticipated result because the authors were expecting to find only coherence relationships. The expectations were reinforced by previous hypothesis, such of Krippendorff [19] that stated: „Artefacts compete wherever alternatives are available. But most species of artefacts end up engaging in mutually cooperative relationships. This may have something to do with designers' preference for coherence and users inclination on common sense – the presumption of a shared rationality or technologic." But the results showed the contrary, the syntechnosis existed between contrasting products, when the interior was designed using the contrasting principle.

5. Conclusions

The authors tested the framework of technotope and the associated concepts through two experiments. At the ending of the first experiment, it was obvious that the used form was not very efficient, but nevertheless the experiment proved that the technotope framework and the associated concepts are valid and easy to understand and use.

Based on the results of the first experiment, the authors designed two spreadsheets (one for interactions and another for connections) that were successful used in the analysis of the real interiors (existing in the dwellings of the participants) and also of the ideal interiors (conceived for display by professional designers). Also, the authors investigated the relationships between interactions and connections and, respectively, the principles of structuring (coherence or contrast). In the case of the real interiors, it was found that the relationship between interactions and connections, on one hand, and the ordering principles (coherence and contrast), on the other, is not so strong. In the case of ideal interiors, the relationship turned out to be quite strong.

It has also been found that physical connections are not used to achieve coherence or contrast in the case of ideal or real interiors, as opposed to semantic ones, which are much more significant. This means that the semantic connections between the technotope components can be used effectively to build coherence or contrast within. It has also been observed that the principle of contrast has been used most often.

Technotope framework and associated concepts are a useful tool for the designer of the product and especially for the interior designer for a deep understanding of the system in which she/he designs and for which she/he generates solutions at an aesthetic level.

6. References

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