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A Novel and Modern Comprehensive Theory to Create an Anthropocentric Architecture Based on Laws of Chaos (Part III): Optimization

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ABSTRACT

As explained in the chaos chapter, in strange attractor of chaotic systems, creation of information takes place in the diverging trajectories while destruction of information happens in converging trajectories. This quality provides the system with an optimization process. In fact, diverging trajectories provide a search space for examination of all the possibilities and probabilities while finding the optimum general solution to the matter at hand takes place in converging trajectories. In the process starting from the subject and ending with the architectural design, the mind constantly converges and diverges in order to create new information and destroy the redundant information. At the stage of idea-finding, as the parasite and often redundant information increase, our mental system's trajectories diverged in order to acquire information and develop the search space. Now, we must consider the actual conditions of the act and the designing priorities and destroy the information by absorbing the redundancies and set aside the improper ideas and through elimination, narrow down our ideas in order to find the best answer so that our final mental pattern takes form out of shapelessness. As if until now, we have prepared the conditions of creating and vitalizing the entity and now we want to deal with its actual essence: what nature does this embryo is supposed to assume in order to be accepted and welcomed by its future audiences and maintainers? In the third stage, the alternatives start their journey to growth and evolution from vague and broad sketches and end when a real design emerges.

1. Introduction

Although optimization must be done at all stages of cogitation and design to find the best answer in an strategic way, in this particular discussion, optimization means determining the generalities of the architectural design which is done through two recurring stages of assessment with convergence and negative feedback and organization with divergence and positive feedback in a given time interval. In order to produce a fractal architectural design, the designer must allocate a major part of designing to repeatedly assess and organize on different scales so that the design come as close to its ideal perfection as possible [1–93].

2. Assessment

As we saw, if the purpose of the architectural creation is to create a form, there are different ways to think of infinite astonishing patterns and in this sense, most claimers of form-making in the field of architecture were not successful even at doing that. If the architecture was to remain on paper forever like the results of many competitions, then you push your imagination much further! For idea-finding, it is enough to imagine yourself on the scale of one-hundredth for ten minutes wherever you are and look around from that angle. Anything around you can initiate the formation of an exciting idea: a dandelion flower, a pine fruit or walnut, a mixture of jelly and ice cream, a lighted candle, a mass of cotton candy, a curved glass, an egg, saltshaker, crumpled paper, cell phone, a soda can, a tube of toothpaste, an eye drop container, clothespin, layers of tissue paper, a shoe or sandal, a diamond ring, a knitted scarf with different colors, a piece of bent wire mesh standing on its edge, a balloon, a piece of melted chocolate, etc. reflecting on form, material, function, statics, and proportions of any of these objects can lead to an innovation in the construction industry. Not just in form, but in the structure and materials and usage. Undoubtedly, though, the most important thing is to realize such a dream.

We don't have to limit ourselves to the restrictive conditions of the design until the stage of finding the alternatives and embodying the fancy into the mold of form. Alternatives and diagrams can remain imaginative and absolutely abstract so that there is room for comparison and conveyance and promotion of the thoughts. But to direct the design from idea to architecture, it is necessary to assess the generated alternatives. Assessment is the process of determining how much a potential idea can contribute to resolving our problem or can adapt to the targeted conditions. During the final selection and assessment, we are not allowed to be reckless. We need to define rules and criteria and act systematically. At the third stage, the matter of which alternatives are suitable and can fulfill the needs of first and second stage is controlled. In other words, at this stage, alternatives must pass through two sieves of basic problem and the conditions of the first stage.

In order to do that, the alternatives are corresponded with the fundamental problem which is introduced beforehand in a reciprocative way so that the accuracy of the two is examined: whether the problem raised has truly been in

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regards to the creation of the project according to the subject of it or not and which alternative could lead to a worthwhile pattern formation. In addition, at this stage, we control whether the idea is generally fit for the conditions of the first stage by putting the alternative in the context. The architect is allowed to forego the conditions of the first stage only if there is a good reason for it. As we said in the first stage, many of the designs ignore the climate-cultural systems intentionally due to political and economic concerns or in order to initiate a cultural evolution. But these important historical monuments shouldn't by some error become the model for architects in designing normal buildings. In case the context of the design is ignored, then it should be proved that the design truly has a targeted program to promote the culture or is worthy enough to spend so much money on its maintenance. We may dare say that anti-climate, anti-social, and anti-cultural designs of the last two decades executed with obscene ideas under the title of mass production and building shelters of poor quality on large scales or to show off the architect or capital owners were none worth ignoring the ecology and culture of the setting of the design and they contributed to the decline in cognitive level and the quality of life of people.

At the third stage, alternatives with much internal contradictions or too far from the limitations of the first stage are eliminated and amendable alternatives are developed on different scales. From the interaction of the environment and the building, gradually the walls and edges of the system are formed fractally and the general form of the building gradually emerges. Here, the architect is forced to constantly shuffle in and out and form different parts of the system by finding the more subtle fundamental issues through idea-finding and assessment. The mechanism of this action is negative feedback. By referring to the super-systems of environment and the assessment criteria, the designer shapes the form and through that, creates something that leaves its impact on the context itself. Then s/he must return to the new conditions and amend the reaction of those internal errors. S/he constantly makes the design, puts it in the environment, corresponds it to its information and fixes the errors and by doing that, gets closer to the optimum alternative and developing it. At this stage, since the work is done in a general form and by consideration of key factors, the scope of change can be broad. By any change, new and cognate alternatives might be born selecting among which might require re-assessment.

3. Drawing the Diagram

The proper diagram for assessment is a schematic or synthetic diagram which shows the posture, orientation, access, and relation of conceptual diagram to the environmental forces and factors which is accompanied with statistics and descriptions and is in fact an abstraction of the final project that can prove useful for the visualization of the general form and boundaries of the building and the architects stand in regard to the conditions of the first stage and modifying them. It's better to start the designing by examining the context through an analytical diagram and as we are shaping a pattern for its formation in our mind, modify the alternatives through synthetic diagrams according to the environmental conditions and take note of all the climate, natural, cultural factors, legal references, executive systems, and other limitations by modeling, sketch, description or a reminder photo on the margins of these diagrams. It is recommended that at this stage, the architects, like detectives who consider every small clues to solve a crime and keep them on sight, allocate a big wall in the assembly location of the designing and execution associates to the formation of the design and put different alternatives up on it along with different types of diagrams and their descriptions, key factors of the concept and the schedule so that they are accessible and modifiable at all times and becomes the subject of debate and criticism and bursts of ideas among the colleagues and using their collective abilities rather than imposing one-sided personal beliefs. Therefore, by criticizing and assessing them, change and modification to re-select and optimize in order to find the final alternative for the creation of work is done gradually over time.

4. Organization

Now is the time to develop the selected alternatives with internal perfection and spatial divisions. In other words, the embryo formed in our mind has reached the point of development and specialization of organs by finding its growth talents. We need pattern formation and zoning for the creation of each sub-space in a fractal way similar to the process of formation of the general pattern and create different parts of the building in proportion to each other in an efficient and beautiful way like the proportionate human organs. Here, what renders the internal conditions determined and limited is the generality of the design itself which was formed during the previous stages. But this generality is not set in stone as much as the conditions of the first stage are and is rather similar to the general form of an embryo which changes with cell division and is flexible and improvable under the influence of the internal changes. Adjusting the internal conditions is done according to the subject of the subsets, separation of functions, circulation, users' characteristics such as age, gender, physical proportions, education, physical abilities, etc., needs and behaviors of the audiences based on the type of spatial functions and culture and also their cognitive-perceptual level. At this stage, we aim to define parts of the space for specific events and reveal the truth of the events by posing basic questions.

Although zoning during assessment and according to the subject and environmental conditions of the design is done automatically, at this stage, we authenticate the organization of the system. At this stage, the architect starts to find the best spatial zones for the components and in other words, specializes the system parts and forms the sub-systems in relation to each other. After introducing the limitations of the system and the spatial boundaries of the phase space, now we've entered it and are on internal trajectories and are trying to find the optimum point on the strange attractor for our question. In this process, the mind of the architect is the motive power driving the information in circulation to be converted into generative information. A well-developed and multi-faceted mind can simultaneously like the formula of creating fractal shapes attempt to create through positive feedback. As in chaotic systems and the production mechanism of a fractal object, to produce architecture, the mind receives an input from the environment and uses the output again as input and does this on all scales until the architectural work is formed from the whole to the parts. Thus, the architect calculates the conditions of the first stage through negative feedback as input and finds the ideas, then through positive feedback, creates the work of architecture: calculates the second stage as input and generates alternatives, accounts for it and creates the spatial divisions, considers zoning, reaches more detailed divisions. Then goes from divisions to decorations and from decorations to

furniture and appliances and even the finest details of the objects. This live mechanism leads to the unity, diversity, and multiplicity in the scales. Note that here the goal is not necessarily to produce a fractal object but to follow the behavior of the chaotic system in order to create the intended natural work. On different scales of design, as it takes place in the natural phenomena- not the same fractal shapes produced by the computers, the requirements of internal conditions according to the audience of the work lead to the diversity and complexity of the system.

To define the internal conditions, other than knowledge of the usages of every space, the architect must acquire comprehensive cognition of the behavior of the audiences in reference to the general and local cultural context. More importantly is the perceptual-cognitive level of the users of the space and the attempt to promote it in the process of pattern formation. As mentioned, the behavioral pattern of the system of architecture is at first, the same mental pattern or idea that is born in the mind of the architect and after constructing the building, this pattern becomes not the volume of the building, but the mental pattern that the audience and even the creator of the work him/herself perceives from his/her experience of the spatial behavior in interaction with the building. In other words, the work of architecture in this system is the medium or language of the architect in order to transmit his/her message to the audience. True or false, intentionally or unintentionally, a mental pattern is formed in the minds of the audiences after every reception from the work, the responsibility of which lies with the architect. So, it's on the architect to control not only the informative content of the message but also the amount of redundancy and parasite during transmission.

As mentioned, architecture is the art of articulating the existence and the truth. Therefore, the pattern goes far beyond the superficial form. Any pattern formation based on the cognition of the universe and in a way, the mental patterning of the subject of the existence, starts with the methods discussed (so, they maintain their relation to the cognitive ground) and then, through positive feedback in the mind, the creation of something new is seceded from it (so, it can be innovative and creative). In every design, the architect aims to transmit his/her special message to the user: the message of living, healing, activity, death, … This connection is established only when s/he confirms the perception of the message by the receptor. If the message is beyond the area of perception of the user, it won't be accessible and if it is lower, it won't be able to capture the user's attention. So, it must be at a point that ensures the possibility and predictability of the news based on the generic and already known patterns- although interpreted personally by different people- and also has the innovation which enables the formation of new schemas and leads to the promotion of the perceptual level to the next level. All architects want to convey their message clearly to the audience and in other words, they seek to describe their work, but those who consider architecture merely a form would face a problem here. If architecture is not based on a rich and meaningful idea raised from the setting, its audience won't understand the existential reasons for the work and their mental patterns which seek to recognize meaningful relations and experiences, won't work. If a hidden relation or invention is based on the elevated level of cognition in the design, then the audience, after discovering it, would be promoted to a higher level of perception and cognition and would appreciate it very much. But if borrowings and false relations are the only bases for the formation of the design, and the perceptual needs and usages are neglected, the architect would deserve nothing more than harsh criticism. Today, most formalist architects, instead of expressing their message to their audience through their real language, i.e. the language of architecture, create shapes with no purpose or based on unrelated concepts and philosopher should come later and justify their design through articles and explanations. This type of architects who are rightly known as showman architects, have forgotten that they must create a human space, not pictures to sell magazines!

Asking the users of the building and exploring the audience's different interpretations of the spatial quality is the best way to judge a work of architecture. It is good to always return to visit a building you've built afterwards and ask the audiences to describe their spatial experience and the flaws of the building. Anyhow, the final pattern of the system of architecture is the one formed in the mind of the audiences and users of the building and despite all the innovations and controlling of the architect, it is the perceptual context of the audiences and the culture of the society that determines how successful s/he has been in sending his/her message through the work of architecture. A competent architect can create a multi-layered work which bears a message and information at any level of perception of any audience with any interpretation and everyone would be able enjoy it. Just as Hafez's poems are pleasant to every social class and as any classical architecture of a country is pleasing to its nation. You can hide ranked information in different layers which would promote the perception of the audience whenever they discover them. The level of abstraction should not go completely beyond the already known patterns, because as we discussed, if determinacy is ruined, the design would not be able to create pleasure and in other words, wouldn't be perceived beautiful by the audience.

Due to the significant importance of the cognitive effect of the pattern on the people, the next stages are completely allocated to this topic that what kinds of arrangements the architect need to make in order to transmit his/her message, generate pleasure and promote the perceptual-cognitive levels of the audiences. The general structure of the Iranian snowflake or the configuration of the architectural system is in fact, completed over the first three stages. The later four stages which are mounted on this structure, describe the properties and qualities of this small system and its effect on the environmental super-systems. The criteria for organization of the building volume and the internal qualities of the system of architecture which will be introduced in the next four stages do not linearly come after the first three stages. They are applied simultaneously with the formation and selection of the pattern. The architect must constantly organize the system through positive feedback and then return to assessment and by re-organizing, deal with different alternatives and designing the next scale of the design, etc.

This way, the design is formed from whole to parts in a way that the final form depends on the internal qualities and the organization of its components which appear simultaneously. According to the definition provided by chaos, the body of the building is not a rigid general mass which heavily imposes itself on the site and the spatial requirements or an essence-less fabric which is merely formed from the plan of the arrangements of the sub-spaces going up. The shell of the building appears within the fractal

area of the work from the interaction of the operational conditions and the environmental forces of the setting and the spatial requirements, expectations, and behaviors of the audiences. The repetition of the assessment and organization through convergence and divergence of the trajectories prepare the conditions for self-creation, self-optimization, and self-production in the design process. The design does not appear suddenly. It is constantly revealed and then returns to the twilight and in a dynamic attempt to reach perfection, it gradually rises from the shapelessness. The mind of the designer frequently organizes the design like the intelligence of a tree which searches for the best biological answer and makes assessments and selections considering the conditions. Thus, a lot of cognate alternatives are also produced at the stage of organization which to get to the final design, one must refer to the collective intelligence and the considerations of the beneficiaries of the design in order to select among and refine them.

5. Conclusions, Perspectives, Strategies, Useful Suggestions and Future Studies

At the stage of organization, we can use Functional Diagram or Bubble Diagram for zoning, displaying the functions and fabric organization and with its help, show the circulation and approximate and relative sizes of the areas of spatial behaviors in addition to the relations and usages of every space. These diagrams are selected in the framework of the main selected idea and repeatedly go through the stages of finding alternatives, assessment, and organization and end in the final design. According to the type of usage or the intended divisions we can draw several bubble diagrams for every alternative in the plan, section and volume. Clearly, the intended qualities which will be introduced in next stages cannot be represented in this diagram. But it is possible to add the purpose of those qualities with pictures and plots on this diagram.

As it can be observed, analytical, synthetic, functional and conceptual diagrams, as the indications of the three stages of architecture, can create a common language among architects for information exchange and sharing thoughts. When these diagrams with clear definitions become frequent in the process of architecture, teaching, judging, examining, and deliberating on the stages of the creation of the work becomes possible and easy.

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Short Biography and Outlook

Architect Sanaz Eftekharzadeh was born in 1975 is an independent researcher and the CEO of Iranian Association of Sustainable Building-City founded in 2014 in Tehran where she can focus on her research interests such as vastu Shastra, sustainability, Chaos, Cognitive science, Transactional Analysis, Semiotics, Persian literature, Aryan culture, archeology, ancient Iranian Mythology and patterns in art and architecture and finds the ways to apply the achievements in practical architecture.

She has got her M.S. of architecture from Shahid Beheshti University/ Architecture and Urban Planning faculty with excellent grade in defense. The subject of her thesis was applying of Chaos theory in architecture, focusing on cognitive science for defining a design methodology entitled: "Towards a Chaotic Architecture".

This theory presents a new definition and then new methodology for creating architecture. It considers architecture a system of distinctive minds of the architect and the audience and the architectural building itself, which is a subset of diverse environment, then chaos, as the agent defining the rules of the mind’s function and the nature and the connector of different branches of science and art, has redefined it as the best system for the human's physical / psychological/ cultural needs which can be named anthropocentric architecture. The achievements of the thesis has been developed in 17 years expanding on different scopes of cognitive science and updated outcomes of chaos theory to present the characteristics of the anthropocentric architecture in 7 stages . The book was published in Persian as: "from chaos of perception to cognition of architecture / a new theory to create an anthropocentric architecture based on laws of chaos" in 2014. In the same year the book has become the finalist of the international award of book of the year of 2014 and awarded as he book of the season in Iran. It also was the winner of the Dr. Mozayani national book award of 2014.

Sanaz Eftekharzadeh has participated at more than 30 national and international conferences and forums, T.V. interviews and academic seminars as the lecturer and architecture theorist and analyst and has presented more than 60 papers and articles in national and international journals.

In 2017 she received the title of "The Architect of the year" of Iran for the best architectural criticisms based on her unique theory. Before that she had been selected as the Best researcher of the year of 2010 by the ministry of habitation, roads and urban development of Iran.

She has been the editor-in-chief of Architecture and Construction Seasonal from 2006 till 2010.