From Chaos of Preception to Cognition of Architecture (Part I): Determinacy and Unpredictability

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Abstract—The three previous stages guide the designer in the creation and embodiment of the building. From here on, the characteristics and qualities of this object are considered in direct relation to human perception and behavior. As if until now, the object was an embryo in production and now, the life is blown in it. These are the qualities of natural systems which the architect must account for while creating the work so that the architecture becomes a chaotic system worthy of the presence of human and his chaotic mind. As was mentioned in the discussion of formation and recognition of the pattern, the two simultaneous and seemingly contradictory characteristics of determinacy and unpredictability which are among the most important specialized traits of chaotic systems account for the sense of pleasure and beauty in natural phenomena and other perceptual states of human institution also stem from the change in the proportion of these two characteristics. The determinacy trait applies to scales of environment on which surrounds human and go beyond his control and unpredictability is attributed to the spaces and phenomena which can be perceptually controlled by human. Take note that here the definition of human scale, besides physical measurements, depends entirely on the human mental pattern of his proportions to the world. The more chaotic, natural, and thus suitable for humankind a system, the more prominent and effective these two characteristics.

Index Terms— Anthropocentric Architecture, Chaos, Adaptability, Determinacy, Unpredictability, Perception, Cognition, Architecture

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1 INTRODUCTION

The brain forms some patterns under the influence of different situations of the world which define human emotions [1–23]. Perceptions like fear, alienation, mistrust, doubt, perplexity, anxiety, adventure, weakness, worry, nihility, and defeat are patterns the brain produces when faced with undetermined situations it cannot control. In turn, feelings like confidence, certainty, peace, stability, purpose, happiness, repose, a sense of belonging, glory, power, familiarity, etc. stem from recognition of patterns which receive the message of determinacy from the environment [24–64]. However, if doubt and indeterminacy are on a scale controllable by human, the patterns would suggest the notions of passion, excitement, curiosity, goal finding, puzzle solving, diversity, hope and motivation, while in turn, solidity on this scale or in other words, predictability would lead to Ossification, malaise, monotony, depression, hopelessness and nihilism, although many would prefer to judge and decide by predicting things [65–72]. The proportion of the magnitude of a phenomenon to human might be perceived differently from one mind to another but in general, we can arouse our intended emotions in the audiences by controlling these two characteristics in various ways [73–98]. Notice how at night and while crossing already well-known streets in the dark, the humans become wary of the possibility of something uncertain happening or a simple and determined game excites a group of adults from experiencing insignificant incidents like kids. Notice how your emotions from the experience of a place the first time is different from

the second time; how your ears immediately pick up the words spoken in your mother tongue in a foreign country from conversations and sounds and becomes sensitive to them; how a work of art becomes more beautiful and valuable when it matures and is filled with more details; how a familiar piece of music gains your trust in an unfamiliar location and stabilizes your memory of it. Notice how speeding up the most serious movies and speeches would render it hilarious to the audience or au contraire, slowing down a part of a movie or sound would provoke the feeling of fear, majesty, or thoughtfulness. The same way, we can control the perception of the audience by changing the qualities of determinacy and unpredictability and thus emphasize a certain message.

It's necessary that the creator of the work control determinacy and unpredictability on three levels: the first level is the lowest level of perception. In the first encounter with the work, just as a listener would be influenced by the format and tune of a poem, the audience of architecture is awed by the building's appearance. The architect can adjust determinacy and unpredictability by changing the proportions, dimensions, and spatial qualities and some other methods we shall discuss in order to control the perception and vision of the audience. The second level starts when the audience tries to reflect on the work in answer to its call and enters the cognitive level. At this level, the architect must be able to send his/her message to the audience by means of a shared language while maintaining his/her innovation and in fact, render the work determined by describing its design. Just as the only person who can enjoy Persian poetry is one who knows Persian language and be able to discover the concepts emphasized by the poet to experience true cogitation and pleasure by the means of this language, in architecture too, a shared and accessible concept must be noticed by the audience through mental patterns

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which must be readable by the shared language. The third level in the higher ranks is producing creativity and taking away the habits while maintaining the cognitive context which can render the architecture understandable to all and yet unique like Hafez's poetry. At this level, the architect would be able to guiding the audiences to a higher awareness by directing them to reflect deeply or pass through their unconscious. Assuming that generally, the perceptual goal of the architecture is to induce pleasure, the fourth stage deals with issues that define it on the perceptual level and the subsequent three stages focus on the spiritual and true joy by means of which the architecture is able to achieve cultural promotion and humane elevation.

As the frameworks governing over chaotic systems are completely determined and constant, it is necessary for the building to also be recognizable and determined in its wholeness and the audiences are able to orient themselves in and out of them building and recognize their location relative to it. This helps the mind to recognize a system and form a pattern of it. On the other hand, since our goal in architecture is to generate a feeling of pleasure in and fulfillment of the aesthetic perception of the audience and this is achieved by means of the two characteristics of determinacy and unpredictability, it's essential that the building be unpredictable as much as possible on scales controllable by the audience. The architectural building must be like this book in your hand. At first encounter, you recognize the object as a book and nothing more. So, the generality of the object is determined for you without giving away the least amount of information about it. Further ahead, its title might give you a general idea of its purposes but, can you predict its content? Yet, you are compelled to open the book and look at its table of content. Reading the table would also clarify the subject some more, but you still can't predict what has the author included under each heading or how she has assembled the content together. Then you read the introduction and encounter new information in any section. Even if you read this book over and again, every time your interpretation would differ depending on the change in attitude and the increase of your experience and this would preserve the unpredictability of the book for a long time.

Our work of architecture must also have these characteristic as a chaotic system. These are the characteristics distinguishing a chaotic system from other systems. However, these characteristics are not something we can add to the building. They should be included by the architect in the process of designing and pattern selection, finding alternatives and organization. The architect is required to observe the two characteristics of determinacy and unpredictability in both the process of designing and the creation of the work's physique. During pattern formation, determinacy is applied through determining the fundamental problem of the design and observing the restrictive conditions of the first stage, while in idea-finding, the architect is allowed to provide unpredictability and innovation in the work by thinking of the farthest solutions. During optimization too, s/he determines the scope of the system by preserving the cognitive context of the audiences and referring to their perceptual-cognitive-behavioral level. All through designing, the architect who designs and draws the building

strategically is actually traversing the determinacy and unpredictability path. S/he determines the frameworks and the general principles of his/her design in a general form while constantly being ready to change and optimize in any unpredictable circumstances from the stage of design to the stage of execution. Assuming that in the previous stages, this matter has been sufficiently dealt with, at this stage, our focus of discussion is on paying attention to these two characteristics in the space and geometry of the work.

Being aware of the effects of these two characteristics, by simultaneously examining the environmental conditions to determine the initial conditions of the design and idea-finding, at first we need to take a stand towards the application of them in the scheme according to the subject of the design. Earlier, we explained that the result of determinacy and unpredictability is the creation of familiarity entwined with innovation. So, in any work of art where specific conditions like concealment, excitement, intimidation, domination, etc. are not expected, we must induce pleasure by creating these two characteristics. In some cases, other factors might precede creation of familiarity or innovation. For instance, the building of a hospital might require that all unpredictable factors be eliminated and the building is designed determined and predictable. Here, the speed of access and saving lives of the citizens takes priority and the usage function trumps aesthetics anytime. In other words, it is essential that the system adjusts itself to the usage factor and the amount of flexibility and adaptation to the key factor of function is so high that in major and main parts of the hospital, unpredictability and surprise are not regarded. It also happens that the determinacy factor is challenged; a military or security complex must be both undetermined and unpredictable, even to the extent that the employees of the complex wouldn't be able to recognize the key and sensitive spots. Here, not only pleasure and familiarity is not introduced but it's even dangerous. Here it's necessary to adjust the system to the security factor. Needless to say, the audiences of such places are not at the same perceptual level as the public.

Only based on determinacy and unpredictability can we classify the architectural styles and distinguish linear and random systems from other works. For example, most buildings of modern style produced through mass production with similar plans and framed relations, the volume of which are determined through heightening the map of the plan are both determined and predictable and thus, linear, boring, and without innovation.

The goal of deconstruction where all frameworks are broken down, according to the followers of this approach, is both indeterminacy and unpredictability. In other words, these works are random and thus unfamiliar, confusing, intimidating, inconsistent, and distasteful and put a lot of pressure on the mind for recognition of the patterns and failing to do so. However, in the past two decades, many buildings were built in Tehran whose internal structure and spatial relations are among the most mediocre plans in the market but appear indeterminate and out of form with their crooked façade. These are the worst types of design which are indeterminate and yet predictable. That is, they are not familiar but have no informative novelty either!

But the building intended by chaos which is determined and unpredictable is seen in all the intuitive styles or according to Bruno Zevi, styles belonging to the realm of sensation and myth. Because pure human feeling and perception are inherently inclined towards nature and inevitably chaos and its qualities. All the significant architectures of civilization history throughout the world and even the local vernacular and self-make architectures are all either formed as a part of the natural setting context or built in the form of simple geometrical volumes with golden proportions. These buildings are as a whole determined, sustainable, and dominant, while in relations, details, and decorations, they are so entwined, unpredictable and dreamy that makes it possible to generate information in any moment.

Whenever humans are put in proportion to something, automatically, they start to orient themselves and deductively recognize the phenomena in proportion to their own scale. The first problems of the mind at the time are orientation, determine the proportion of the person to the location and identifying the boundaries territories to form and recognize the pattern. On any scale, in order to recognize the situation and identify the external phenomenon, the mind needs to determine a framework and criterion. Otherwise, the mental pattern wouldn't form. Determinacy provides this criterion. The mind will not enter the stage of aesthetics and pleasure until this is done and would remain at the stage of discovery, search, curiosity, intimidation, and confusion. Thus, unless the subject of the design is city of terror, security building, hideout, or a specific museum or exhibition, it is required that the general frame of the building be defined determined. Readability and determinacy on urban scale is provided for the citizens with the help of navigation, orientation, and defining the location through road, edge, nodes, neighborhood and urban signs. A city like Tehran where the notion of neighborhood is lost and whose privacies, signs, edges, paths and squares are constantly changing and evolving, takes away security, confidence, the sense of location and psychological peace from the citizens and adds to their anxiety, violence, fear, mental congestion and depression.

Seeing an undetermined building has a similar effect on urban bystanders. The audience of such a building wouldn't gain psychological trust and their cognitive level is challenged due to lack of recognition of the building's pattern and thus their mind never promotes from the aesthetic perception stage. Today, at architecture competitions, these buildings with their complex and unrecognizable appearance win while even one-third of them don't ever rich the stage of construction. We might ask why the judges are impressed by these works and vote for them while they are aware of the impossibility of constructing these buildings. The answer is in the indeterminacy and unexpectedness of these works. These works appear unpredictable and very attractive on paper and on a small scale. The superficial judges who have no comprehension of the scale are impressed by the designer while they ignore the disastrous effect of these forms in real scale due to their indeterminacy. Works produced today by computer and the architect has little control over their spatial quality only emphasize on creating complex and unknown forms. It appears that film makers who use these random forms in creating virtual spaces to create frightening spaces belonging to other worlds have a better grasp of the space than the architects. These shapes are rightly useful in creation of fear and terror due to their indeterminacy not in creation of residential, office, and lodging spaces where citizens go routinely and daily in search of work and peace. Unfortunately, the arbitration of today's competitions shows a process which brings only hypocrisy and contempt people rather than searching for human space. Creation and confirmation of such works can only be a show-off or demagoguery not creativity or a response to the true human institution.

As was mentioned in the discussion of pattern formation, a determined and unpredictable phenomenon is immediately recognized by the natural and general frameworks of the brain. This phenomenon is either classified as a subset of the previous patterns or is so excellent that it can create a new pattern without causing any shock or breaking any structure. In any case, since it bears new and permanent information, it promotes the pattern, elevates the perceptual level and the power of cogitation and computation of the brain. Learning in the system is increased and the brain enjoys discovering new things while preserving confidence and peace. The change in the proportion of these two characteristics to each other leads to different interpretations and alterations in the mental patterns and generation of different emotions. If the information is too indeterminate and unpredictable, the emotions induced are very negative, shocking, distressful, and intimidating because it lacks any previously specified framework of the mental pattern and if the phenomenon under experience is determined and predictable, it would mean that no information is generated and thus it becomes tedious, boring, depressive, etc. as in linear systems which don't bear enough information to constantly motivate the mind after the first or second instance of observation. Between the two extremes, more balanced proportions of determinacy and unpredictability form the sense of pleasure. It can be stated that where the two characteristics are in a state of equilibrium in relation to the mind of the subject of the perception, the feeling of beauty or pleasure is generated. The feeling of beauty belongs to the realm of familiarity and cognition which is peaceful but as we mentioned in the discussion of computation as the most original cerebral activity, the mind is satisfied and gains experience from recognizing the differences in similar things and similarities in different things. Therefore, it is necessary that in a familiar and determined setting, new and variable information is included in order to discover the differences and in a new setting, familiar information is included in order to conform to the previous mental patterns and the mind feels pleasant and fulfilled. If we want to summarily state what in the fabric of the building generates determinacy, we should say a simple and definable scheme in a three-dimensional phase space. And the main cause of beauty and unpredictability is the details; Infinite and variable details on different scales. Following, some of the strategies for creation of these two basic characteristics of chaos are presented in the structure of the work.

2 PURPOSEFULNESS

Despite having discussed it many times in previous sections, again, we remind you that no part of the design should be born of nothing or an unrelated, vain idea. Having a purpose is the base for the formation of a system and also the formation of pattern in the brain. Humans look for a meaningful experience. In organization and recognition of the patterns, the mind immediately asks about the existential reasons for the phenomenon. The architect is bound to find the fundamental problem on all different scales of designing and deductively from wholeness to the parts assign a purpose to each stage of the design. When the determinacy of volume and appearance of a building is emphasized, beyond a simple façade and recognizable scopes purposefulness and accuracy of the building pattern define determinacy. If ancient buildings are all definable in simple geometric forms of cylinder, pyramid, sphere, cube and rectangular cube, it is because they directly answer the fundamental problem of structure, culture, and function and immediately are recognized and confirmed by the mental patterns. The purpose of simplicity in ancient architecture was for the mind of the audience to get to the details and complexities which bore the main message of the architect as soon as possible after forming a broad pattern and zoning. Whatever takes place in designing, as emphasized before, must be based on a purpose arising from a fundamental problem, the conditions of the first stage or an authentic idea. While you are thinking of new solutions, avoid doing anything purposeless and vain and don't leave the mental pattern hanging with no answer. Even if you are designing the façade of a building with a formalist approach in the form of a combination of volumes, don't choose the next factors like material and coloring purposeless and with no regard to these volumes. Their selection and scope should conform to the volumes and the edges. A building might be built in an unusual way for a reason arising from a completely distinguishable fundamental problem. The mind of the audience would discover the reasons and not only does it accept it, but it also promotes its own patterns. But a minor defacing out of taste and with no purpose leaves the mind without an answer and even worse, if such works are imposed on people through advertisement and justifications, they still leave an unpleasant effect on the mind due to their indeterminacy and lead to the spreading of superficiality and the arrest of the mind from thinking.

3 CONTEXTUALISM

The conditions of the first stage emphasize the necessity of answering to culture and local conditions. These conditions are among the most important factors of creating determinacy and the sense of belonging which should be considered in urban development and architecture. To convey his/her message on the perceptual level of the audience, the architect needs a shared language, the diction and grammar of which must be learned from the context of the work. To maintain the identity and integrity of what we call the city, it is essential that this language is respected and constantly developed and taught. So, it is essential that the textures and historical monuments and ancient architectures be preserved and restored in the best way possible and the younger generations be familiarized by them. An architect not familiar with his/her country's and city's architecture in the past is not architect at all! As me stated many times, the mission of the architect is to answer to the human institution and one of the most important needs of this institution is fulfilling the sense of belonging and a meaningful experience, both of which are ensured by the connection to the past. The cultural legacy ensures the preservation of the link between the generations and stabilization of the mental pattern of the city. In addition to preserving and introducing the cultural heritages, it is essential that urban development and architecture of different eras be developed based on the old structure and historical monuments and inspired by them so that the essence and spirit which defines the city flow in it despite all the variety. The architect must have such a high level of creativity, knowledge, and humanity to be able to form a deep connection between his/her own work and the history of the context of the design considering the modern technology and facilities and the present limitations. Attention to the adjacencies neighborhoods, idea fancy-finding based on locally significant architectures, redefining forms and elements of the past, reviving the symbols and signs, implementing local arts, materials and technology, conforming to the vegetation, topology and natural resources of the setting, climate orientation and zoning, and localization of imported knowledge can be maneuvers to share a language with the audience and preserve the cultural-historical continuity of the city. This way, through a shared language and respecting what people already have, the building would appear determined, familiar and trust worthy to them.

4 FRACTAL GEOMETRY

One of the first solutions that come to mind in creation of a chaotic system is creating a fractal form. If we can create the building on the form of a fractal object, all the qualities of chaotic systems including determinacy and unpredictability would be present in the volume of the building. But doing so is not easy and few can truly pull it off because as we said, the main purpose of the architecture is to create a chaotic system answering to the environment and human behavior not merely creating a form. The idea of fractal form as the main factor in designing and the fundamental idea of the design must be proposed truly in answer to a basic problem and in line with the environmental conditions and functional and psychological needs of the audience in order to perfect the system. Otherwise, the form of the building would be merely a result of computations of chaos by computers not of its behavioral system. Although the behavior of the system is always fractal in the creation of the work and the mind, as stated, attempts to create the work through positive feedback, especially in the stages of assessment and organization, the resulting form is not necessarily fractal. It is very important to pay attention to the nature of fractal phenomenon and how they have been formed due to their existential reasons during the processes of optimization, self-organization, adaptation to the environment, and feeding on it, multiplicity and change, flexibility,

etc. while the element of randomness has caused these objects to become variable and unpredictable. One of the outstanding characteristics of fractal objects is the similarity of their components on different scales. This similarity is not superficial. It is rather due to the similarity of the function and nature of the components. Similarly, using fractal geometry in creation of large-scale works such as a city or a complex or mega buildings with similar components is justifiable but not practical in creation of small buildings where every part is specialized. In a city or super-systems, the element of necessity causes the structure to change and vary.

It is essential to note that in creation of fractal geometry, the process of production is the most important notion of the creation. Thus, the components on different scales must truly be born out of each other and be flexible and adaptive to meet the needs of the project. But in architecture, it appears that most efforts in this regard end in the production of two-dimensional layouts to cover the main volume, module definition, rendering the design and its functional characteristic modular that is pre-fabricated: issues which were used much earlier than the introduction of fractals. Juxtaposing some similar volumes does not produce a fractal. Shapes which are paired and compared merely due to their apparent similarity while their presence is not inherently co-dependent and none is the existential and productive reason for the other does not form a fractal object. They just enjoy the similarity feature or in short the self-similarity of the fractal phenomenon. The shapes must be born out of each other in a way that if one is extracted, it would be impossible to create the next element.

Fractal objects, due to the similarity on different scales and differences on these levels, trigger the brain to compute and due to the presence of a cohesive internal relation and constant swing between multiplicity and cohesion unity, trigger cogitation and thus promotion of perceptual level. Composition and diversity of these states and the presence of variety in them increases the amount of information and thus the amount of unpredictability. The bystander, based on his/her distance from the building and the amount of his mental engagement and interest, recognizes different patterns in different combinations of the groups of the fractal object. Therefore, implementing this type of geometry is recommended in every part of the design, even in whether to use natural material or place a simple vase in a corner of the room.

5 SELF-SIMILARITY

The simplified definition of self-similarity in chaos is the same principle of similarity in Gestalt theory. Self-similarity is one of the traits of fractals. Most people who have attempted to design in the name of fractal have in fact, merely succeeded in creation of self-similar or self-same volumes not a fractal due to the lack of presence of a productive and inherent relation. Clearly, creation of such forms is very simple. You only have to put some similar forms together. All the squares and all the circles resemble each other. So you can't claim to have produced a fractal object by bringing small and big circles together. Although creating similarity and self-similarity in a design would not result in ambiguity, formation of different patterns

and cohesion unity in multiplicity, a collection of objects which might be similar in nature, function, shape, color, etc. would help form and recognize the pattern. Since the mind tends to define and determine elements of the environment in order to identify them, creation of similarity to help classify and generalize the objects is useful. In the face of such collection, the mind also starts to calculate by perceiving the differences in similar things and similarities in different things. Then it causes the promotion of perceptual level on a lower degree than the fractals. Wallpaper is an old example of self-similarity. The mind plays very little with it because it is completely repeated but the pause on it is longer than a monotonous surface.

When the phenomena are similar, cognition of one can trigger the cognition of others by generalizing the mental pattern. So, this characteristic is useful in resonating determinacy. The introduction of plan or small model of the building in the entrance space or hotel rooms is one of the cognitive strategies to help the audience interact with the building. This way, a customer who is not familiar with the building can acquire a determined and general pattern of the building at first encounter and notice the details in his/her further exploration of the spaces and be less intimidated by the volume of the building. In whatever way we can provide the audience with a determined cognition of the building as a whole, we have succeeded to gain their trust and comfort in exploring the next stages of the space and their interest in discovering the details. Otherwise, the first encounter of the audience would be dedicated to orienting themselves and perceiving the spatial proportions and if this cognition is not soon achieved, anxiety, restlessness, and the desire to exit the place would increase in them and the efforts of the designer to transmit his/her message would be lost.

6 FLUCTUATING IN THE VICINITY OF EQUILIBRIUM

As live forms and chaotic systems with determined general form have the state of near equilibrium, in order to increase determinacy and familiarity, it is required that harmonious and balanced effect be introduced in generality of the architecture. However, as natural shapes are not perfectly symmetrical in details but similar, it is appropriate that in order to maintain unpredictability we avoid creating perfect symmetry in design because it leads to redundancy of information. Therefore, symmetry, rhythm and repetition are recommended in the general volume of the building which enables the audience to rapidly gain a general and determined image of the building. But, for the inside and the details which the audiences discover over time, it is recommended that you design coherently by spending time on every corner. Not just prepare half or a quarter of it and then multiply the rest through mirroring and copying by a software. In other words, don't do something that would discourage the observer from exploring the rest of the building after seeing half or a quarter of it. Concerning the designing of the façade, although in practice we can hope that interaction of the interfering factors like mode of access, orientation, the observer's vision field, and the setting potentials of the design would not allow the audience to perceive perfect

symmetry, since whenever the audience guess that the building is symmetrical, they won't be curious to know the repetitive parts and the mental pattern would form rapidly after perceiving a part of the building, show the audience that the building is not symmetrical and this asymmetry must be reflected in the details.

Symmetry reduces the beauty jollity of the face of the building and adds to its rigor and dominance. That's why most palaces and classical and historical temples are built this way. So that they embody determinacy, clarity, and solidity. The more they change in symmetry while maintaining their symmetry determinacy, due to inviting the audience to explore, it adds to the intimacy and attraction of the building. But, if disorder goes beyond the vicinity of equilibrium, the effect of the building would lean towards banality and sloppiness. It is the responsibility of the architect to recognize where the building stands regarding the subject of the project and the expectations of the audience from symmetry and expression of solidity to asymmetry and the increase in attraction while maintaining the equilibrium. It should be noted that in the past, even if the building was deliberately designed symmetrical, improvisation and human errors, multiplicity of the masters, and the variety of the traditional material provided the necessary diversity over time. Today, the building is set up very soon using industrial materials, thus the designer must consciously create this diversity him/herself. Therefore, determinacy for adequate familiarity and unpredictability for wonder are simultaneously provided. The more the diversity in details gets, as long as the entirety remains intact, the more you desire to come back and stay in the space. Knowing these properties, the architect can control the level of perception of the audience: if the intention is to express dignity and clear authority in a government building, then it might be designed symmetrical, especially the entrance. If the intention is to entertain and create a friendly space to attract the audience repeatedly, then we need to add diversity. But in general state, i.e. to generate a sense of pleasure, as stated in the definition of the two properties, discovering diversity within the framework determined by equilibrium is the best option. Even if this difference is in the finest details, the mind would be obsessed to discover it. Basically, a perfectly symmetrical object wouldn't arouse your curiosity and the mind would abandon the total cognition of a completely asymmetrical object. But if something looks symmetrical but is not actually so, it would appear attractive, natural, beautiful, and valuable to the mind like the human face. Our appearance is in general equilibrium and symmetry while the details, capabilities and the inside of the two cerebral hemispheres and body is completely different.

Discovering the differences and cohesion unity in diversity triggers computation and cogitation and promotion of the cognitive-perceptual level of the audience. The entertainments proposed in the magazines are interesting cases of this motivation: Finding the differences between two images, while very easy, compels the mind! In hand-woven carpets, hand-made cloths, and all hand-made products which are provided in pairs, you can always observe the asymmetry and we may dare say that their value is in this quality which is indicative of their naturalness and tastefulness. We always enjoy discover-

ing these differences and since we are sure these are works created in the hands of an artist and are never going to be repeated, the older they become, the more valuable they get, while the industrial productions are produced in masses by the passage of time, they would be out of fashion.

7 VISUAL OPPORTUNITIES

People gain cognition of the building when they can recognize their environment and their position relative to the building and the placement of the different parts of it relative to each other. Therefore, by determinacy of the generality of the building, we not only mean its outside and face, but its whole system. Establishing some measures for visual perception from different angles and heights and allowing views of the whole building from certain points are very effective for its cognition and initial pattern formation. The architect must be able to introduce his/her building as a solid coherence whole while saving an amount of information for future visits. So, s/he must be able to build a general pattern in the mind of the audience and render the completion of that pattern dependent on future visits and further use. Most of us recognize only part of a work when we visit it and we cannot judge its entirety.

The best way in architecture is being able to visualize and determine the entirety of the building in a short time. The best solution for creating visual opportunities and triggering reflection of the audience can be found in the architecture of our past: two building design methods, in the form of a villa belvedere in the middle of a vast open space like the Taj Mahal and by creating inside yards and arranging the spaces around it like the old houses in Yazd and Kashan are the best ways to create distance and visual opportunities for the perception of volumes of the building. When the audience approaches the building from various distances, they can complete their mental pattern of the building step by step and reflect on its different scales and when in the middle of the yard, different parts of the building surround them, they gain a direct and clear understanding of the spatial and psychological circulation quality of the building. By appearing in the open space and inspecting the building and being present inside the space and observing its environment, the audience are zoning and determining their orientation and position at this time and place and that of the architecture in this world. Besides, we can see that in Iranian historical architecture, there has always been clever measures situations implemented in order to perceive the building from different levels and angles. As the design of vault platform, terrace, balcony, patio and other types of open and semi-open spaces at different levels all over the building provides the audience with the chance to perceive and experience the beautiful space and volumes of the architectural building in various ways. During their childhood, our ancestors each had a different and unique memory of spatial experience of different parts of the old houses and shelters they liked which we can't even dream about!

Nowadays, thought-out landscaping is suggested for defining the deployment and perception of the buildings, especially for tall buildings, and creating the possibility of visual connection within the building is recommended for crossed views and dominance over different parts in order to establish determinacy. Clearly, all

that facing facades and decorating of the tall towers north of Tehran adjacent to narrow allies who leave no breadth of vision in order to perceive the mass of the building is useless and pointless because a work with no human audience is no architecture!

On urban scale, creating viewing angle, perspective, and enough visual spacing affects the perception, visual pleasure, and creating a pleasant sense gravely in a way that cities defined based on the natural morphology with the maze of roads and different heights always look more beautiful than flat grid plan cities; and cities with broad squares and wide streets which allow for perceiving the horizon and walls are more pleasant than cities with narrow allies and tall buildings which leave the audience feeling frustrated and repressed. Naghsh Jahan Square in Isfahan is an excellent example of creating visual opportunities. In order to perceive the outstanding buildings, the opportunity to see the whole volume and the defined entries which we approach quickly on foot is provided by the broad expanse of the square and the spatial perception of each building is also uniquely defined. As Alighapoo building is designed in the form of villa belvedere and Abbasi Mosque is composed of inner courtyards. In Sheikh Lotf Allah Mosque, upon entrance, the general shape of the dome of the house is determined through the grille while the quality of this net and its dimensions are in a way that all the information is not revealed but merely encourages you to see the rest. This way the great architect of this building has provided determinacy while preserving the unpredictability and the aura of secrecy of the details. In addition, the square and its surrounding buildings can be experienced from different angles and heights of the market and the surrounding buildings.

8 EDGES AND CORNERS

In Perception Chapter, it was stated that the eye is more sensitive to the boundaries of the object than its surface and inside and the Gestalt law of reciprocity reinforces this. In fact, it should be said that the eye looks for the thing that determines the object. So, the size, edges and corners play the key role in determining the design. The larger, more organized and more regular these factors, the more determined the volume and in turn, visual confusion is caused by the disorder of edges and the main boundary of the work. Impressive buildings undoubtedly have large and determined volumes, statuesque bumps and dents with determined edges and corners in which depth and shading are maximized. The sky line is one of the most important parts of the design. The vertical lines in the direction of Earth's gravity induce strength and solidity and horizontal lines of the beams convey the response to this gravity and surrender. Most urban views are drawn in the form of vertical and horizontal lines and emphasize too much on the submission of gravity. The lines and edges of the curve can severe this bond by their dynamism and motion. The lines of the curve are closer to the natural lines and hence offer more pleasure and peace to the mind. The oblique line at the end of the work (roof) sky line is well known to all. This is the line which turns the residential unit to a home. When the gable roof covers the vertical lines of the walls, a sense of security and comfort is evoked in mind. However, these lines which

connect the sky and the earth are not captives of the gravity like horizontal lines. It's like they provide a chance of elevation and instead of finishing the vertical lines, they deviate them from the direction of the gravity and elevate them to one peak.

By creating edges and corners we can increase the degree of the audience's awareness of the building. We can determine how tall the building is and how many floors it has by determining the edges of the building floors on the main façade in order for the observer to gain general information about it or recognize the floor referred to. In turn, in a security structure, we can totally hide the edges and corners and exaggerate their boundary by using intertwined and curved forms. Since the pattern formation is done deductively from the whole to details, the eyes, at first stage step, look for the edges to recognize the general volume. All the information you want to provide the audience with of the boundaries and determinacy or complexities and details of your design at first sight should be expressed through the edges and corners, bumps and dents; not the texture and design drawings. These initial information which build the initial mental pattern will be the most lasting information and the introducers of the design. Most of the architects try to create new forms by extracting new edges and corners from simple cubic volumes. When these efforts are done with the goal of establishing a direct connection to the observer of the building in response to the fundamental issues of the design like the usages functions, skylight adjustment natural lighting and environmental conditions, boundaries zoning and so on, they can lead to architectural masterpieces. Creating volume, cut, bump, dent, opening, etc. not only can visually attract the audience and increase determinacy, but it also can provide the volume of the building with unpredictability and constant attraction by creating shadings which change over days and seasons.

9 DEFINING THE ENTRANCE

The most important part of the building facing the audience on human scale is its entrance. The entrance is the boundary between two worlds: outside world of the city and inside world of architecture. It is the title of and the prelude to the architect's message and a unique event through whose perception and experience, the human becomes ready to accept somewhere else. The effect the entrance structure leaves on the audience is the first close and deep and long-lasting encounter. The entrance unit is one of the most important factors in the formation of a general framework to judge and the mental pattern of the architectural system. The entrance, as the statement of the architectural work, must be determined, outstanding and welcoming in order to emphasize the invitation and by using classifications, the hierarchy and details be so that the process of entering becomes an attractive, pleasant, and memorable experience. Here the balance of the two characteristics of determinacy and unpredictability must be targeted at receiving the audience with respect and welcoming them and encouraging them to interact with the building.

If we liken a building to a human, its façade would be the face and its entrance the lips. When you meet someone for the first time, you will undoubtedly make a mental impression of his/her face and appearance which form the general framework of your mental pattern of him/her. But the first facial gestures and words s/he speaks are much more important and effective. In a way that for a long time, your judgment of that person would be still affected by it despite the familiarity with his/her actions and beliefs. The effect of the entrance on the audience is the same.

No wonder the entrances in the past were not like today merely a hole in the surface of the building but a complex system which through a hierarchy in proportion attuned with the subject of the architecture, prepared for human presence by changing the perception of time and place. In Iranian architecture, measures have long since implemented in order to connect the outside to the inside in the form of defining the hierarchy so that over a thought-provoking process, the two environments are separated while maintaining their connection. The definition of medium spaces which outside of the building, are presented in the form of semi-open space, porch or Ivan, in addition to answering to the fundamental climate and functional problems, were a chance for initiation familiarity, perception the change of space, peaceful company of the two systems of environment and architecture, reflection thinking about the passage, volume making, and casting shades on the façade.

The entrance unit in the past architecture of Iran was defined specifically for all climates. Long ago, home was truly a place where humans experienced inhabitation in the world and on the lips of that home was always a smile which welcomed its presence in the world. In the face of the entrance of the house, a majestic propylaeum frontpiece could be seen which defines the important event of entering in the form of a volume or dent. Didn't matter whether you were in Iran, Whether you are a passerby or guest, a stranger or acquaintance, here are two Stone benches which allow you to sit alongside it and reflect on its whereabouts and know it better and go on a cognitive odyssey to the highest levels by thinking about the unpredictable details of the framings, designs, tilings, Persian geometries, and brickworks of the entrance. But entering the hearth of the building is not so easily possible. After knocking on the door by the knockers which entail hidden messages, the landlord comes to welcome you. You enter the vestibule; A place where the contrast of its lighting with the outside space acts as a psychological filter and by creating a change in the quality of the space, prepares the visitor to enter a place with unpredictable information and qualities. The vestibule is a space which smiles at you with the designs on its ceiling and walls and the gentle light shining through the small hole of the dome inside and invites you hold its court to remain at its presence by presenting new information. After the vestibule, there is the corridor in each of whose bend and twist and up and down and extension and delay lies unpredictable and new information. The corridor is more or less dark and determines the destination by presenting light at the end of the corridor and prepares the hallway visitor for the inspection. You follow the path until in the heart of the building; you encoun-

ter the welcome of a house which gives your world the worldly existence quality. The architect of the past, after preparing your mind by creating visual opportunity, shows you the beautiful face of the house through an entrance system. Suddenly, like a beauty who lifts her mask and shows her face only to the intimate and worthy people, the house appears before us. The heart of any awareness pounds here. Here is the place where the pattern of that first smile becomes meaningful and eternal in the mind. The smile which remains at the time of saying goodbye in the hopes of future visits.

Perhaps, up until two decades ago, people were still aware of the importance of entrance system warranted by their human nature and this part had always been defined with the consideration of setback, creating a semi-public space, passage through a semi-open space, presence of plants, defining a space for a pause and the steps and change of materials and lighting and wooden doors. However, as the human identity is becoming less valued in regards to the property more and more, the building also paying less attention to his presence. Today, we can observe in the entrance of some buildings that there isn't even a shade to protect people waiting at the door from wind, rain and sun. As the walls get taller, the definition of entrance becomes more a hole tangent to the surface of building with the function of holding the doors and is never welcoming of human presence.

Another example of the most admirable entrance systems in the history of Iranian architecture is the entrance to the prominent urban buildings and power centers which were designed quite in accordance with the subject. In the entrance unit of a governmental castle like Persepolis, the message of the architect is not warm and friendly welcome but granting admittance to the ubiquitous patronage and authoritative presence of the landlord in a way comprehensible to all nations and this gateway alone becomes known as the Gate of All Nations. The visitors recognize the outline of the castle and most specifically, the Gate of All Nations on the heights of a vault platform from afar. Although the visitors face two choices of access, the overall outlook specifies one destination. Each entrance has 111 steps (the sacred number) and each step was about 7 meters long, 4 centimeters wide and only 10 centimeters tall. These low, wide steps slowed them down to a gentle pace coupled with scrutiny and respect. Slowing down adds to one's cogitation, internal readiness, enthusiasm and consequently the awareness of the visitor. After reaching the platform, the audience finds enough space and visual opportunity to perceive the entrance shining upon the enclosure of the complex. At the time of its glory, the entrance was a determined cube resting on four pillars. The gigantic and symmetric statues of the body of cows faced upon entrance emphasize the strength and clarity of the message of the center of power while remaining welcoming. Let us remember that the doors and statues were extremely colorful, gilded and finely detailed at the time. After this attractive call, there is the vestibule of the complex; the place where people had to wait for the castle guide in order to gain admittance. This was a waiting space full of colors, decorations and details, the remains of which can be observed on the column heads of the complex. The ceiling was covered by cedar woods which diffused a pleasant aroma and a gentle

light shining through the valves, the attraction and privacy of which prepared the mind even more for presence in Persepolis. The visitors could choose to enter the complex from the port opposite to the entrance gate or enter the open area of Apadana palace from the southern port. At the time of leaving the complex, various statues wished the visitors farewell with a smile (unlike the angry faces of Assyrian sphinxes). Thus, the entrance unit known as the Gate of All Nations conveyed its message clearly and emphatically in the language of signs and symbols to all perceptual-cognitive levels of all nations by combining different states of pause and motion and control over the quality of this process via the two characteristics of cognition and surprise; a creative move seemingly impossible today!

10   CHANGE AND MOTION

Change triggers generation of information and guarantees the preservation of unpredictability. Over time, the information borne by any design which lacks the characteristics of a chaotic system goes to zero and so, loses its attraction and novelty for the audience. In order to deal with this issue, we need to increase the possibilities of the space in the form of change, variety, and diverse functions. On the inner scale, creating unpredictability takes priority. Here, to create change and transformation in order to constantly create information, nothing is better than inviting the dynamism of natural elements including water, natural light, plants, wind, fire, etc. These elements create new and constant information the entire duration of their presence. Imagine the leaves of a tree such as white poplar and how they amazingly shine like silver plates in summer, descend on us like golden confetti in the fall, burn like the fire at a time and give the sky a new look by leaving intertwined branches in the clouds at another. And all the while maintain their determined and familiar pattern in mind. Anywhere in the world, the institution of any human in a simple cottage with such a view would be filled with the sense of beauty and pleasure regardless of culture and reasoning, and more than any artificial innovation in architecture.

Designing multifunctional spaces, multiple and different light sources and variable furniture are also among other measures to create diversity. We should note that in creation of variety and designing change, other requirements of designing such as function and the conditions of the first stage should not be disturbed. Otherwise, although the unconventionality of the subject might generate surprise and initial attraction and be the source of much boasting in front of guests and temporary audience, its negative impact on the comfort and perceptual levels of the permanent beneficiaries threaten the main conditions of the chaotic system.

The ancient Iranian architects had an unrivaled mastery over creating change and diversity with regards to the needs of the residents of the buildings. The natural elements were present in the spaces through different maneuvers: the wind blew into the building by different means such as air-holes wind catchers , vents, and windows; the water was differently presented in not only the open space of the outdoors but the spring houses and pools; the light was presented through any means

such as highly decorated and colorful orifices; the soil, as a true haven, was the secure shelter of the residents underground from cold and heat and played the key role in the form of materials; and the plants and domestic animals were always respected and loved in the house. In the examination of vertical sections of the maps of old houses, we can see how the difference in height and creation of half-floor, open, closed, and semi-open spaces and rooms with different heights has provided the space with diversity and complexity. A look at the plan of such houses indicated that each main space, while having a view of the courtyard and the open space in order to benefit from variable and pleasant natural elements had the possibility of extension and integration with the adjacent spaces and other rooms. In the architecture of our past, wall was not a divider and barrier like today, but an important element in defining and even integrating the spaces which made the spaces flexible for a variety of functions and creating different spatial qualities. The window on the wall, unlike today, did not function as a hole to let the light in and was not covered all day long due to being open to the street. It was rather an element fitting the climate of the region and was identifying in defining the wall, controlling the color and the light quality and adjustment of the view which transformed the quality of the interior space over the days and seasons by overlooking the private area of the inner courtyard. Such a building was alive in the true sense of the word.

Using glasses, lenses, mirrors, and cameras showing different angles of the audience at the space is one of the interesting measures which determine the presence of a person in the space, leads to a new cognition by providing angles which are never seen on human scale and have completely unpredictable states. For us who don't see ourselves other than in front of a mirror in normal circumstances, simultaneously seeing our image from another angle (e.g. from above or our silhouette or as others see us) and perceiving the unusual movements of our bodies like the spaces we see in our dreams from unusual angles and unconventional viewpoints are always novel and attractive. In creating such phenomena, the architect must become a painter, an architect, a poet, a sculptor, a stage manager scene designer and a storyteller!

Perhaps, at first glance, creation of a variable space seem very difficult, but in fact, in most cases, what happens within each space is cause for fluidity and changeability of the space in itself and the architect does not need to do anything extraordinaire. The movie theater cinema hall is an exaggerated case of this event. The theater hall might be merely a closed (or even open) space which bears the least amount of information in passive mode, but when the audience is ready to exploit it and the lights go out and the movie is displayed on its broad screens, every time, people experience very different perceptual states ranging from sadness to happiness, excitement, anxiety, grief, etc. Truly, it is the most fluid and variable of all spaces!

Change is always accompanied by motion. Motion, whether of the observer or the object, leads to generation of change. Change creates diversity in both quantity and quality of the information borne by the object and leads to the completion and determinacy of the mental pattern on different angles. By

moving around and within the spaces, the user identifies the building over time and completes his/her mental pattern of the architect's design step by step. On the other hand, the movement of the elements and objects leads to the creation of new information and adds to the unpredictability. So, provide the audience with the possibility of turning and moving around and in different parts not just to access and use but to explore and perceptually recognize the spaces.

In addition, the speed of the observer alters the perception. When we pass a building in a car, the speed of our movement interferes with our cognition of the building. The entirety of our cognition of the city and spaces depends on how we move and our relative speed. Undoubtedly, when you walk a path, the surrounding space and buildings are perceived differently compared to when you are riding. So, in designing the volume of the building, the direction and speed of the audience's movement towards the building is one of the determinants. Referring to the designing requirements on different scales and having in mind the different observers, it is required that in order to create determinacy on the face of the buildings seen from the right side of the highway, the audience is provided with some information about the generality of the building through determined surfaces, big volumes, and strong colors, and then on the human scale and suited for the speed of the pedestrians approaching the building, details and delicacies are designed relative to the distance of the audience from the building. According to the speed of the observers and their presence in front of the building, the variable elements on urban scale must be transformed with lower speed and micro elements on human scale with higher speed.

11   COLOR AND LIGHT

Color and light are among the most ancient patterns with underlying universal concepts meanings. Awareness of the perceptual, psychological and physical effects of different types of optical and chromatic spectra are among the most important tools in architectural design. Bright colors affect the mind even more than recognition of the bounds and edges of the building. Different chromatic levels determine the bounds and limits. The observer judges the color observed in the texture, the quality and even the spatial quality and the type of activity and compares them with his/her own mental patterns. Each color, due to belonging to natural elements, is introduced in the form of archetype and by awakening a collective memory in the minds of the audience; it attempts to provoke determined perceptions in regards to the observed object. Yellow and orange belong to the sun, red to blood and fire, blue to water and sky, green to plants, white to day, black to night, etc. mastery over psychology of colors and the activities associated with each and consequently, effective usage of them in designing can be a very powerful tool at the service of the creative architect. However, there are few designers who are aware of the importance of the color pink in controlling social behavior, green in relaxation, blue in stimulating cogitation and the sense of release, orange in energizing and increasing the creative capacity, yellow and gold in fostering the sense of presence in the moment and self-awareness, etc. and use it

accordingly. Proper use of color can help the architect adjust the limits, potential qualities, function, goal, etc. Similarly, the architect can increase the audience's expectation to receive news by using color and define the desired activity in the space, even if such information is not actually there. One sure way to simultaneously create determinacy and unpredictability is to use familiar and generic patterns where they are not expected. For instance, a long yellow wall which suddenly ends with a red surface increases alarm, expectation of a new event and the likelihood of the presence of a new message, even if there are not functional change in the space; the mind of the audience reacts to the change in color and the underlying concept of the color red by recognizing the mental patterns. In many countries, a variety of factors, including internalized fears and depressions prevent the implementation of color on large scales and high concentrations in urban sites. So the main colors used on urban walls are gray or white and matte colors and recently black which soon turns into gray due to the grimy pollution and adds to the dejection and listlessness of the citizens. This is while black and white and gray bear the least amount of information for the mind and they must only be used to define the background of other colors. Therefore, in fact, the color is removed from the face of the city which is, in itself, a very important factor in psychological depression. In polluted and gray cities, bright colors can be exhilarating and stimulate the mind.

The best type of color is natural colors. These colors, due to their fractal nature, are formed from a mixture of gradients of a color and are not uniform single colors. Thus, in the texture of a carpet, using natural colors gives it an attraction that adds to its value and using artificial colors destroys the quality of Persian carpets. If, instead of one color, we could use a color composition, as is the case in flowers, birds, and fishes, the spatial quality would be increasingly optimized due to its fractal quality. Architects of the past achieved this by using handmade materials and fine details in decorations.

By combining and juxtaposing different colors, besides meeting basic psychological needs, we can induce cold and warmth in different climates and add virtual depth and volume to the face of the building. The color of the buildings in different climates can be effective in completing the chromatic harmony of the environment and adjusting the psychological emotion. For instance, in the forest area or Snowy Mountain, the color red for a gable roof in a green or white background, in addition to standing out, can add to the unpredictability due to its contradiction and lead to the perception of diversity and variety and useful functioning of the mind. Besides, the color red is a warm color which tones down the coldness the audience receives from green and white.

In interior spaces, color is the most important factor in determining the space and defining the type of expected activity and behavior. It is emphasized that you should never use color based on taste or in order to innovate except in some special cases related to the orientation of the space and the psychology of the users. The color of each space should be commensurate with the expected behavior. For example, the color of the bathroom, commensurate with the act of purification and washing, must be blue or colors affiliated with it; or the kitch-

en, in accordance with the main act of cooking, warm colors should be used. Colors such as white or green in this space would be inconsistent with the behavior expected of the space and would lead to the corruption of the respective pattern and activity. The type of behavior and activity associated with each space should be determined through consultation with the beneficiaries according to their age, gender, psychological, perceptual, and physical characteristics. In general, it is recommended that we avoid strong colors, dirt, pure white, gray, and black which absorbs all the energy on large scale and the darkening of the color be reduced from bottom to top. Do not ever use dark colors for the ceiling. You can use colors to adjust the perception of dimension. Cool colors broaden the space and warm colors make the environment look smaller. Mixing taste in coloring of spaces where humans are in close and constant interaction with is not allowed at all and if you cannot decide, you'd better use light colors close to white or cream. In consultation to choose the color of the spaces, the architect should have an understanding of the real and symbolic effects of the colors and the power of decision-making in order to be able to choose the best option to improve the conditions according to his/her specific audience and not just be a pretentious show-off or act according to the desire and demand of his/her employer. It is essential to note that in most cases, the color preferred by a person is the same color resulting in emotions and behaviors which if encouraged, could lead to psychological disorder and sickness specific to that person. Your employer might demand that the ceiling be painted navy or that the entire area be painted black due to his/her own frustration. Depressed people are especially interested in the color gray. Young people might want to paint their rooms red due to their internal emotional seething. A young shy girl might prefer pink. A fat person might enjoy atomic tangerine. A housewife might prefer green due to laxity and sedation. Or an energetic and athletic person might even want to paint his/her bathroom orange or golden. In these cases, if you choose to respond positively to the demands of the employer and use their favorite color on a large scale on the walls, then you've betrayed him/her so profoundly that it might truly lead to his/her mental disintegration and ruin his/her life.

However, color cannot exist without light shining upon it. It's no secret that beyond color, light has a key role in architecture. Spectrum, orientation, intensity, and frequency of daylight define our cognition of the space and our perceptual feeling. Changing sunlight shines determinacy upon everything with its luster and provides unpredictability by changing the angle and intensity. In addition to creating visual opportunity, it should be noted that light is the ultimate universal archetype and equals the presence of God. So, the quality of its presence in architecture affects our message a hundred percent. Introducing the outside and the inside of the spaces with natural light is one of the most important points in giving the architecture determinacy and change. Modern designers use artificial light and energy and pay less attention to the importance of sunlight in the proper definition of environmental perception and health. But, over the centuries, adjusting sunlight in architectural spaces has been one of the most important concerns of

the architects to create health and various spatial qualities which one might dare to say is one of the most important reasons why the architecture of the past is superior to the modern architecture. Today, we know very few architects who with awareness of the local climate conditions, much like in the past, design holes, colorful glasses, sash windows and various filters to adjust the spatial quality and flourish human imagination and mood by creating shades and lighting. As if the modern architect who has no visual of the light in the sky and marquees, knows only two solutions; either to strip people naked to the assault of the light by using vertical and broad panels of glass or to benefit from the sunlight by embedding holes instead of windows to deal with the usage. No more creativity and skill applied to the ceiling and walls which was unique in classic styles.

One of the most beautiful manifestations of light and color can be seen in sash windows and colored glasses of Old Iranian mansions. Lights that transform the face and feel of a room at any time and manifest the most beautiful and intimate façades of the building at night are the manifestation of determinacy and unpredictability at the same time. Small colored glasses in regular geometric shapes seem completely determined and repetitive, but the sunlight is never repeatable and forever generates unpredictable information into the ancient rooms. The audience can stare at it for hours and days and his/her mind is yet fed with natural computation and cogitation. Truly, the perception of variety and similarity and cognition of plurality in singularity unity of this architectural masterpiece is one of the greatest ways to increase the creative capacity of the brain and improve the perceptual level.

In addition to sunlight, we should also add fire to the beautiful manifestations of the architecture of the past. Still, every poetic gathering and every pleasant environment is adorned with candle light and hearth and fireplace because motion and change of the flame in the depths of darkness adds to the unpredictability, illusion and attractiveness of the space. Fire is also trendy in religious and ritualistic environments. It should be noted that in addition to symbolic concepts which accompany this natural light, perceptually, the candle can never be replaced by a lamp and artificial light because artificial light does not enjoy the ambiguous and vague effects of this live light and is not suitable for the atmosphere of being in the presence of a hidden and vague power. This small source of natural light provokes mental patterns and develops the imagination. It is recommended that we specify a place on the walls for candle holders to account for the presence of this spiritual object.

Today, artificial light has jeopardized our health and perception by distancing us from natural system of day and night. Besides lacking the health-related effects of sunlight, artificial light, in most cases, lacks the necessary intensity and quality for the proper perception of objects. Most light bulbs lack the complete chromic spectra and so most colors cannot be observed properly in their light. Therefore, the mind cannot form a proper pattern of the environment and feels inadequate in seeing objects compared to daylight which is deceptive and disturbing. Besides, it generates an alternating electric field in the spaces which severely damage the nervous system and the

human brain. Halogen and LED bulbs also have their issues which should be paid attention to at the time of purchase including the production of ultraviolet radiation, heat, chromic spectrum, and color temperature. Therefore, we have to be very careful in selecting the source of artificial light and we should keep them as far from the heads of the inhabitants and their direct field of vision as possible in the design. To adjust the intensity, the amount of lux printed on the bulb is not intended. The intensity of the light should be adjusted on site and in proportion to the type of work done under it and be measured by the proper devices. It is because of the vast hazards of electricity and artificial light compared to the life-saving sunlight that it is recommended that the architects always design each building and even each room with direct lighting (not via void) from at least two directions so that at least the users enjoy the health and proper perception of their environment and experience beauty through the determinacy and unpredictability of sun.

However, there is no option in this machine-driven life other than using AC power and its advantages which brings welfare. So, we should make the best of it and create a pleasant atmosphere because lighting has a great effect on the quality of spatial perception. It is suggested that in addition to the measures taken to manipulate daylight, you design different lighting systems in various types, such as spot lighting, linear lighting, surface lighting and volumetric lighting, with the ability to change and assimilate color, texture, intensity, and light direction in different spaces. Light not only renders the space determined by brightening it up, it also can have different impacts on the human perception with each change and force his/her mental patterns to learn. It is suggested that each space be equipped with at least four light sources with different intensities and colors from different directions and heights. Sometimes, changing the source of lighting which leads to the change in the color of the objects and the direction of the shadows triggers computation and cogitation due to the creation singularity unity in plurality and diversity and stimulation of the mind to recognize the differences in stationary objects and the user of the space experiences pleasure and bliss from perceiving the change in the familiar space. Since man always attempts to save and recognize mental patterns during the day and with sun shining upon him, any similarity of the lighting to this natural pattern can trigger familiarity and determinacy and any dissimilarity will stimulate new interpretations. For instance, the presence of light anywhere is associated with lightness and liberation and the mind is accustomed to see the shadow of objects beneath them. So, to give the impression that the ceiling is higher and lighter, we can apply surface lighting on the ceiling or to induce the sense of floating to the floor and stairs, we can use light boxes and remove the shadow. Displaying shadow on top instead of beneath them creates an unconventional state and due to its inconsistency with the conventional mental pattern, it triggers different perceptions of attractiveness, grandeur, or fright because it causes black ghosts to float over the observer which conveys the feeling of being dominated by darkness. The choice of optical spectrum, like the color, depends on the characteristics of the audience. Since the therapeutic or harmful effects of the light

shone upon the users of the space is also more than the colored surfaces, then we need to conduct the necessary research in choosing the colors of light in different spaces, especially in regards to the health level of the users. Mixing colored light with music can leave profound effects on the spatial perception and control of the feelings. Particularly, it is recommended that you take measures for using candle light on the walls especially in the bathroom so that the natural light of the fire can recapture its place in the modern life.

How to choose color and lighting is a very broad and delicate discussion which requires a whole separate book to explain it. Choosing color and light and their effect on the spatial behavior and the perception of the audience must be carefully considered by the designers, particularly interior architects. Defining different types of lighting for each of the activities performed in the space is subject to your mastery over the space and the behavior of beneficiaries and patrons. For instance, for the lighting of the confined space of a hotel reception, we need to consider different factors in practice. In such cases, flipping through magazines and imitating its samples won't help you. You need to take into consideration that the reception has two functions at the same time: practical and decorative. Lighting on practical level should serve several purposes; downward lights placed over the desk must help the customer read the forms carefully and fully understand what s/he is signing. These lights must not be too strong and shocking or too weak and far. Lighting behind the desk is also necessary for writing and reading by the staff. Of course, in these states, the material used should not be such that give off light to the eye or in case computer is used, cast light on the screen. The atmosphere of this section must be welcoming and pleasant and warm lights and bright surface should be used in the vertical background of it. Ceiling lights must be adjusted with the help of desk lights and other environmental lights in a way that the faces of clients and staff appear milder and more beautiful and not frightening, alarming or vague. In most hotels, the reception is the first element under consideration in which the lighting might be directed downward or upward. This light must be very mild and only light up the desk and not reflect any light upward. Otherwise, it not only interferes with the function, but it also renders the faces of the staff frightening and would cause terror by creating shadows going upward! In designing and selecting the material to be used in the work, optical fibers with upward lighting on the floor or together with cold cathodes can affect the symbolic state of the collection very much and put emphasis on the corners and edges with the light of the stand. The skilled architect can create the reception with mere lighting and simple materials such as a silent dramatic display screen scene in a way that it subtly attract the clients to itself and give them a sense of peace and confidence. Similarly, for every space with its specific spatial qualities and behaviors, there should be a different lighting system which we will not linger on anymore here.

12 CONCLUSIONS, PERSPECTIVES, STRATEGIES, USEFUL SUGGESTIONS AND FUTURE STUDIES

On urban scale, we can define the building differently through

lighting. You can easily compare the perceptual effect of black structural masses with those which are determined by light. Indefinite ghosts emerging from the darkness provoke fear, insecurity, and aggression in the mind, while buildings with lighting and determined volumes, particularly if the lighting is in gold, purple, or pink, create more of a sense of security and peace of mind at night. Here is our only chance to create a better urban landscape in a city like Tehran. Through professional lighting, we can give volume to flat and lifeless views and even make the buildings appear shorter and render urban spaces more open and welcoming. By awareness of the effects of different lights, we can create different surfaces and friendly, cheerful, emotional or relaxing places all over the city and hide the unsightly and distorted parts in the dark or convey a different message of the architecture to the bystanders.

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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.