# INCONSISTENCIES (PROBLEMS OF) BETWEEN TWO DIMENSIONAL GRAPHICS OF (URBAN) DESIGN AND ITS THREE DIMENSIONAL (URBAN) FORMS

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**INCONSISTENCIES (PROBLEMS OF) BETWEEN TWO DIMENSIONAL GRAPHICS OF (URBAN) DESIGN AND ITS THREE DIMENSIONAL (URBAN) FORMS**

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**I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.**

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# ABSTRACT


**INCONSISTENCIES (PROBLEMS OF) BETWEEN TWO DIMENSIONAL GRAPHICS OF (URBAN) DESIGN AND ITS THREE DIMENSIONAL (URBAN) FORMS**

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This study concentrates in particular on (*good*) visuality and visual perception of any design with consequences on urban environments and human lives. The purpose is that 'any design requires not only *holism* (*wholeness*) within itself, which is generated by its design parameters, but also *co-relation* (*consistency*) between its mental imageries (visualizations or conceptual-mental fictions) and all their representational products in each and every dimensional realms. The design process is conducted respectfully to cognitive process (seeing, visualizing, perceiving) so that it could finalize within a *good* (perception) design'. Therefore, it is questionable whether design parameters enable (holistic and consistent) *good designs* with all representations, and then good urban environments, and sequentially good experiential-daily lives. Definition of related subjects, explanation of processes referring each other, and examination of some design cases regarding whose visuality is constructed and communicated by design parameters contribute to this scope of the study. Containing far more details, the study discusses (the analysis of) the survey touching upon (environment) lives and implements conclusions with future recommendations in this field (keywords).



**Keywords:** Cognition and Cognitive Process, Visual Perception, Design Process, Gestalt Theory and Design Parameters (Principles, Elements and Tools)

# ÖZ

## (KENTSEL)TASARIMIN İKİ BOYUTLU GRAFİĞİ İLE BU GRAFİĞİN ÜÇ BOYUTLU FORMU ARASINDAKİ TUTARSIZLIKLAR

Eren, Ebru
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Tez Yöneticisi: Doç. Dr. M. Adnan Barlas

Aralık 2013, 148 sayfa

Bu çalışma, kentsel çevreye ve insan hayatına olan etkileriyle birlikte tasarımın özellikle (*iyi*) görselliği ve görsel algısı üzerine yoğunlaşmaktadır. Çalışma, 'herhangi bir tasarımın, tasarım süresi boyunca bilişe uygun olarak (görme, göreselleştirme, algılama) kendi içinde (tasarım parametrelerinin ürettiği kendisi) *bütün (bütünsel)* ve ayrıca kendisinin zihinsel betimlemeleri (zihni görsel imajlar/ kavramsallaştırılmış kurgular) ile bunların boyutlardaki temsili ürünleri arasında *ikili ilişkileri (bağlılık yada tutarlılık)* olması gerektiğini ve böylelikle *iyi* (algı) tasarım edinilebileceğini' önermektedir. Bu yüzden çalışmada, tasarım parametrelerinin bütünsel ve tutarlı *iyi tasarımlar*ı ve birlikte *iyi temsilile*ri ve *iyi sunumlar*ı, sonrasında iyi kentsel çevreleri ve nihayetinde iyi yaşantıları sunabilirliği sorgulanmaktadır. Konuya uygun tanımlar, süreçlerin birbirlerine değinilerek yapılan açıklamaları ve görselliği tasarım parametrelerince organize edilmiş tasarım örneklerinin incelenmesi, çalışmanın kapsamına katkıda bulunmaktadır. Detaylarıyla çalışma, incelemeleri (ve sonuçlarını) konuya bağlı kalarak ve yaşantılara değinerek tartışmakta ve son olarak özetleyip ileriki çalışmalar için öneriler sunarak sonuçlamaktadır.

**Anahtar Kelimeler:** Biliş ve Bilişsel Süreç, Görsel Algı, Tasarım Süreci, Gestalt Teori ve Tasarım Parametreleri (Prensipler, Elemanlar and Araçlar)

To My Family

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# CHAPTER 1

# INTRODUCTION

*"Human mind is a dynamic set of cognitive structure which tries to give meanings to everything reached to it."* [1]

(Piaget, 1952)

This chapter presents an 'introductory background', which includes identifiable and explanatory characters of the study. This introductory background focuses on some basis for the study such as

- the purpose (why it is considered),
- the problem (what is concentrated on),
- the contents and contexts (what it deals with),
- the aim (what it attains),
- the method (how it is conducted).

While depicting all, a narrative composition within a fluent deduction is rendered to put the purpose of the study into words. This narration leads a soft transition among the topics, which flows from human being to its 'biological systems' and from its survival needs to 'the related theories of the mind and reality', to the basis of the study with reference to '**cognition**' and '**design**' within '**their processes**'.

[1] *"İnsan zihni kendisine ulaşan her şeye anlam bulmaya çalışan dinamik bir bilişsel yapı grubudur."*

Özden, Spring; 1996. Eğitimde Yeniden Yapılanma Çerçevesinde Otantik Öğretim. *Pegem Kuram ve Uygulmadan Eğitim Yönetimi Dergisi*, *2* (2). Retrieved and translated into English from: https://www.pegem.net/dosyalar/dokuman/876-20120404153937-ozden.pdf

As a highly complex organism, humans sustain their lives with the help of biological systems in their bodies. The nervous system plays the most crucial role. The nervous system is a web system, which regulates the communication of outer and inner stimuli through the body (online Medline Plus Medical Dictionary). This system is under control of neural organs such as the brain and cerebellum as well as the spinal cord and its bulb, with the brain undertaking **the vital and experiential functions** of the organism (online Encyclopedia Britannica Company). To sustain the vital and experiential functions of the organism, humans are facilitated with mental abilities such as to sense, to perceive, to feel, to understand, to learn, to imagine, to think, to visualize, to respond, and to act.

Correspondingly, those mental abilities require meeting the cognitive needs for proper functioning of brain, and the brain operates these functions according to the cognitive theories. As Cohen, Stotland, & Wolfe (1955) state, "Need for cognition has been variously defined as 'a need to structure relevant situations in meaningful, integrated ways' and 'a need to understand and make reasonable the experiential world'" (p. 291). This implies that the brain endeavors to define relationships among everything in the environment to supply those experiential needs in order to satisfy itself. As De Jager (2009) and Jensen (2000) claim, "Brain forms a vital connection between the body and the environment" (Krog, 2010, p. 2). Everything which comes from outer environment by sensory stimuli is firstly perceived as descriptions of these stimuli, then produced as mental imageries created as a result of the comparison with previous knowledge, and finally kept in mind (stored in memory) as learnt information (mental codes). Consequently, they are translated into mental products, or imageries, which have interrelations with each other (Krog, 2010). Due to their interrelationships, these mental products are operated comprehensibly for visualizations of any future '**conceptual-mental fictions**'[2] among which there are cognitive interrelationships (just like the ones among the neurons) not only between everything in the human mind and in human environment but also among everything in the human mind.

[2] This term is proposed by the *author* and described as short expressions for any thoughts, especially for the first definitions of a design (final product) structured in mind. It means that this design would be formed and shaped by these priori ideas (fictions) of a final product (in reality).

The word cognition means ‘related to understanding and comprehension’, and works together with ‘perception’; so do the cognitive theories. Such theories as Phenomenology, Theory of Knowledge, Information-Processing Approach, Problem Solving, and Gestalt Theory can be listed as models of theories. While Phenomenology embodies the terms ‘consciousness and conscious experience’, Theory of Knowledge studies ‘knowing and learning’ and Information-Processing Approach handles the process of ‘storage and recognition’ of the information in memory (online Encyclopedia Britannica Concise). As for Problem Solving, it leads ‘mental thinking’ and ‘designing’, **Gestalt Theory**[3] concerns ‘visuality and visual perception’ of formed imageries of our sensations in the mind. While thinking, designing, and perceiving are characterized as mental abilities which evaluate stimuli, Gestalt is described with the words ‘form, shape, and figure’, which fundamentally mean ‘**pattern**’ of visually perceived stimuli, or pattern of conceptual final design. Depending consistently on the cognitive theories, pattern; in other words, ‘**the unified whole**’[4], is regulated and generated both in the mind and reality by their represented parts (inner and outer stimuli) of that whole. This explains the existence of a fabric, which is constructed by the interrelations among ‘the parts together with the whole’. In a fabric, it could be assumed there are, on behalf of regulation and generation, flexible co-relations between ‘the whole and the parts’ in which, “The whole is more than the sum of its parts” (Koffka, 1963). Koffka states that, “It is more correct to say,” asserting explicitly,

> ... the whole is something else than the sum of its parts, because summing is a meaningless procedure, whereas the whole-part relationship is meaningful. (Koffka, Principles of Gestalt psychology, 1963, p. 176)

Accordingly, it could be noted that everything is related to each other in harmony (regulation) or they have a tendency (generation) to be related to form a pattern, a unity, and a whole. It could also be considered that this tendency is possibly

[3] Gestalt is visually perceived structure of an organized whole and Gestalt Theory is the theory of visual perception and organization of whole. Gestalt Theory is developed in 1920s by German psychologists: M. Wertheimer, K. Koffka, and W. Köhler. The theory deals with the organizations of visual things (parts) as in groups and as “unified whole”.

[4] It refers to a psychological term: ‘Gestalt’, wholeness of parts.

brought to the fore by those interrelations cognitively produced in the mind, which leads those relations, in the words of Lozano (1990) to strike "**balance**"[5] so that a pattern or a whole could be formed in the cognitive process of visual perception. To put it another way, they are perceived as a pattern and a whole with the help of these tendencies in the mind, or cognitive processes of the brain.

SAMPLE 1:

'Cognition', 'whole-part', 'design/ing', 'pattern', and their relationships could be explained and exemplified through jigsaw puzzles. Correspondingly, the pieces of the puzzle (the final form) and parts of the whole (the pattern) can be resembled each other. Referring to the process of forming a whole, or design/ing, it could be said that there are tendencies among the pieces, which makes the pieces find their perfect matches and fit into their unique places in the whole as this game expects that all pieces must precisely come together to complete the final picture. This seems so much like mental thinking, designing or problem solving that, indeed, the cognition generates these tendencies during the game. It is nearly certain that the tendencies here emerge from the mutual relationships among pieces in the case of their visual features: shapes, borders, indentations; arrangements, locations, positions; functional qualities (i.e. fragments of the picture they carry).

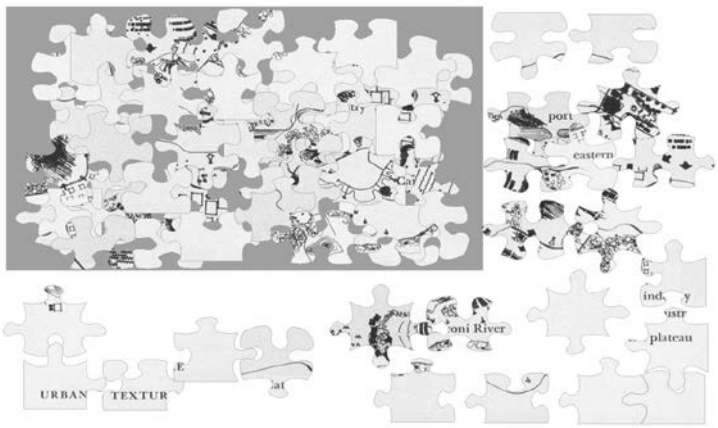
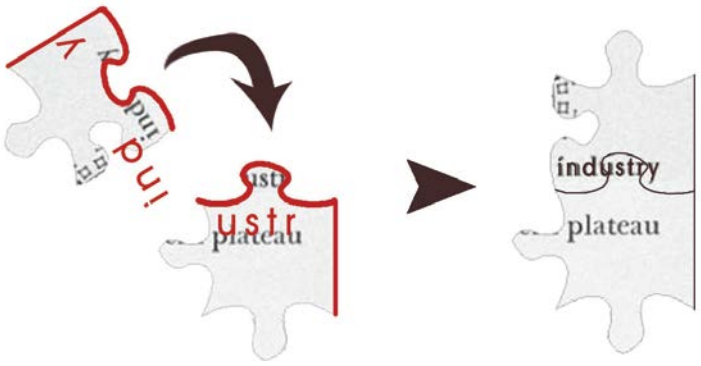
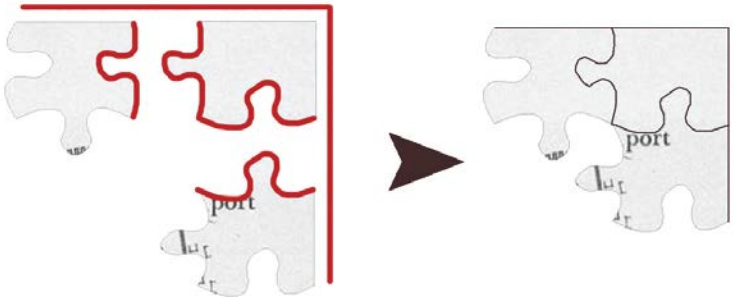



**Figure 1.1**: The pieces of a puzzle, each of which has specific features, or tendencies
(The puzzle with the pieces is digitally prepared by the *author* in JPC: Jigsaw Puzzle Creator.)

[5] The term frequently used by Lozano.
The situation in which tendencies among parts are neutralized to a 'unified whole', which means parts move towards each other to strike balance by 'pushing and pulling', organized by tendencies.




a) Two adjacent pieces of the puzzle (group a)




b) A corner piece which is the mutual piece of two adjacent-piece groups (group b)


c) Combination of 'group a' and 'group b' with three other pieces (group c)

**Figure 1.2**: A unification process: piecing together (patterning of the puzzle by cognition)
(Figure 1.2 is digitally prepared by the *author* using the pieces in A. Photoshop, Figure 1.4 in JPC)

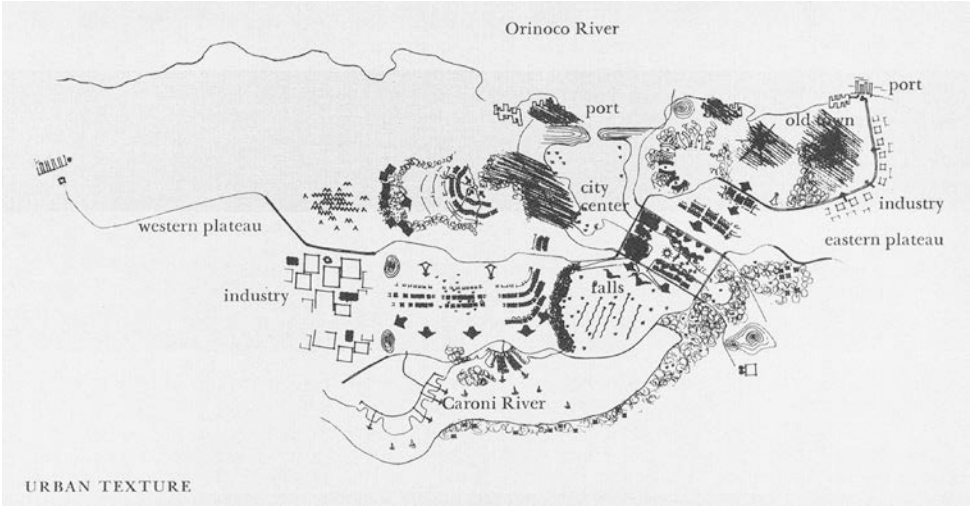



**Figure 1.3**: The picture of the puzzle
(Source: Appleyard, 1965, p. 191)

In this jigsaw puzzle example, Figure 1.2 gives an idea about the mental thinking or the cognitive logic of the mind, pointing out how the pieces are combined with each other and how a whole is formed by the parts together. Mental thinking (designing or problem solving) implements a generating system on visual features of the pieces. Explicitly, '(a)', '(b)', and '(c)' in Figure 1.2 illustrate this generating system regarding the visual tendencies:

- borders of the pieces
  - matches in the gaps of the pieces; the same border line of the indentations and projections of the gaps (a, b, c)
  - continuation of the outer borders of the pieces; the same alignment in the locations of the adjacent pieces (a, b)
- fragments of pictures which the pieces hold
  - complementation of the words; 'ind-ustr-y' and 'easter-n' (a, c)
  - the same texture (c)
  - the continuous lines and figures on the picture (c)

In brief, firstly, the visual tendencies lead the pieces to be co-related with each other, then interrelationships strike balances to produce groups, and finally the groups generate the whole final picture of the puzzle.

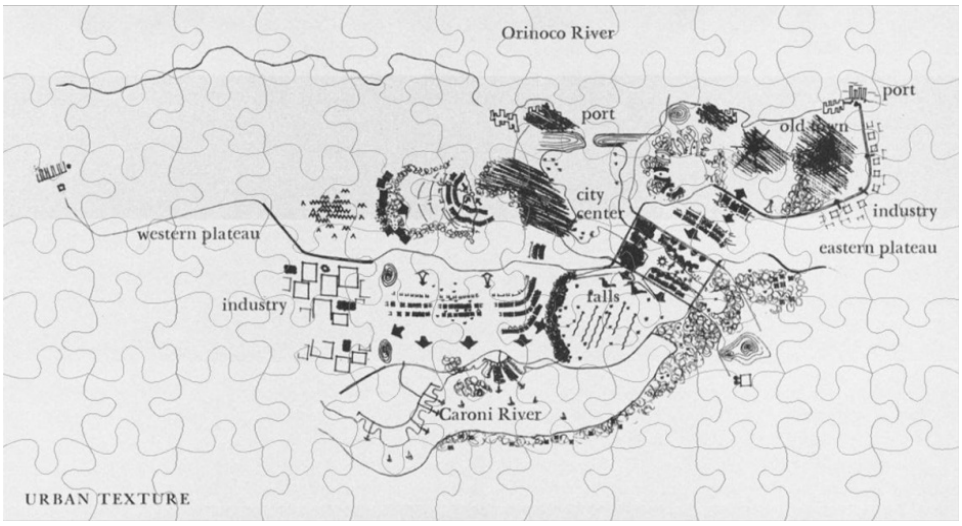



**Figure 1.4**: The completed jigsaw puzzle: the whole with the parts

The process of 'forming a whole', any of which is brought to the fore by cognitive relations could be applied to any future mental imagery or any cognitive production of the mind. In other words, cognition could accomplish any design (final product) in the nature of *conceptual-perceptual fictive wholeness*[6] with respect to Gestalt Theory and design parameters. This cognitive process operates parts through their wholes re-interpreting the outer and inner stimuli, or 're-visualizing the conceptual-mental fictions from the mind into reality'; so do designing and design processes[7]. It is proposed that 'designing' refers to mental thinking processes in the mind; 'design process' to the entire process of processes in both the mind and dimensional realms because 'design' means the final product of this in the dimensional realm.

According to the proposal, design processes aim to turn *designing* into *design*. In other words, conceptual-mental fictions turn into real final products which are **the re-presentations**[8] of these fictions. This process requires both **the transfer** [9] of

[6] The state of being a unity and the feeling of being complete

[7] 'Designing', 'design process', 'design' are proposed and re-defined by the *author* for the study.

[8] Visions of any conceptual-mental-fictions explicitly projected in reality, or re-presentations

[9] The designing process by which conceptual fictions pass on from the mind into reality as designs

the conceptual-mental fictions from the mind into reality in each and every dimensional realm and **the transposition**[10] among dimensional realms in reality, from one dimensional realm to another. While re-presenting these fictions as conceptual designs enables transfer, re-drawing and re-forming these designs as re-presentations conduct transposition.

The re-presentations of conceptual fictions could be expressed,

- two(bi)-dimensionally with 'graphic communications' o*n plane*,
- three(trio)-dimensionally with 'concrete and/or digital models' in any scale and/or '1/1 constructional forms' *on space*,
- four-dimensionally with 'the vital, experiential and daily lives' *in space-time* relationship between humans and the constructed environment.

To sum up, the re-presentations in each and every dimensional realm require **to be interrelated and consistent** with each other to be able to transfer and to transpose the conceptual fictions into final products, i.e. *designing into design*.

SAMPLE 2:

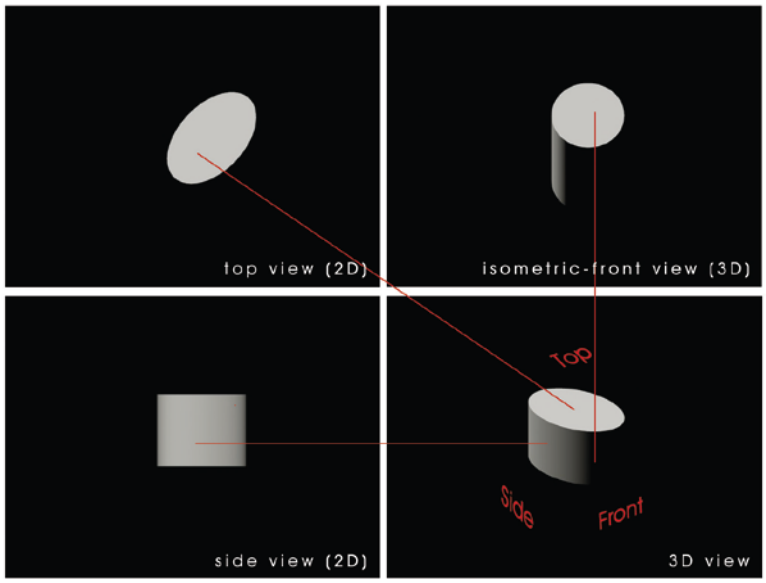



**Figure 1.5**: Digital graphic communications;
2D and 3D re-presentations of an elliptical cylinder

[10] The re-presentational process of transferred fictions in which they are implemented among dimensional realms through the final product

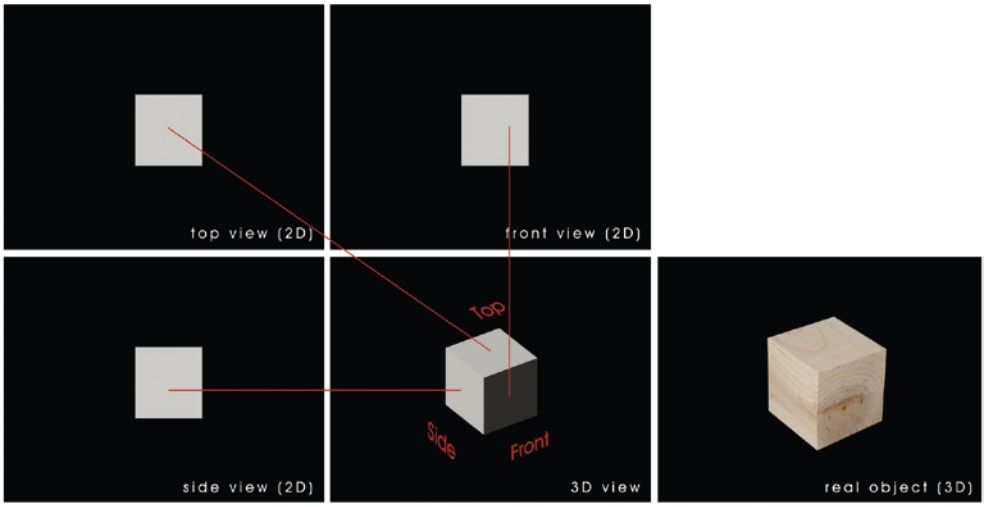



**Figure 1.6**: 2D and 3D presentations of a wooden cube in space and time;
2D orthographic drawings (top, side, front views) with 3D isometric drawing (soft model)

(Figure 1.5 and Figure 1.6 are prepared by the *author* in AutoCAD and in Adobe Photoshop.)

The design in Figure 1.5 is an elliptical cylinder, not a circular cylinder, and the one in Figure 1.6 is a cube, not any prism. Explicitly, they claim that co-related drawings and consistent re-presentations are harmonized in balance presenting only one conceptual-fictive design without any contradictions with any other design. To conclude, there would be both *consistency* [11] and *perceptual wholeness*[12], not only between conceptual-mental fictions and the representations but also among the re-presentations throughout the entire design processes.

## 1.1 The Problem

Those designs, however, could sometimes have trouble in their visual perceptions. It could be deducted that they can be based on some '**key reasons**' (critical[13])

[11] The state of being compatible without any conflicts and having harmonious relationships
This situation defines the sameness in concept, fiction, re-presentations among the co-related parts of their whole.

[12] According to Gestalt Psychology, it refers to wholeness in 'visual perception': holism.

[13] Playing decisive or crucial roles in the success or failure of something: tip (the key to)

which possibly appear in the transferring and transposition processes. In other words, the reasons are similarly associated with the 'design/ing or design processes', which proposes that not paying enough attention to design process, especially to **the design principles, elements and tools**, leads to these reasons.

Explicitly, those designs could cause trouble when they and their representations are not ***holistic***[14] and not ***co-related***[15] with each other:

- The first provision means that designs (with re-presentations) can be successful in forming a pattern due to their ***balanced*** conditions provided by enough perceivable ***simplicity*** and ***order*** between parts and the whole.
- The second provision means that designing and its re-presentations need to be ***consistent*** with each other so that each re-presentation with ***properly*** and ***sufficiently*** utilized design principles, elements, and tools through the ***(mutual) interrelations*** could be the unique section of the same conceptual-mental fiction (designing).


**Figure 1.7**: The problem of the study with the reasons and the results
(The graphic is drawn by the *author* in Microsoft Office Word)

Furthermore, the trouble arisen mainly from the key (critical) reasons related to the design process might affect the designs subsequently. It could be claimed that consequential results of 'visual-dimensional-perceptual troubles' might be some problematic outcomes exemplified as *perceptual chaos* and *dissatisfactions in vital and experiential lives* **(**inner and outer environment of human).

[14] The term related to the Gestalt Theory, meaning that the parts of something are intimately interconnected to the whole
This implies that there is a relation between the parts (any re-presentations) and their whole (the re-presentational design).

[15] The term assigned for mutual relationships in which one thing affects or depends on another
This implies that there is a relation among the parts (any re-presentations).

SAMPLE 3:

The game of ‘Tetris’ could be given to explain the keys (critical tips) for designs. Tetris is a well-known video, puzzle game played with three-dimensional objects named Tetrominos. The objective of this game is to organize the Tetrominos with the *concept* of gathering the *sufficient* Tetrominos regarding their visual features together without any gaps within a *proper order* to fill the blank levels. The *simplicity* here is to manage striking a *balance* among the Tetrominos to get full-line levels. Subsequently, the full (organized) line-levels would crash, and more space would be obtained for the continuation of the play because the space of the game, which could only be observed in the screen, is limited and fixed. However, the video play could be observed from different surfaces in another version of this well-known game, ‘3D Tetris’ in which the entire play is set in 3D.

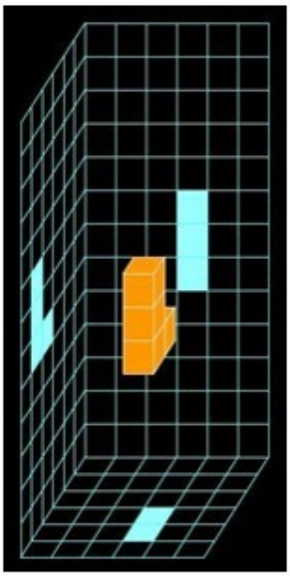
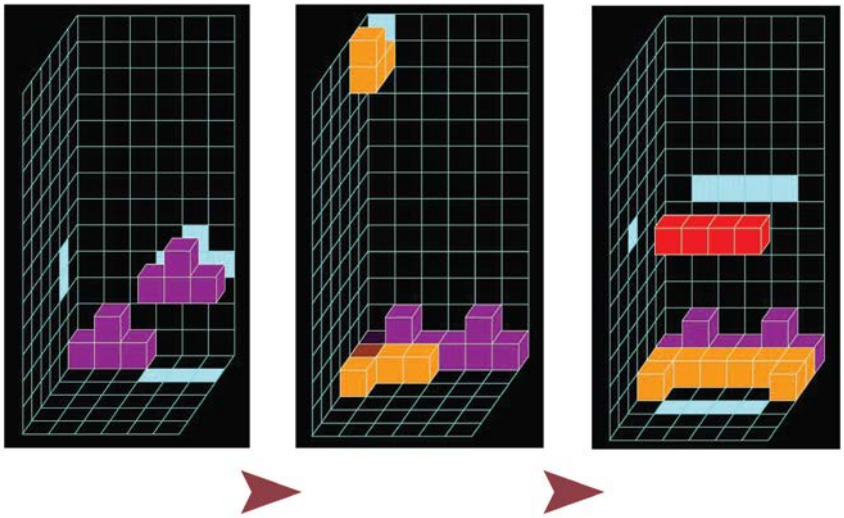


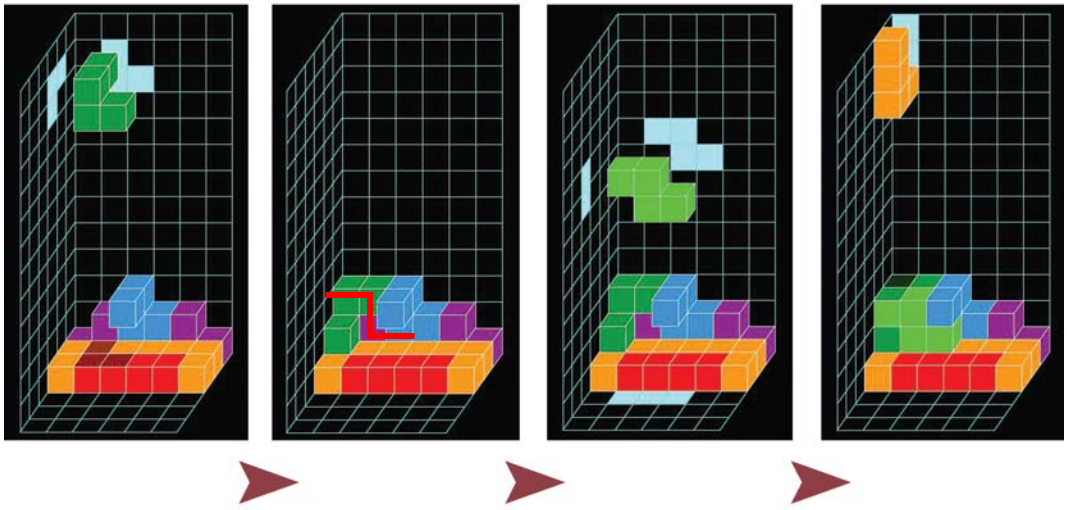
**Figure 1.8**: A Tetromino in a 3D space, together with three dimensions and three surfaces

As shown in Figure 1.8, the surfaces of a Tetromino are displayed on each plane of the three-dimensions as colored projections. During the game, it is a need to observe three-dimensions, three surfaces with the projections; because, these projections can *control the space* and *order* of Tetrominos to fill the levels in *balance*. Hereby, these *consistent relationships* among the projections, and Tetrominos, will generate a *whole*, and similarly, the re-presentations of any

volumetric design; 2D drawings (top, side, front views or projections) and 3D model (game object), assist perceptual wholeness of its design in design processes.



a) filling blanks in an order and balancing simply



b) a co-related whole with three (sufficient) Tetrominos in proper organization
(Red thin Z-line in the second column shows the volumetric void among the Tetrominos)

**Figure 1.9**: Tetrical, the 3D Tetris game: designing for a whole

(The sequential photographic images of Figure 1.8 and Figure 1.9 are prepared by the *author* with 'print screen' mode of computer during online game.)

(Source [*online game*]: Tetrical)

Similar to this game and its purpose, any design needs to be ***properly*** and ***sufficiently balanced*** to follow up its concept (conceptual fiction) to such an

extent that fictions (designing) and representations (design) would be ***holistic*** and ***co-related*** in the context of their concepts in a design process.

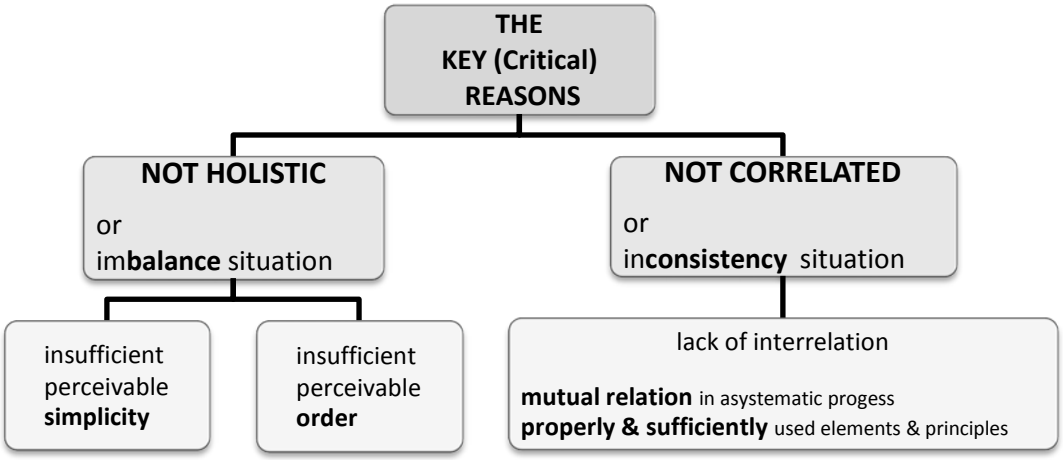



**Figure 1.10**: The reasons of the troubles: the keys
(The keys list the conditions for a *good* design pointing at *holism* and *co-relation*)

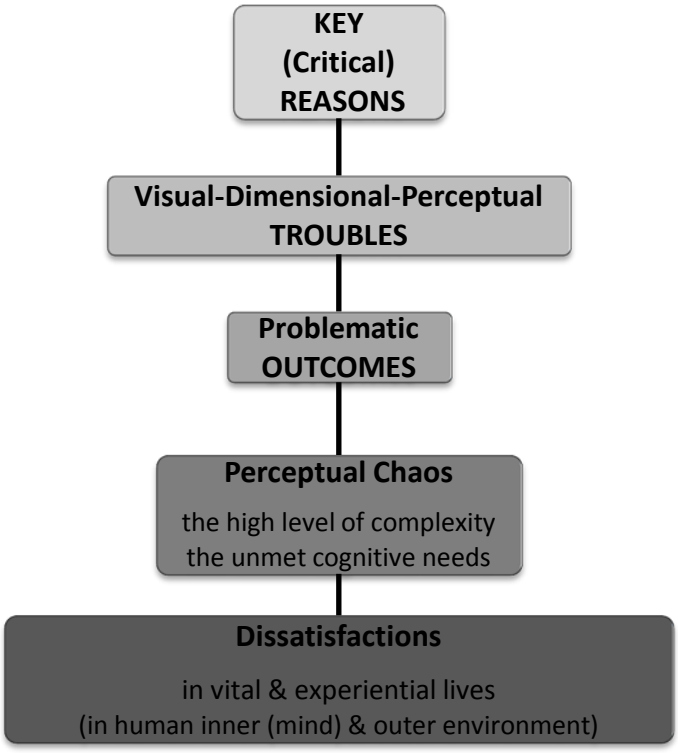



**Figure 1.11**: The consequential results of the troubles: the outcomes

(The graphics Figure 1.10 and Figure 1.11 are drawn by the *author* in Microsoft Office Word)

Nonetheless, in daily life or in designed environment, humans face such troubles and outcomes. They can be exemplified both for in daily life such as personal private matters, i.e. ambiguous status in a relation, and in designed environment such as unexpected situations which are caused by greeneries in safety islands that block the line of sight of vehicles in their early growing-periods and shifts in perceptions of the paths or streets as they are not surfaces, but instead, they are spaces with constructions on both sides (a surface path with pavements and facades all create a space).

SAMPLE 4:

Kızılay/Ankara (a workshop-project[16]) can explicate this field discussing visually perceptual mass of the signboards on the building facades.

- ***key reasons:***

  for the signboards
  - no simplicity and no order in signboards *(the 'coding' tools)*
  - no grouping for easy notice and no continuation for easy reading *(Gestalt Theory and design principles)*
  - color chaos and imbalance in proportions *(the elements)*

  for the buildings
  - not enough emphasis on the entrances
- ***visual-dimensional-perceptual troubles:***
  - difficulty in finding not only the location but also the entrance of a place (e.g. an office), which one quickly looks for with the help of signboards being almost unnoticeable and chaotic which interrupt both the sights of themselves and the entrances, even that of the buildings.
- ***problematic outcomes:***
  - confusion, dissatisfaction, loss of time, touring around unnecessarily

[16] WIRE2013/Art & Architectural Installation (Department of Architecture in Gazi University)

This project was proposed (by one group in the workshop of which the *author* was a participant of studio1) to provoke the mass of the signboards on the buildings in Kızılay/Ankara.
Details of the projects are held on the webpage:
http://www.hochschule-bochum.de/fileadmin/media/fb_a/Gatermann/studio-1/studio-1.html


**Figure 1.12**: Buildings with signboards (left) and the same buildings without (right) signboards (The photos in Figure 1.12 are taken (left) and re-edited (right) by *the partners* of studio1 to show the differences in visuality and in perception of the buildings with/out signboards.See Footnote 16)

To sum up, it could be concluded that the concept of mental fictions (the concept here is the idea of 'signboard' that signs a place as visible and noticeable) would be unsuccessful and their representations (the real environment, Kızılay) would be unsatisfactory. Owing to the fact that there are disappointing the mind and reality in space-time relations, the communication between the cognitive processes of the brain and the design processes of environment; in other words, between the human beings and their experiential lives, is interrupted or blocked.

*Therefore, the problem of the study could be proposed that designs and designed environments whose conceptual fictions and re-presentations are not holistic in the mind and reality (dimensional realm) and are not correlated with each other, as a result, cause perceptual troubles and affect experiential-daily lives of human beings adversely; in brief, inconsistency between conceptual fictions and re-presentations and among dimensional realms of any designs.*

## 1.2 The Hypothesis

Due to being relevant to design process and visual perception, those problematic troubles could be alleviated possibly by means of utilization of design principles which conduct the process of visual perception performed in the mind both cognitively and respectfully. In addition to 'design principles', 'design elements' and 'design tools' could assist this alleviation during both conceptual (in mind; designing) and representational (in reality; transferring and transposing) design processes. Considerably, concentrations on '***the principles, elements and tools***'[17] is greatly indispensible and determinant in controlling not only design but also visual perception, and in alleviating visual-dimensional-perceptual troubles within the design process considering cognition.

If the design principles, elements and tools are utilized for a design *properly*$_{b1}$[18], *sufficiently*$_{b2}$[19] and *inter-relatedly*$_{b}$[20] by taking into account Gestalt Theory with the act of seeing and perception, any '*holistic*$_A$* final product within *co-relative*$_B$** relations' could be achieved. Those designed final products are defined as visually perceived ***'good Gestalt'*** [21] and they are formed as '*order*$_{a1}$ed patterns with a sense of *balance*$_a$ and a level of satisfactory *simplicity*$_{a2}$'. Moreover, they are qualified with being visually perceived in *consistency with their conceptual-mental fictions*, which means that they are compatible with all outer and inner stimuli. In consequence, both cognitive (vital and experiential) needs, plainly *mental satisfaction*, would be met and the *communications between human and its environment* would be improved.

---

[17] Design Parameters: design principles, design elements, design tools

[18] In ordered and hierarchically arranged way of patterning process

[19] In balanced way of forming a whole
Satisfactorily acceptable quality or quantity for particular purpose (here, for the concepts of mental fictions)

[20] Co-relatedly, in co-related way of re-presentational process

(*) (**)Diagrammatic relationship is given as in Figure 1.10:
*Word*$_A$ is related with $w_a$, and $w_a$ with $w_{a1}$ & $w_{a2}$. *Word*$_B$ is related with $w_b$, and $w_b$ with $w_{b1}$ & $w_{b2}$.

[21] Good perception, the law of visual perception: 'Prägnanz'

**Holism** ⟶ requires balance (order and simplicity)

**Co-relation** ⟶ means inter-relation (properness and sufficiency)

*Explicitly, the more designs with qualities of good Gestalt that provide mental satisfaction there would be; the more vital and experiential lives of better quality there would be in human environments.*

## 1.3 The Aim

In order to obtain visually perceived *good* final products, designing with design parameters[22] is strongly required; because, they undertake the control of design processes and visual perception of designs. Correspondingly, this study deals with design processes as well as the act of visual perception. The discourse of this study consisting of 'cognition' and 'design' draws attention to 'the holism' and 'the co-relationship'. It significantly highlights the requirement of 'wholeness and consistency of both cognition and design throughout their processes'.

To get back on the matter, the study explores the answers to the questions of 'whether design parameters affect visual perception of the designs and designed environments, consequently the human lives through (*good*) designs' and 'how this intention could be examined and indicated'. More in depth, the objectives of the study are stated in following two sentences:

- One of them is to investigate the effects of each design principle, element and tool on visual perception in each and every dimensional realm. *(with questionnaire: semantic analysis; close-ended and open-ended questions)*
- The other one is to discuss analytically their effects on alleviating the problems and the consequential results. *(with table/matrix: cluster analysis and Pearson Correlations)*

These investigations and discussions could reveal how they modify 'designs and designed environments' and 'human experiential daily lives'.

[22] Design Principles, Design Elements, and Design Tools

*The main intention of the study is to emphasize not only the significance but also the necessity of utilization of design parameters (regarding cognitive process) and of (good) designs (processes) for the human experiential-daily lives in the field of visual perception. In other words, it aims to examine the relationships between the designs and their visual perceptions in the context of these proposals with respect to the design and cognitive theories.*

## 1.4 The Method

In the views of this discourse, it is almost certain that making a comparison both between a quantity of designs, which are determined concerning their Gestalt quality (a *good* Gestalt or bad/***ill*** [23] Gestalt), and between their constructions, which are differentiated in 'utilization of principles, elements and tools', could present how design parameters would produce *good* gestalt designs and better visual perceptions. Examining the visuality of these designs in the matter of human perceptions through questioning and interviewing with laymen and experts contributes to the survey.

Therefore, the most logical method would be to make a verbal-visual experiential survey including control and experiential groups of samples, which are preferred concerning their different features and facilities in the matter of design parameters: principles, elements, tools; and the proposals. Throughout this survey, it would be easy to present differences in the level of gestalt qualities (visual perception) of designed environments with visual-dimensional-perceptual troubles.

In brief, it is expected from the survey to confirm that design parameters could generate, reinforce and develop the designs as long as they are *interrelated* and *holistic*, and to mention more about experiential-life relationship with designed environments, about conceptual fictions of designs and their compatibility with design parameters and dimensional realms.

[23] The term 'ill' proposed by K. Koffka and the antonym of 'Good Gestalt': good perception

*Consequently, not only the significance but also the necessity of 'design processes', through the utilization of design principles, elements, and tools properly, sufficiently, inter-relatedly within simplicity and order which generates any holistic final product (design) with co-relative relations, would be emphasized in the field of visual perception.*

## 1.5 The Scheme of the Study

The scheme of the study attempts to gather the chapters which are separated regarding their subject matters of this study (topic of the study[24]). Hence, the chapters are integrated in sequence of 'the introduction', the body including 'theoretical framework' and 'the survey', and at the end 'the conclusion'.

The first chapter included brief information about the study and its subjects. The problem of the study was defined and justified with related samples. In this context, some proposals aiming the alleviation of the problem were hypothesized and correspondingly, methods were determined to examine the proposals.

Theoretical framework, which follows introduction, will embody the related subjects and the explanatory descriptions in three parts (subtitles). The first part, 'the definitions of the terms' of 'concept', 'fiction', 'transfer and transposition' and 're/presentation' will be given in order to provide basic knowledge for this study. The second part, 'the cognitive process' of the mind will be written in order to express how 'perception' and 'imaging or visualizing' work and how the brain produces designs by 'problem solving'. The third part, 'the design process' with 'the design principles, elements and tools' will be illuminated to discover how this process could be conducted and be controlled respectfully by the cognition.

The survey chapter, which follows theoretical framework, will focus on the experiential survey in detail explaining the methods and the analyses together.

[24] *'Visual perceptions of designs: (in)consistencies in design processes from the mind into reality'*

This chapter will discuss the survey in these contexts:

- the scope (subjects),
- the research tool (preparation, decisions),
- the methods,
- the sequential steps and the process of the survey,
- the analyses (results, evaluations, interpretations and discussions).

The final chapter will involve a brief summary of the study reminding the problems, the hypothesis, and the aims again, discussing the survey with the results, and making contributions and suggestions for further researches.

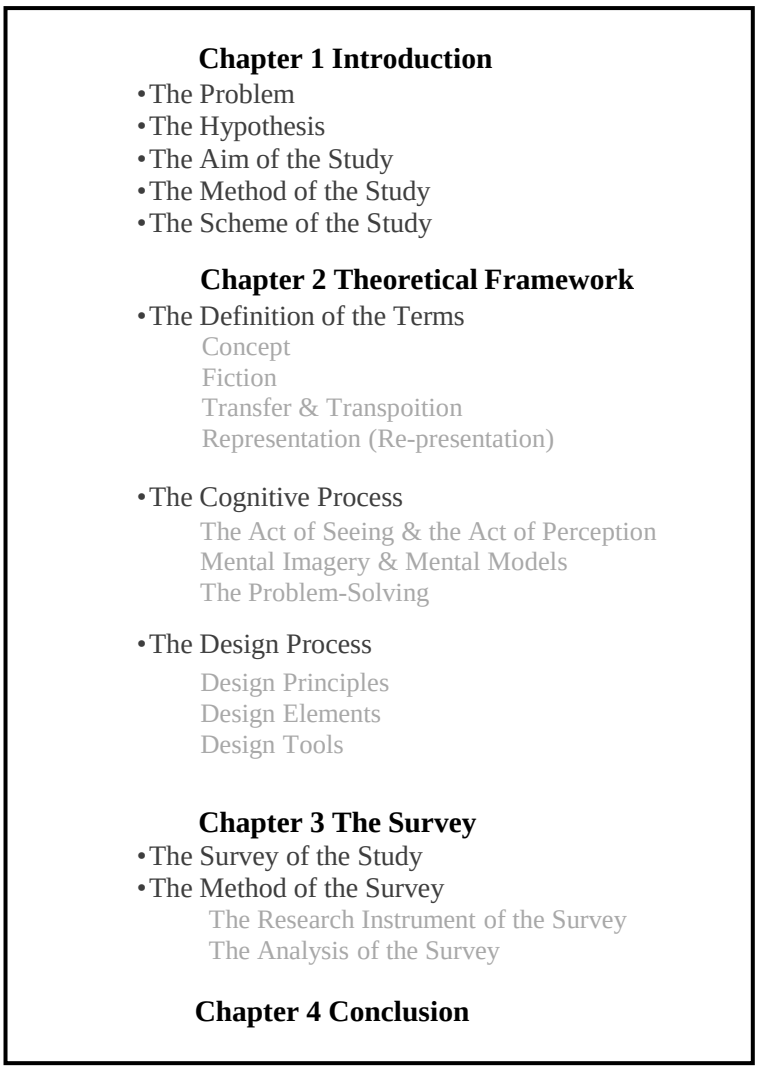



**Figure 1.13**: The outline of the study

# CHAPTER 2

# THEORETICAL FRAMEWORK

*"When it comes to human vision, it is clearly not possible to reach ... itemizing individual experiences. Abstractions are needed."*
(Spillmann & Werner, 1990, p. 5)

This chapter draws a 'theoretical framework' for the study. This theoretical framework aims to clarify what the related terms of 'the cognitive process' and 'the design process' are, and to construct an interrelationship between 'visual perception/cognition' and 'design process/design parameters' within the context and the scope of the study.

At a first stage, the chapter focuses on the thematic terms of this study which would instruct what the study mentions about: the terms 'concept', 'fiction', 'transfer and transposition' and 're/presentation'; and would define them within the context of the study. This makes the study context be enriched and reinforced, and the proposals be supported and improved.

At a second stage, the chapter continues with the theories and the processes, which would be detailed with relevant to the thematic terms. The content, 'cognitive processes and design processes', would be explained with literature reviews; consequently, the study collated within its contextual framework would introduce preliminary information about the study and for next chapter: Chapter 3 The survey.

## 2.1 The Definitions of the Terms

### 2.1.1 Concept

- plan or intention and idea or invention (Oxford Dictionary)
- illustrative organization around a theme, conceiving in mind (Thesaurus)
- mental representation (Representational Theory of Mind), ability of thought, or abstract objects (Platonist Theory of Mind), and theoretic structures (Stanford Encyclopedia of Philosophy)

In addition to the lexicographic meanings, there are several other means for the ontological definitions of the term 'concept' as Alberto Marradi (2012) refers some explicit citations given previously by:

- J. Locke (1690) denotes his thought about the term describing it as '*idea*' with a meaning of "mirror image of things" being "a process of abstraction in which only the relevant elements are retained".
- D. Hume (1748), who adopted a Scholastic position, upholds the statement, "Ideas are nothing but copies of ... sense impressions" as "*continuum"* of examinations.
- I. Kant (1781) emphasizes Locke's stance and states that '*selected elements*' are "not common in themselves, but are made common by the mind itself in its activity", in the field of categorization[25].
- J. S. Mill (1843) has a notion which denotes that "concepts represent and symbolize in large classes of facts" (1900s) and defines that 'concept' is "not built from the mind out of its own materials [but rather] is obtained by abstraction from the facts".
- H. G. Blumer (1931) confirms Einstein's attitudes toward 'concept' which means "free creation of the human intellect" and he proposes that the "essential nature consists in transcending the level of perception".
- G. Sartori (1984) affirms, "Concepts are the fundamental units of thought".

[25] Kant defines 'concept' as '*categories'* which are conformed by perception. It is not actually 'classifications' but rather 'generalizations' or 'simplifications' of objects, called '*active species of re-presentation*': Concept generates rules to perceive general relations between re-presentations.

To summarize, according to the philosophical definitions, previously explained, 'concept is abstractly created imageries of things, especially the thoughts and the ideas which are constructed not only by the experiences but mainly by the mind activity in the brain'. However, this study proposes that *'concept', being a part of the cognitive process, is briefly visually formed or shaped (Gestalt) ideas since it offers 'creative thinking' and 'idea-lly solving for a problem'*.

In views of these aspects, 'concept', probably described as 'goal-orientat(ion)ed problem solving' (here, goals are targeted to reality), inevitably requests to be goaled with the fictions (to be solved for the problems) concerning to 'conceptual-mental fiction'. Needed further explanations, 'conceptualized-mental fiction'[26] could be structured as 'fictions which are patterned over the ideas of mental imageries (collaged with componential segments of images)'; in short, as *design ideas*. Consequently, concept not only re-creates or originates the fictions but also produces the re-presentations of these fictions in wholly co-related way, which strengthens mutual relationships of the fictions with their concepts and with any re-presentational segments (*the parts*) of the fictions (*the whole*).

Therefore, 'concept characterizes fictions' contributing such features as simply ordered patterns, which could alleviate perceptual trouble in reality. If there is consistency between the mind and reality, between the fictions and the representations, or between imaging/visualization and normal seeing, any conceptual-mental fiction could turn into (defined as) *good* gestalt design and designed environments without troubles, respectively. Otherwise, reality would face problems as mentioned in Chapter 1 and their experiential-daily lives would face to yield or fall. With the words of Smith & Kosslyn (2007), "Many real world situations represent ill-defined problems, in which there are no clearly defined initial or goal states, and the types of operations[27] that are used to reach a goal not highly constrained by rules" (p. 415).

[26] *kavramsallaştırılmış zihni kurgular, fikri belirlenmiş tasarımlar, çözüme yönelmiş problemler*

[27] The quality of 'concept': the generating and controlling system of 'fiction'

### 2.1.2 Fiction

- montage of segments (parts), like mosaics [28]
- design and description of an imagery situation (Oxford Dictionary)
- the act of inventing and imaging and assumption [29] (Thesaurus)

Short meanings of 'fiction' indicate that it relates to the act of design quite well because it is qualified with an identity which attempts to describe and narrate how a design should be, look like, and so on. Correspondingly, 'fiction' could be considered as a visual "scenario[30]... [which is seen as] ... combination of design representation", according to Sutcliffe (2010). Explicitly, a fiction could be a drama or an instant frame of this drama, which stands alike with the whole-part relationship. This means fiction re-presents its concept narrating it in a descriptive way. When compared fictions with scenarios since they are composed of frame by frame, scene by scene, it could be supposed that fictions have co-related or serial frames or scenes of a unified whole, similarly. These frames and imageries of the concepts, or representations of the final products, or "vivid illustration of real-life problems", could be resembled each other (Sutcliffe, 2010, p. 39). In other words, concepts are such predictions or pre-conditions of their fictions that conceptual fictions are pioneers of the representations and even of the final products (designs). In fact, a fiction seems 'the act of design/ing' for the solutions to a problem. Therefore, it can be improved mentally by creative thinking. To sum up, Peuguet underlines that the mind unites parts "through the construction of mental imagery", as in the sample of counting the rooms with a mental walkthrough while answering the question of "how many rooms are in your house", and he continues with explications:

> ... some visual images ... are images that we mentally generate and manipulate to solve problems and to deal with novel

[28] The term mosaic is inspired from Roman Mosaics by Max Wertheimer. It was used by Gestalt Psychologists by means of which it, in perceptual process, directs grouping and figure-ground identifications, which control the dimensional differentiations.
It could be re-evaluated in the study as a 'generating systematization'.

[29] It could be proposed as internalized seeing, produced by cognitive process and used in designing.

[30] Applied as a tool of design process

> situations. For example, people use this type of visualization in everyday life to 'see' how the living room would look if the furniture were rearranged in a new way, to give directions, or to plan a road trip by, in part, imagining what sight they want to see along the way. This is also the type of imagery that architects, engineers, and mathematicians use an essential tool in creative thought. (Peuguet, 2002, pp. 118-119)

### 2.1.3 Transfer and Transposition

- transfer
  - moving from one place to another [31]
  - copy into another [32]
- transposition
  - transform into[33]
  - intercommunication[34]

As previously mentioned, any design activity launches in the brain with conceptual-mental fictions and continues with their projections in real dimensional realms. The former status of this design is quite abstract; as a result, they could not give any impressions of concreteness of it in reality. In that case, to make the former status in sight with real-effected renders is a provision. It is highly possible to provide this provision with both 'transfer', which reifies the conceptual fictions, and 'transposition', which enables their designs to be formed or be finalized. In other words, while transfer undertakes the task of projecting from the mind to reality, transposition controls the inter-communications in reality. Throughout these projecting processes, 'transfer and transposition' implement the rules of 'graphic communication' with assists to 'design tools'[35] such as sketches,

[31] It refers to moving from 'mind' to 'reality', *from mental world to dimensional realm*.

[32] It refers to 'project by the tools through the re-presentation'.

[33] Changes among the dimensional realms: from bi-dimension into trio-dimension and/or into forth

[34] Interchanges among mutual relations of design parameters and of the re-presentations

[35] See page 53: The Section 2.3.3 Design Tools

technical and professional drawings, models, photographs, collages, diagrams to present the conceptual fictions from original layouts to their productions (constructions), by which 2D and 3D visual materials (design elements) are directed.

SAMPLE 5:

If a mental fiction of a house in countryside for five people family is imagined, the house might be conceptualized with descriptive features and narrated as a traditionally patterned cottage whose attic is allowed under its pitched roofs, with a saloon-like apart in open back-courtyard attached on one side of.

To start with sketching basic forms of prisms for a pitched roof house is properly sufficient for transferring the conceptual-mental fiction into reality. Drafting and detailing on sketches, the design begins to be modified into its final state. With technical drawings and renders, it is precisely and consistently re-presented for its construction. Transposition of the conceptual fiction, including all these phases, improves actual formation of the conceptual design within mutual relations among the re-presentations by the feedbacks of them: sketches, drafts, drawings, modeling, and renders.

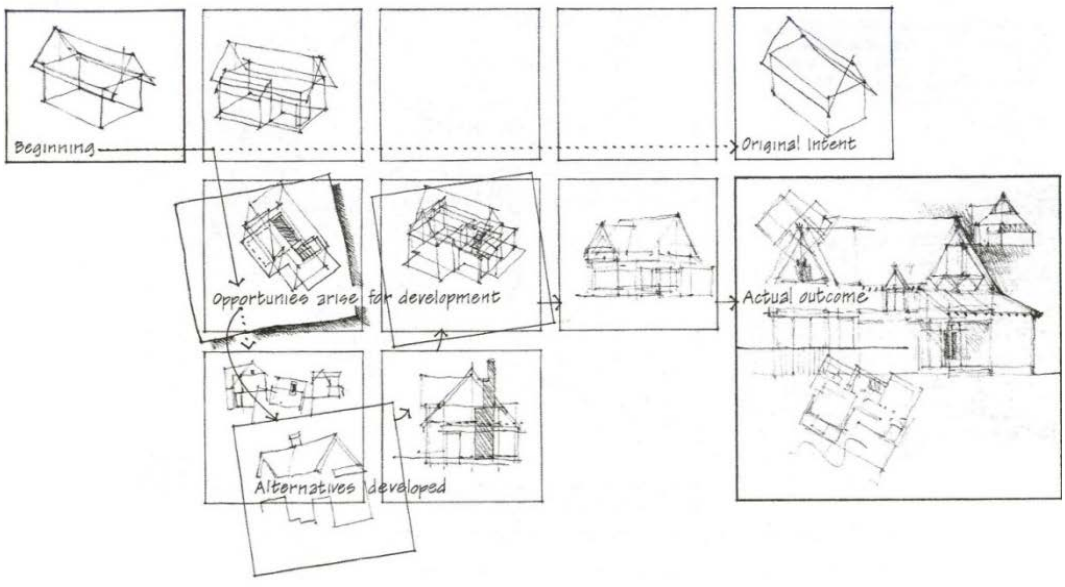



**Figure 2.1**: A design process; re-presentational process (transfer and transposition)
(Source: Ching F. D., 1990, p. 189)

### 2.1.4 Representation (Re-presentation)

Representation primarily means ‘to re-presenting’ something, or else ‘to re-existence’ of it in particular way. It is a mental state of describing what is being presented again and being re-built as its replicas. That is why, it constructs a communication towards the “real product”; even, it carries characteristic phases of the “designed entity”: properties, qualities, descriptions (Goldschmidt & Porter, 2004). Taking this into account, conceptual-mental fiction (the proposal of this study), could be intended as designed entities of a real (final) product. Furthermore, ‘the designed entity’ is first *transferred in the mind into dimensional realms*, second *transposed outer of the mind in reality*, and finally completed as ‘real product’. In these multiphase series of imaging, transferring and transposing, representations need to be consistent with previous and following ones during the process of forming holistic patterns, so that the real (final) products would be existed in real environment as vivid copies (replicas) of conceptual-mental fictions.

Penny Yates (2004, Design Representation) states, “Representation in design process is a visual testing of the results of this conceptual process”, and this intensifies the significance of feedbacks, so the consistency (Goldschmidt & Porter, 2004, p. 4). Deductively, re/presentations could control the final products (designs) and be controlled repeatedly by the conceptual-mental fictions and the design principles, elements and tools. Therefore, “visual representation ... can be used to envision” the design to be documented and clarified, as Schaller (1997, The Art of Architectural Drawing: Imagination and Technique) expresses (Çıkış & Ek, 2010). In addition to his states, Piaget notifies that “what is the role of representation seems vital at first” (The origins of intellegence in children, 1952, p. 350). He adds (1952) that re/presentation is quite important for the act of design since it plays a creative role in *simplification* of visualizations, which consists of simply *inter-combinations* (pp. 350-352). What is more, re/presentations “form ... external memory which can store information about the design by similarity” (Poelman & Keyson, 2008, p. 22). Concisely, re/presentations could be ‘internal’, which is engendered in the mind, and ‘external’, which is constructed physically

in real environment. For example, while fictions could be assumed as the internal representations of the concepts, the external re/presentations could be assumed as the real products of the fictions. On the contrary to the internal ones, “external representations” are cognitively facilitated to ensure the consistency and patterning between conceptual-mental fictions and final product in entire processes of transferring and transposing (Poelman & Keyson, 2008). The empowerment of the representations is principally developed by the (specific) techniques and different design tools such as imagining, sketching, conventional drawing, computational drawing, concrete or digital modeling, constructing, structure, film, photographing, or collage. To conclude, design languages are converted from abstract visuals into concrete constructions.

## 2.2 The Cognitive Process

### Cognition

- become acquainted with (Oxford Dictionary)
- understanding the thought processes (Thesaurus)
- concerned with internal mental states (Psychology Dictionary)

Cognition is ‘the mental process or faculty of knowing, including aspects such as awareness, perception, reasoning, and judgment’ (The American Heritage College Dictionary) and it includes,

> ... all processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used. It is concerned with these processes even when they operate in the absence of relevant stimulation, as in images and hallucinations... Given such a sweeping definition, it is apparent that cognition is involved in everything a human being might possibly do... . (Neisser, Cognitive psychology, 1967, p. 4)

Thereupon, cognitive science deals with mental activities such as to perceive, to think, to remember, and to react, with their developments, interactions and influences. To attention to those mental activities, cognitive processes of

'*perceiving*', '*interpreting*', and '*thinking*' are adopted to the study sequentially with the processes of

- seeing and perception,
- imaging and visualizations,
- problem solving and design/ing

To go further into the context, cognition (and reliant to the neuroscience) contains the contents of "understanding the neurons as a system and explaining the communication between neurons" (Posner & Raichle, 1997, p. 11). Furthermore, cognitive process holds the neurotic inter-disciplines, which could be rather difficult to be certainly proven. Nevertheless, there are some ways to express how this process is conducted. For instance[36], while watching a dram, any person can predict the end of the dram from the first act, and while listening an unknown melody for the first time, any other person can desire its continuation towards the end when it is stopped suddenly (Koffka, Zihni inkişafın esasları, 1954, p. 71). Similarly, while reading a piece in a novel, one visualizes characters akin to alive models with help of the narrations however while watching the movie of this novel, it is ended in disappointments if the actor does not fit this mental image (Posner & Raichle, 1997, p. 1).

Under those circumstances, the cognitive process and instances could be associated with the study matter, the keys[37] of the problem. For example, a situation can cognitively generate a concept in order to face or act for it. Moreover, this concept tends to conceive the related fictions concentrating on the inputs of this situation such as characters, parts, frame so that the fictions could be collaged as visual scenarios. The instance 'predicting the end' (previously cited), implies a continuation of screens (the parts) to a *well-defined* complete dram (the whole).

[36] "*Bir dram seyrederken, insan birinci sahneden itibaren korkunç bir şeyin cereyan edeceğini hisseder, (...) tanımadığımız bir melodiyi ilk defa olarak dinlerken, çalan adam birdenbire durduğu takdirde, melodinin devam etmesi lazım geldiği hakkında bizde vazıh bir intiba uyandırır.*"

Koffka, K. and Tavlan, S. (n.d.). *Zihni inkişafın esasları.* (S. Tavlan, Trans.) İstanbul: Hüsnütabiat Matbaası, 1954. Translated into English from Turkish translations and re-narrated.

[37] See page 9: Chapter1 and Footnote 13

Another one, ‘in stopped melody’, meaning the feeling of finish, identifies a enclosed entity not only grouping rhythmically related notes (figures) apart from the others but also defining a composition or piece of music (boundary/border) which divides the melody from another. The other one, ‘a movie actor’ is presented with a most similar model (re-presentational figurant) to the character in its inspired novel. Throughout these cognitive processes, mind implements a *simple order* within *co-related relations* among the inputs (for the parts of a situation); consequently, they are *sufficiently* and *properly* in *balanced*.

### 2.2.1 The Act of Seeing and the Act of Perception

#### Perception and Perceptual Process

Perception, a neurophysiologic process of interpretations of external stimuli, which an organism directs, is the capacity of becoming aware of something by senses. Attended by external stimuli, the organism enables to experimenting environment and acting in response (online DictionaryofPsychology). Throughout the cognitive process, organism would be acquired information about the environment in the case of properties, features, elements, relationships; moreover, this information-collection process supports actions such as ‘mental activities’. To sum up, perception is where cognition and reality meet (Neisser, 1976).

#### The Steps in the Perceptual Process

Kendra Cherry, in a webpage, instructs about perceptual process from her book ‘The Everything Psychology Book: An Introductory Guide to The Science of Human Behaviour’ that perception is a set of sequenced-stepped process which starts with the collection of stimuli from the environment through the action for response (Biopsychology, n.d.):

**1st.** The Environmental Stimulus
**2nd.** The Attended Stimulus
**3rd.** The Image on the Retina
**4th.** Transduction
**5th.** Neural Processing
**6th.** Perception
**7th.** Recognition
**8th.** Action

Taking the study, which concentrates on 'visuality' and visual perception of 'designs', into consideration, perceptual process need to be considered. Concisely, the process can be explained with the words of Cherry (Biopsychology, n.d.):

- Everything in the environment spreads '*environmental stimulus*' with whose interplays, '*attended stimulus*', are built forming '*an image on the retina*' of an organism. The retinal, structures of rods and cones associated with colors and shapes (design elements), turn the light into visual signals or else electrical signals. At that time, '*transduction*', transformation process of the image on the retina into electrical signals, begins to run. This process provides the visual messages to be transmitted to the brain for their interpretation by the '*neural processing*'. Neural processing builds a path controlled by the interactions and the interconnections between the neurons of sense organs and the brain. The backside of the brain, occipital lobe[38], is the place that the visual signals are converted into visual images. The virtual existence of these copy mirror images[39], which match with the originals in this environment, is become after neural phases which carry the image through the brain. It is the moment of being aware of what has been seen. It is the attitude of '*perception*', the moment of what has been perceived. These stages ease to be aware of and experience[40] the (outer) environment and to respond with an '*action*' born in the organism (inner environment). In the end, the perceived things are given with a meaning (coding into hierarchically ordered presents) which allows, then, both acknowledgement of the existing and apperception of identified (perceived) ones; in other words, '*recognition*'[41].

In view of summarized information by Cherry about the perceptual processes, it could be assumed that the mental fictions[42] are respond actions of their concepts,

[38] See page 39: Figure 2.7 (V1 & V2 areas)

[39] In the middle age, it was taught as a mean for 'concept': 'idea'.

[40] It is re-assigned as not 'a practise', but as 'a slice of a life or course of existence', for the study.

[41] It is re-assigned as 're-visualization or imagining', for the study.

[42] See page 24: The Section 2.1.2 Fiction

and the designs as the respond actions of the mental fictions. In other words, if the concepts are considered as 'internal perception' of the mental fictions, all representations of them could be re-thought as their actions in space and time.

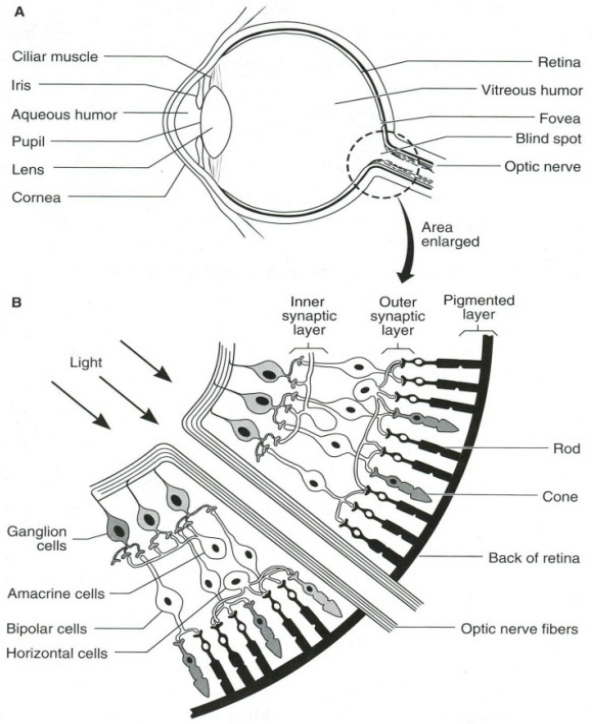



**Figure 2.2**: The structure of a human eye (A)
The retina: rods and cones, and other neurons (B)
(Source: Ashcraft, 2006, p. 7)

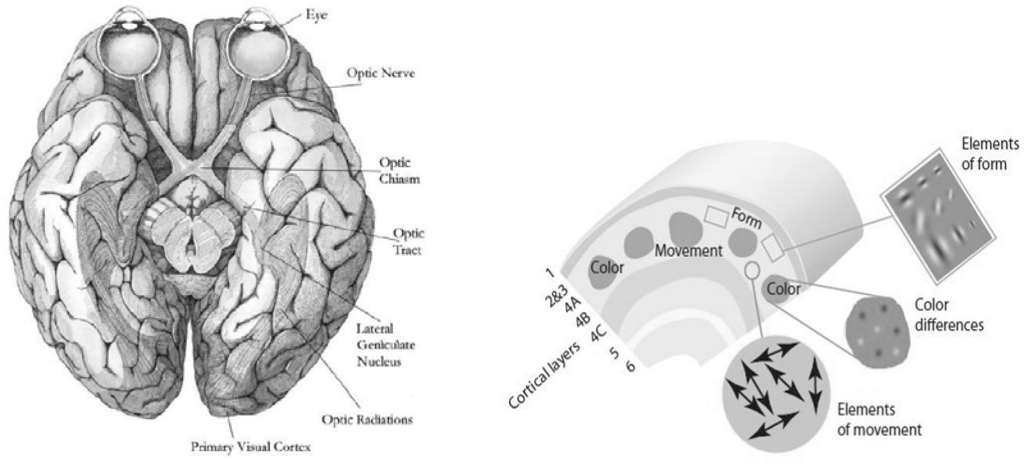



**Figure 2.3**: Left: A brain from beneath; the path of seeing and perception from eyes to cortex
Right: A fold of the primary visual cortex and the place of entire image process
(Source [*edited into grayscale*]: Colin, 2008, pp. 24-25)

Bottom-Up and Top-Down

The visual perceptual process depends on two other phases (Colin, 2008):

- **Bottom-up** (pre-conception) is of an approach to a problem that begins with details and works up to the highest conceptual level (Thesaurus), *asking for a solution, growing a solid re-presentation pieces by pieces, visuo-perceiving, drafting with basic elements, etc...*
- **Top-down** (local interaction) is of an approach to a problem that begins at the highest conceptual level and works down to the details (Thesaurus), *having an idea or a solution, generating images with learnt and background knowledge, interpreting, outlining, attending and expecting, etc...*

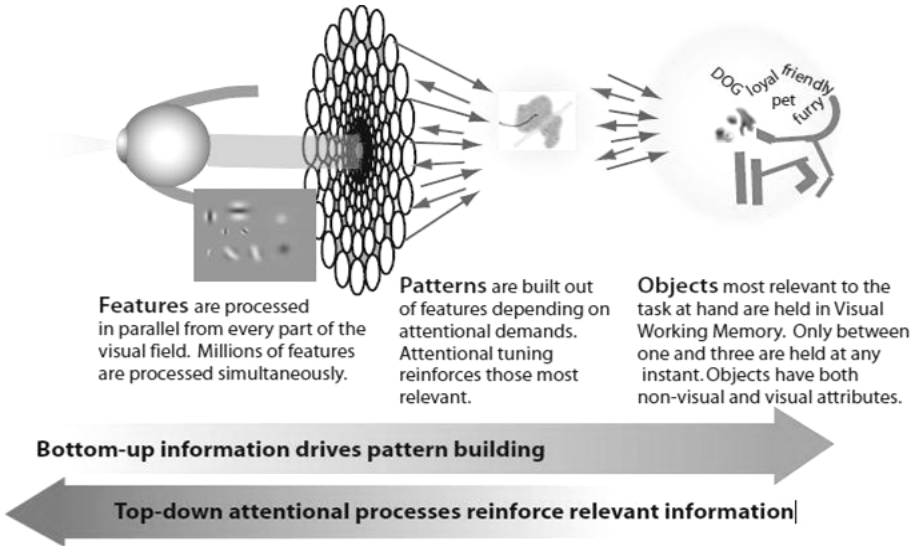



**Figure 2.4**: Bottom-up and top-down processes
(Source [*edited into grayscale*]: Colin, 2008, p. 9)

Colin (2008) informs about bottom-up process as, "Information is successively selected and filtered [with an *order* or in *co-relation*] so that meaningless pieces in the first stage form into patterns ... and meaningful objects in the third stage" (p. 10). Consequently, he explains the forming-pattern stage that the pieces or *the parts* are constructed into *patterns*, which are derived from the continuations of the contours in visual spaces and the visual spaces become organized as *a whole* so that its parts could be linked, *grouped* or *separated*. In conclusion, he notifies

that bottom-up puts emphasis on the 'edges, contours, depth, shape, form, silhouette, and so on', which sound like 'design elements'. These are low-level features (rather than high-level) or components/parts of an image operated within a system towards the whole, both[43] of which are image processing in the act of seeing and perceiving. All these considered, *design theories and parameters come into prominence since design elements include low-level features, or components; and design principles define rules, or systems, for them and re-operate to the whole; and design tools depict re-presenting the whole concretely in reality*.

At the end of the bottom-up processes, those organizations have formed in their patterned visuality; on the other hand, patterning could be a product of thinking, or problem solving. As Colin (2008) explicates, "Often to see a pattern is to find a solution to a problem", which means "seeing the path to the door tells us how to get out of the room, and that path is essentially a kind of visual pattern" (p. 12). In contrast to bottom-up, top-down conducts in opposite direction. It means top-down sends signals of the visual information back down to the nonvisual ones in each stage of bottom-up, which constructs sub-levels collecting details because

> Top-down processes are driven by the need to accomplish some goal. This might be an action, such as reaching out and grasping a teacup or exiting a room. It might be a cognitive goal ... There is also a constant priming of action plans (so that if we have to act, we are ready) ... . (Colin, 2008, p. 12)

In brief, this two-way (mutual) system controls the relationships (or consistency) between up (*the whole*) and down (*the parts*) during thinking, problem solving, visualizing, and designing even if these two processes could not work together or one of them could be dominant over the other. However, it could be deducted that if they work together, information and/of patterns could be finalized in or designed as better gestalt. In conclusion, it is replicated in any design process between conceptual fictions and visualization of them (presentation in the mind).

[43] For example: Climate is a high level description of the actions of the atmosphere and oceans (physics of water and gas molecules is a low level description of the same system), or The instruction 'write a poem on love' is a high level instruction (the instruction 'tighten the tendons in the dominant wrist to grip the pan' is a low level description of an activity within that). (Wikipedia)

What is more, Colin (2008) categorizes two-dimensional and three-dimensional re-presentations concerning their easy-perceivable and patterning characters. First, he points the contours in 2D, which make the objects be well-defined separating them from others in near environment, and second, he emphasizes on basic components of 3D objects, the sum of whose unites them (2008). It could be comprehended that contours define objects or components of these objects, named ***Geon***[44], and these Geons come together "with a description of the way they are connected- a kind of structural skeleton" to unite the objects (Colin, 2008, pp. 110-111). To sum up, the mind prefers *simpler and ordered patterns* for wholes.

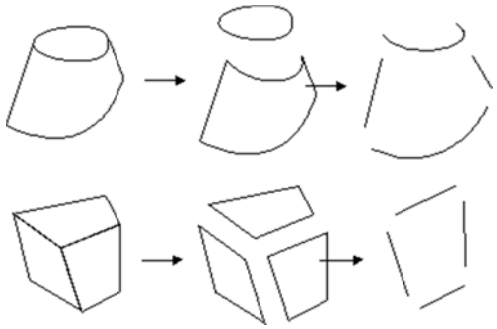


**Figure 2.5**: 2D expressions of 3D objects: Geon components (Contour; grouping and separations)
**(**Source: Yin, GIRG)

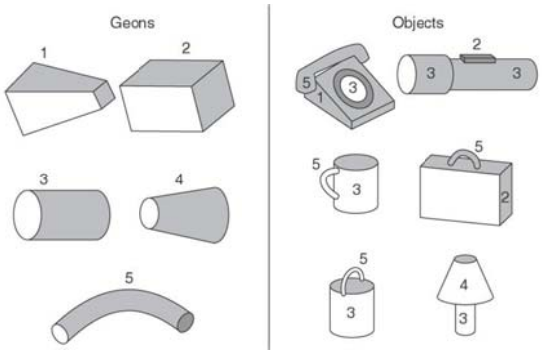



**Figure 2.6**: Geon components and the objects
(Source [*edited into grayscale*]: Smith & Kosslyn, 2007, p. 106)

[44] Geon components are defined with the Geon Theory, which is proposed by Irviny Biederman in the late twenties as being a generating system of the objects for their definitions. Here, the Geon components are 'three-dimensional structural components'. In this theory, the connections are the most important basis for the montage of parts through their whole. In the study, it could be helpful to sample the *keys* of **'simplicity'** and **'hierarchical system (order)'** in the case of the compositions of these basic forms through their **'interrelations'**.

In addition to Irviny Biederman's Geon Theory, David Marr's Computational Theory of Vision (Vision, 1982) proposes three levels of 'representation'[45] on the vision task of deriving shape information from images, which focus on detecting the leading elements of the act of perception and/of representations. Similarly, the elements of design processes are categorized in three (Kitcher, 1988, pp. 3-11):

- primal sketch

  (which means 'geometrical organization' and refers to design elements such as edge, boundary, virtual line, group, position, orientation, scale, etc. )

- 2.5 sketch

  (which means 'orientation and coordinate frame' and refers to design elements such as depth, contour, surface, distance, etc.)

- 3D model

  (which means 'spatial organization and hierarchical re-presentation' and refers to design elements such as shape, volume, reference-line, arrangement, etc.)

### 2.2.2 Mental Imagery (Mental Models)

To mention beforehand, philosophers, throughout the history, assumed that "mental images are picture like representations similar to that occurring in perception" (Tye, 1991, p. 11). They are resembled "the faint images" of perceptions because there is difference in "their degrees of force and vivacity" even if they have 'great resembles' in their particular (generation or patterning) features (Hume, 1739/1978, pp. 1-2). However, mental imageries could be described as 'shapes of objects' (Gestalt), or 'preliminarily detailed visions for any real-environment'. To adapt this to the study, mental imagery could be associated with 'conceptual fictions'. With this in mind, mental imagery probably becomes visuality by the formations of mental re-presentations of design ideas and conceptual fictions. It means that mental imageries are patterned with and by

[45] 'Representational Framework for Vision'

The proposals on 'vision task' could matched up with tools mentioned in the Section 2.3.3 Design Tools since these level of representations refer to the Section 2.3.2 Design Elements (the underlined words) according to the explanation.

the concept creating a fictive scenario. Because of the fact that mental imageries are quick and approximate re-presentations or priors to a final product (design), they control design process to goal the aims.

The importance of mental imageries (conceptual-mental fictions, term of the study) could be sampled with emphatic comments of Frank Lloyd Wright about his 'Fallingwater'. He asserts that the design of the building just depends mentally on the fictions, and after the fictions are wholly patterned in the mind, it is ready to appear, to be re-presented, and to be constructed in real space and time. With the discourse, he (1928, Concept and Plan: *The Architectural Record*) focuses on '*visualization*' of "the building in the imagination, not on paper but the mind, thoroughly- before touching paper" and he attaches importance to growing it up mentally, which means "gradually taking more definite form before committing it to the draughting board" (Christensen & Schunn, 2009). F. L. Wright states briefly with his own words:

> ... when the thing lives for you- start to plan it with tools. Not before. To draw during conception or sketch ... is well enough if the conception is clear enough to be firmly held. (Christensen & Schunn, 2009)

To conclude, concepts which suggest 'fiction' by means of how, where, when and conceptual-mental-fictions combined by mental imageries are rather undoubtedly noteworthy for a *good* designing and design processes to attainment of a goal, a *good* design.

**Visualization**

'Visualization' is the act of making something visible to the eye and interpreting in visual term or putting into visible form (online Medline Plus). It is the work of descriptive figure making, and consequently the work of forming 'visual (mental) imagery'. It briefly means, "Seeing in the mind's eye … in the absence of the appropriate external stimuli" (Thomas, 1997) or "[thing] that people formed while they thought" (Colin, 2008, p. 20). In other words, visualization creates 'visual mental images' which could be resembled "*simulation* of perception", just as suggested by Currie in 1995 (Thomas, 1997).

In article, Nigel Thomas (1997) mentions about the role of the imageries not only in memory as Frances Yates (1966) and Allan Paivio (1986) signified but also in motivation as McMahon (1973) assumed, re-stating that the roles are "involved in visuo-spatial reasoning and inventive or creative thought", each of which is a cognition. Explicitly, memory conceives itself as internal background or mentally storage, standing probably by recognition while motivation presents itself as goal-orientation, which intends for a need of a reason to provide something or an interest to act, which reminds action. In other words, motivation implements as a 'thinking process' so that it could encourage the organism to reach the expected results, the goals, for instance, the expected well-designed environments. The construction for the expected (conceptual) environment starts in the mind by visualization of the fictions responding 'visuo-spatial reasoning', 'problem solving' and 'creative thinking', and ends through the processes of transfer and transposition. In other words, it is controlled by the entire design process. In this respect, that is why it is not impossible to resemble the visual mental imageries and the mental fictions in the case of their visual features (borders, contours, depth, figure-ground relation, grouping or holistic totality) since visualizations are the visual forms of goal-oriented concepts, which direct the fictions to reach the goals, or the concepts.

In addition to this resemblance between visual imageries and mental fictions, there should be possible similarity between the act of seeing and the act of perception and visualizations (imageries, internal seeing). Figure 2.7 and Figure 2.8 illustrate that the normal seeing and the imaging result in precisely similar pattern[46] on the cortex. The fMRI images show the similarities of both 'perception' and 'imagery' in the brain areas, for example,

> ... in the parietal lobe area associated with active looking, very similar patterns of brain activation occur whether the person is actually looking at an image or imagining that same image ... (Colin, 2008, p. 150).

[46] It is better to say 'similar' rather than 'the same', because it (seems unproved) may require more fMRI experimental results to prove the alikeness.

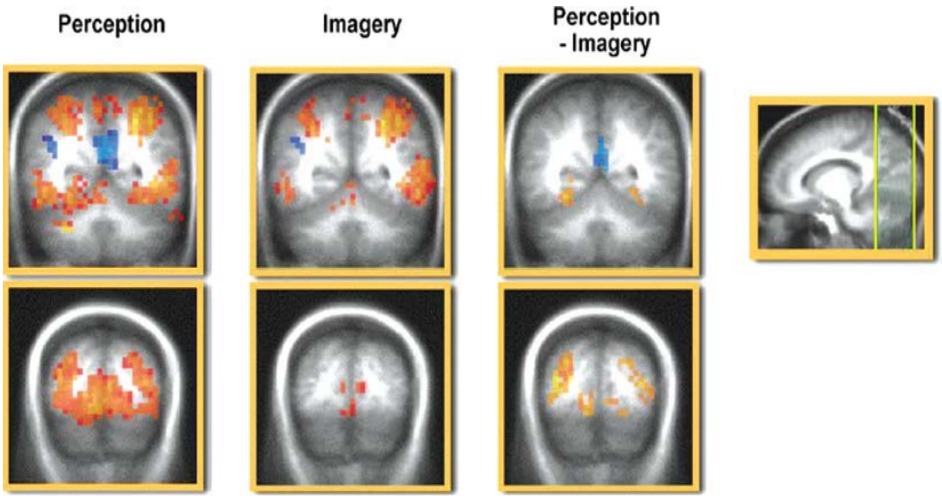



**Figure 2.7**: The fMRI images (the first row presents V2 area, the second row presents V1 area)
(Source: Colin, 2008, p.150)

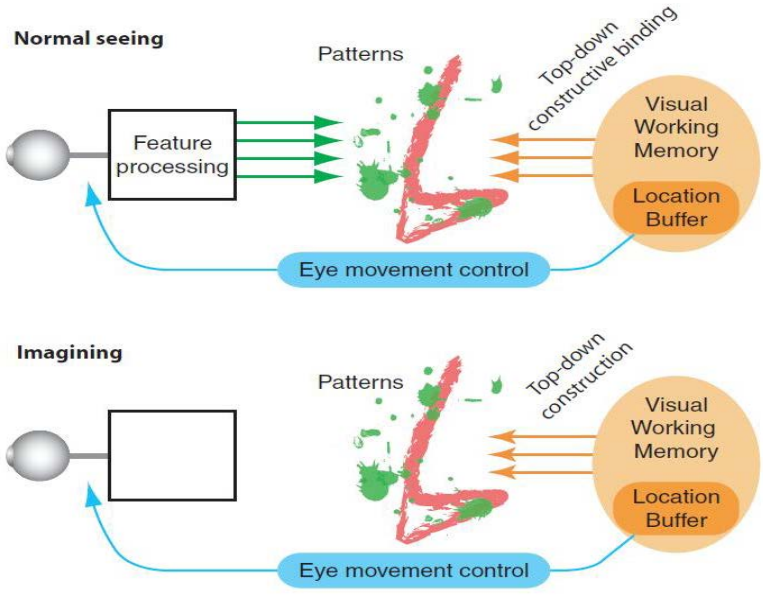



**Figure 2.8**: Normal seeing and imaging
(Source: Colin, 2008, p. 151)

Correspondingly, the imageries (visualizations) are similar to virtual (in mind) photographic pictures of normally seen environments. Therefore, it could be declared that the conceptual-mental fictions need to be consistent with the real-final environment or conceived with their co-relations. Special attention should be

paid to this point because the conceptual-mental fictions are constituted by imaging, and in the end, their re-presentations in real space and time (in constructed environment by design tools) is perceived by normal seeing. It is almost certain that the mental satisfaction will be met, and consequently, the problematic perceptual shifts will be alleviated if the re-presentations in reality are holistic and consistent with the goal, or the conceptual-mental fictions and the visual images.

### 2.2.3 The Problem Solving

'Problem solving' performs a mental process from the existence of a problem through the proposed solutions, including the "*sets of*" stages: *the notice of the problem (perceptually), understanding the problem (with descriptions), re/presenting the problem in memory*, *deciding to undertake the issue (regarding different aspects of the problem), researching the available options,* and *taking actions to achieve goals* (Colin, 2008). The crucial goal of 'problem solving' is to find a solution, which overcomes the issue the best. It should be considered that both understanding the problem in detail, and selecting the appropriate solutions avoid from the mistakes, inconsistencies, failures, dissatisfaction. That is why focusing on 'creativity/motivation thinking' and 'idea or concept' is the best options for problem solving matter because it is "a sudden 'Aha!' reaction" that a concept (solution) comes up with an accurate final product (or problem), which could be cognition (Ashcraft, 2006, p. 326).

Furthermore, the goal-oriented problem solving requires organizations in order to reach a desired solution. First of all, the answer to 'what the problem is' should be enquired so that it could make a path to the solution or to the desired solution which would be the best among all options. Defining the problem precisely helps to form a strategy[47], which defines the rules of solving procedure: how the creative/thinking would be supported during this process, be decided. The strategy

[47] 'Strategy' could be substituted with one of the proposals of the study: 'concept'.

constituted regarding the design theories and parameters works towards the desired solution with getting sufficient attempts. Consequently, problem solving is a cognitive process, which deals with mental thinking and reproductions, or with the Köhler's words, "discovering a relation … [because] ... solution of problems seems always to be a matter of realizing certain new relations" (Köhler, The task of Gestalt psychology, 1969, p. 145). In this respect, problem solving can be put forward as a proposal for 'designing', in brief, being the main part of the cognitive process. Without a doubt, problem solving and design process resemble each other; what is more, a design process is a problem-solving procedure.

## 2.3 The Design Process

### Design and Designing (as a problem solving)

In the study, design processes are associated with cognitive processes since designs together with design parameters spring as artifacts of problem solving, one of the mental activities. The first thing to keep in mind beforehand is that

> As far as the design field is concerned, Gestalt Theory has had two main contributions. The first is that it tried to formulate the rules of visual perception through an analysis of object patterns and groupings, and secondly it has formulated principles of problem solving and creativity. (Günay, 2007, p. 94)

It needs to remind expressions of the terms [48] of the Chapter 1, 'design', 'designing', and 'design process', again. Designing is proposed as productive thinking process (problem-solving), correspondingly, design means its final product in dimensional realms; however, design process refers to the entire process together with the ones both in the mind and in dimensional realms. Explicitly, in the context of a problem re-formulated with well-defined solutions,

> Design ... is the intellectual conception of a manufactured or constructed object prior to its production. Any discussion about how a designer arrives at this concept generally focuses on the relative importance of process versus goal ... Some believe that

[48] See page 7: Footnote 7

> the correct process or method will produce the ideal object; others believe that the designer must somehow know in advance the ideal properties of this object and then seek the means of achieving that ideal. (Goldschmidt & Porter, 2004, p. 4)

In short, Goldschmidt & Porter emphasize on 'concept' for '*ideal*' solution of any design. A conceptual design drafts "an on-going perceptual critique" and it directs how well this design would be achieved by cognitive tasks (Colin, 2008, pp. 160-162). Consequently, designing, "a lengthy process in time", is "as much about the problems as it about creating a solution" (Poelman & Keyson, 2008, p. 20). It could be assumed that designing seems similar to problem solving, being a section of cognitive process, a lot. As Poelman & Keyson (2008) cited the notes of Roozenburg and Eekels (1995), designing is such a process that it performs steps alike the ones in problem-solving process, not only just in sequence "at least once, but most likely many times over" (p. 20). This is a cognitive reasoning process of a conceptual problem, which means that it is a direct process of problem solving and decision-making.

However, design process has some modifications in problem-solving process on behalf of 'patterning'. Additionally, it discovers how this progress could be controlled by the modifications, by design principles, design elements and design tools. *Designs are organized during designing by design tools such as drafting, detailing, technical drawing, rendering and modeling, using the rules of design (Gestalt Theory) principles with reinforcement of design elements.* In other words, concentration on design options, generalization of principles and guidelines, combination of the images, and organization of the re-presentations are needed to create a pattern language for the final product, and for the design.

Based on utilized conceptualization, design process means "continual process of selecting and organizing elements" (Tunstall, 2006, p. 25), or "inspiration, conceptualization, exploration or refinement, definition or modeling, communication and production" (Aspelund, 2006, pp. 3-4). In the respect of the study, definitive words of Aspelund could subsequently match with the words: fiction, concept, visualization/imagery, transfer and transposition, re-presentation

of final product. It could be summarized that the formation of conceptual-mental fictions, with movements of thinking of solutions, grows essentially in the mind until being ready for real space and time. Consequently, it comes closer to the final state for its construction, with re-presentations in the re-thinking (feedbacks or critics) and re-drawing processes.

The act of problem-solving or decision-making as a design process and the act of seeing and perceiving as a cognitive process resemble each other, work similarly and they overlap in particular points. It could probably be assumed that this patterning of a design process could be re-interpreted[49] by the language of 'visual perception' with respect to 'the act of seeing and the act of perception'[50]:

- In the process of seeing, which starts on the retina of the eye, the objects begin to appear with their contours. Contours (near lines) create enclosed-system collecting edges and corners, through the *good-continuation* of borders. This closure forms the shapes in two-dimension. Subsequently, with contributions of shadows or colors occurred by lighting, the forms become visible as constructions in three-dimension, characterizing themselves qualitatively and quantitatively. The characters of the shapes and the forms, which are empowered regarding their locations and orientations as well as the proportions, make them be grouped together and be separated from each other *orderly*. The relationships between their *proximity, similarity, common fate, grouping* and *separating* move some of the shapes or forms perceptually to forward (as figure) and others to the back (as background). These figure-grounds (also solids and voids for 3D realms) construct *patterns* which mean *ordered* organizations within the whole-part relationship. Consequently, the patterns (organizations) composed by the rules (design principles) of characteristics (design elements and tools) are seen and perceived as copies or replicas (re-presentations of the real and the conceptual fiction) in dimensional realms.

[49] This explanation is composed of the expressions of Colin and Köhler
See also: Colin (2008, Visual Thinking for Design) and Köhler (1940, Dynamics in Psychology)

[50] See page 30: The Section 2.2.1 The Act of Seeing and the Act of Perception

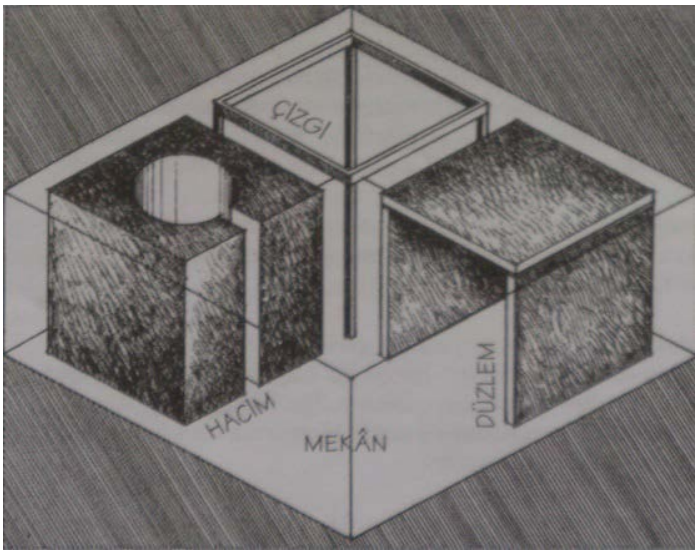



**Figure 2.9**: The generation of the space and time from 1D to 2D, 3D and 4D
(from line to surface, volume, the space and time)
(çizgi is *line*; düzlem is *plane*; hacim is *volume*; and mekan is *space*.)
(Source: Ching, 2004, p. 23)

### The Whole-Part Relationship (Gestalt and Patterning)

Designing is survived with the whole-part relationship since the perception of the design tends to make the parts communicate with each other through this relationship. This point needs further explanations about the design principles (Gestalt) and the whole-part relationships (patterning), and it could be said that the principles pattern the parts through the whole by means of the whole-part relationship.

According to Köhler (1969), as he recites his own statement (1929), " [Gestalt] has the meaning of a concrete individual and characteristic entity, existing as something detached and having a shape or form as one of its attributes" (p. 682). "A Gestalt is therefore a product of organization, organization the process that leads to a gestalt", and in this process of organization, as Wertheimer (1925) designates, "what happens to a part of the whole, is determined by intrinsic laws inherent in this whole" (Köhler, The task of Gestalt psychology, 1969, pp. 682-683). This law provides the parts to be organized in the whole and the whole gains the character of structuring unity. Gestalt (with its principles), relevant to the matter of vision and visual perception, prepares unitary forms (parts and wholes)

with the help of perceptual organizations. What is more, organization structures a balanced order with equilibriums of inner (whole) forces. Correspondingly, the whole-part relationships could be clarified with the perception of process of patterning constructed by design principles and elements:

> Visual fields tend to be clearly organized in the sense that they contain objects with well-defined boundaries. These objects again tend to appear as parts of larger organizations which we call groups. Proximity and similarity of objects, for instance, are factors which facilitate the organization of objects in group-units. (Köhler, Dynamics in psychology, 1940, p. 44)

These proximity and similarity between boundaries of objects generate connections (continuation) or patterning since

> ... objects appear in the visual field only if their boundaries are visually preserved. Consequently, the processes which make visual objects emerge in the field are just as much processes which establish certain separations, separations of visual units, as they are processes which make objects unitary entities. (Köhler, The task of Gestalt psychology, 1969, pp. 53-54)

In addition to the 'unitary entities' (visual characters of parts), which generate and pattern a unit, the whole, "other dependent qualities appear in simple visual perception" as Köhler exemplifies,

> ... when we [draw] square, four points in the boundary of this figure have the character of being 'corners'. Precisely the same points in the same locations would not have this particular character if they were points of the boundary a circle. (Köhler, The task of Gestalt psychology, 1969, p. 54)

Deductively, this may strengthen the eye to perceive a square in the circle; because, the corners nearly facilitate an enclosure on boundaries through this shape. Moreover, "Wertheimer has pointed out that, if some parts of the field begin to move at the same time and in a uniform way, they become at once a moving unit" because there exists a " 'common fate' actually determines sensory grouping" (Köhler, *Gestalt psychology*, 1947, p. 145). Taking into consideration all mentioned about design principles, design elements, and design tools, Smith & Kosslyn concludes:

> A large set of rules governs the complex process by which we infer the contents of the visual world. ... the system must determine which features go together ... (Smith & Kosslyn, 2007, p. 65)

To conclude, what is being perceived by design parameters cognitively expresses how a 'patterning' is generated and implemented through the whole-part relationships.

### 2.3.1 Design Principles

Before looking into this context, it should be significant to state, "A *'Gestalt'* has no history because it does not account for earlier experience" (Piaget, 1952, p. 381). It just deals with form and shape as it means in German language. Therefore, Gestalt can operate design and designed environment visually in figures (parts in a whole); in other words, in geometries (patterning by co-relationships).

It is proposed that cognition corresponds to Gestalt Theory very well according to the similarity between the act of seeing or perception and the designing. That is why conceptual-mental fictions are expected to be designed as a *good* (gestalt) final product in reality and be perceived well, with respect to the cognitive process and visual perception. To sum up, perceptual organizations should be modified as a *whole* both depending on the principles in a *simplicity and order* and controlling the *consistency* with the conceptual-mental fictions.

Design principles can be listed as similarity, proximity, closure, good-continuation, common fate, figure-ground, balance, symmetry, grouping, separation and segregation, constancy, repetition; pattern; goodness or prägnanz. However, the study proposes design principles in five sets: *prägnanz*, *closure*, *good-continuation*, *grouping*, and *pattern*.

- **Prägnanz**
  defining good shape, form, and unity; simple and ordered compositions

Prägnanz possibly refers to 'Good-Form'[51], meaning that neural and perceptual organization of any set of stimuli forms as a gestalt, or whole, as the prevailing conditions allow (Encyclopedia Britannica). The goodness of design collages all principles together having the logic of 'the part and whole relationship' and it emphasizes consistent and co-related relationship together with/in any organized unity. Prägnanz, the state of being whole by minimal amount of energy (*simply ordered balance*), is discussed by Luccio R. (1999):

> [It is] a quality possessed by certain specific objects, forms or events belonging to our immediate perceptual experience which makes them 'unique', 'singular', 'privileged'. ... But Wertheimer also gave a second sense of Prägnanz, that of the lawfulness of the process leading to the formation of visual objects. According to this second meaning, the term is used by Wertheimer to indicate the fact that it is rather a 'meaningful' process. The principle of organization acts as precise laws to which the process is forced to obey, overall in the sense of maximum economy and simplicity. Its result is a perfect balance of the forces at play and thus has also a maximum of stability and resistance to change. (Mennan, 2009, p. 311)

- **Closure**

  continuation of lines and borders, filling the blanks and completing with referential borders or corners, building a shape and a form, construction of a unity, even if there are missing elements

Ching (1990) states, "Closure refers to the tendency for an open or incomplete figure to be seen as if it were a closed or complete and stable form" (p. 74). This means that a unification of clearly defined boundaries creates a new space and separates this space from others. The more it is to complete; the greater it is to be perceived as enclosed. "The perception of closure"[52] could be depended on the surfaces around: their relations and the proportions of the boundary lengths and heights (Spreiregen, 1965). The volumetric expressions in proper proportions and relations define the spaces well to the eye (for perception).

[51] The term of Wertheimer (1923): Gute Form'

[52] Spreiregen is determined the perceived enclosure with two reqirements: 'the boundary height of the frontal view' and 'the physical distance to the boundary'. See page 48: Figure 2.10

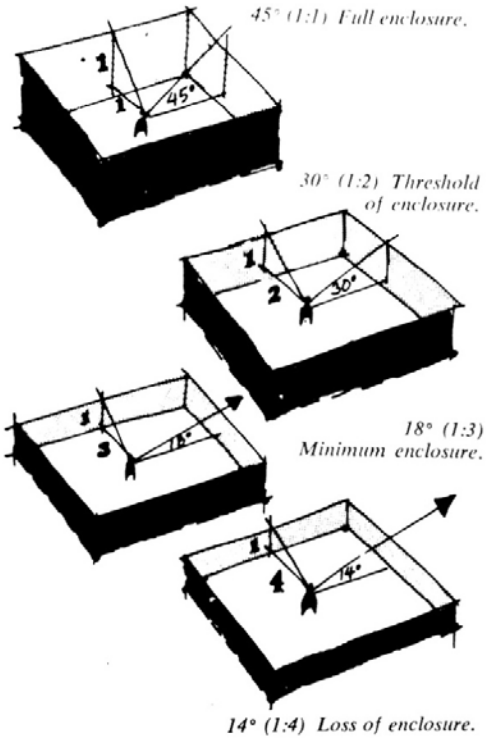



**Figure 2.10**: The perception of closure
(Source: Spreiregen, 1965, p. 75)

- **Good-continuation**

  completing shapes and forms on a direction or on a reference-line, a lock and key or mutual relationship between the parts within a shape, a form, or a unity, following borders, edges or corner

It seems that continuation is created by a tendency among the things in the environment, which forces them to come together for a compact whole to balance each other within a repetitively ordered pattern. In fact, perception gathers the sequential or continuous elements into single forms. It could be explicated with the words of Lynch: continuance of 'edge surface; nearness of parts; repetition of rhythmic interval; similarity; harmony of form or use',

> These are the qualities that facilitate the perception of a complex physical reality as one or as interrelated, the qualities which suggest the bestowing of single identity. (Lynch, The image of the city, 1960, p. 105)

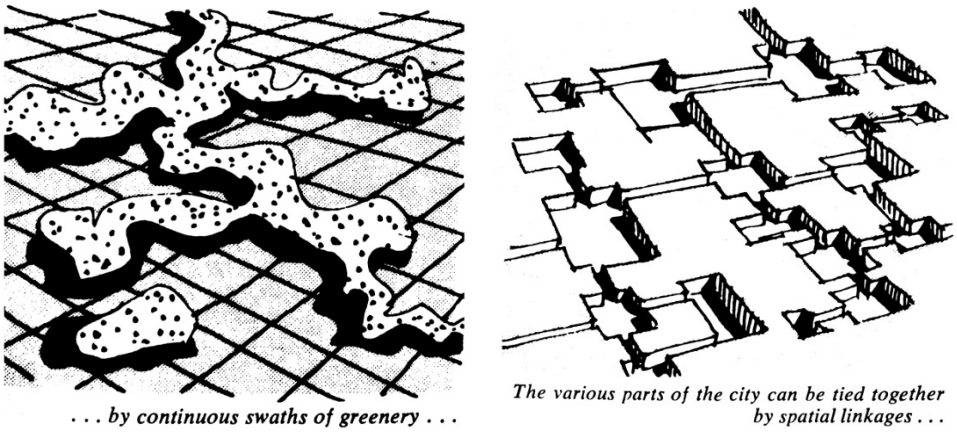



**Figure 2.11**: Continuation of solids and voids in urban environment
(Source: Spreiregen, 1965, p. 138)

- **Grouping**

  collection of elements or parts with regard to their similarity, proximity, common fate, defining figures or shapes and forms, coming together or being separated from others, and creating patterns by the figure-ground relationships

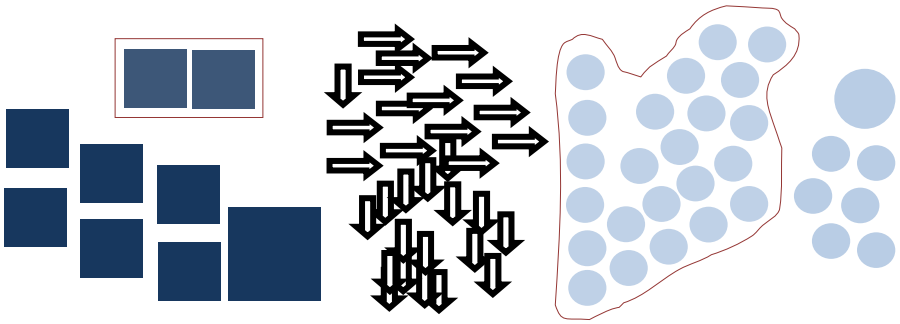


**Figure 2.12**: Grouping by design parameters

(Design principles, repetition, similarity, common fate, proximity and design elements, color, alignment, contour, material, texture, scale, constitute patterns constructed by the individuals- the parts- the patterns are shown by red borders)
(Figurative elements are drawn by the *author* in Microsoft Office Word)

Figure 2.12 illustrates perceptual grouping con-figured by means of other principles or design elements. The groups of ‘square pieces’, ‘arrows’, and ‘circles’ can be differentiated from each other due to similarities in shapes and

colors, contours and repetitions of the individuals. In addition, the bigger square among the squares can be separated from other individuals (parts); so does the one among the circles. However, it could be noticed that there is a mess among the arrows because of their disordered arrangements. Yet, it can be overcome with their re-alignments (or common fate and proximity), as seen among squares, diagonally arranged six squares; and among the circles, six vertically aligned circles. In brief, design principles and design elements make the individuals (parts) to be visually perceived together as groups defining wholes. Consequently, the wholes constitute patterns, which "thus helps promote the coexistence of unity, variety, and visual richness in a drawing" (borders of some patterns are drawn in redline, in Figure 2.12) (Ching F. D., 1990, p. 73).

**Figure 2.13**: Patterns, which are structured by the 'grouping' principle
(Source: Colin, 2008, p. 56)

- **Pattern**

  creating simple ordered; in other words, balanced shapes, forms: 'shapes' as 2D figure-ground patterns and 'forms' as 3D solid-void patterns

As long as the parts could be patterned within a holistic design, the sense of satisfaction of wholeness could be perceived, and the relationships between human and the design could be improved by patterning. It means that a pattern in dimensional realm could be a re-presentation of any conceptual fiction concerning its organized order and unified whole abstractly and mentally,

> If perception, ... , suddenly acquires a "form", this is because at any degree of maturation whatever it is impossible for the subject to see things differently, given the ensemble of the situation. ... (Piaget, 1952, p. 385)

In addition to (solid-void pattern of) ‘form’, patterns could be applied for other dimensional realms, especially for 2D, because of the fact that ‘pattern’ refers organization of a whole, which is composed of 2Ds continued or attached in sequence and balance. At that point, Colin explicates this instance that

> ... two-dimensional patterns are fundamentally important for two reasons. First, they are the precursors of objects. Second, a pattern can also be a relationship between objects. In some ways, pattern finding is the very essence of visual thinking, and often to perceive a pattern is to solve a problem. (Colin, 2008, p.45)

In other words, patterning reinforces imaging and designing. Vrazhliotis (2009) cites Christopher Alexander’s statement, “Patterns are a more explicit instrument for the use of a person” (p.31). It could be a template or a “basis of all the ideas about serialization”, being a route for the final products throughout the design process (Gleiniger, 2009, p. 13). Correspondingly, this focuses on why patterning and the whole-part relationships are included in design processes.

### 2.3.2 Design Elements

Early in The Section 2.3 the Design Process, some design elements are offered in a scenario concerning the act of seeing. Another element, lighting, could be added to the act of seeing since it engenders the colors, and the textiles of the materials. Moreover, it provides depths, which makes the borders and the edges appear, and subsequently the surfaces and the forms become clear.

For example, Figure 2.14 illustrates these design elements of interior spaces which are re-defined with some design principles such as closure (formation of objects), continuation (shadows), and pattern (illumination on floors, the figure patterns on grounds). That is to say, design elements, which seem as crucial parts of designs, are empowered and governed by the design principles, which functions as regulating of all relationships. In this way, they are adapted to the design processes.

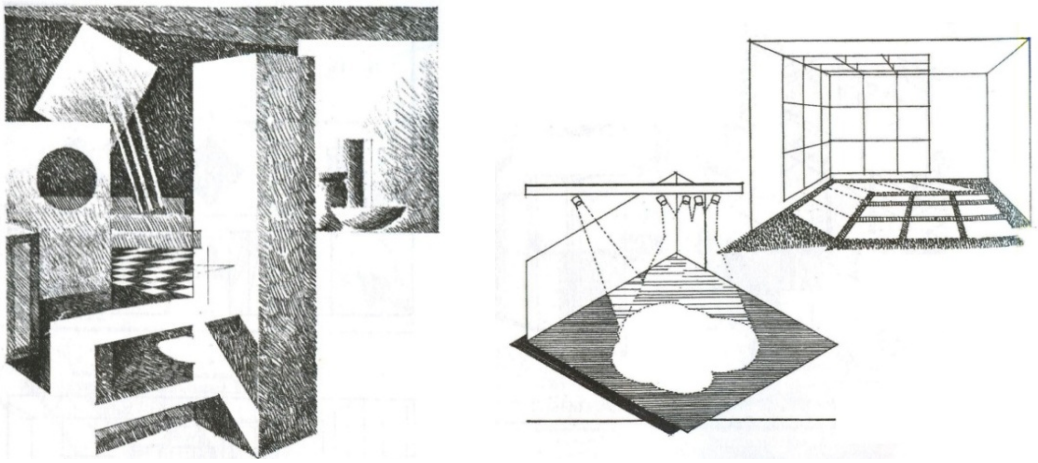


**Figure 2.14**: Lighting and design parameters
(Source Left: Ching F. D., 2004, p. 106)
(Source Right: Ching F. D., 2004, p. 24)

Furthermore, there is a variety of design parameters for the list of 'design elements'; however, it is quite hard to detect all and mention about. Therefore, some of the design elements are requested for the study and it is expected that the questionnaire, being the research instrument of the survey, reveals them with respect to the design principles and any design (designed environment).

Table 21[53] demonstrates some design elements deducted from the survey and Chapter 3 discusses them in detail. However, it could be congruous to list some well-known design elements previously:

* Lighting (color, depth, shadow , material, textile)
* Layer (topography, datum level, reference-line, line-weight, figure-ground)
* Line (border, surface, shape, form)
* Proportion, scale, size
* Location, rotation, alignment, position, orientation
* Regulations, laws, rules
* Landscape (has ability of being defined as both solid and also void)
* Furnishing (detail)

[53] See page 101: The Section 3.2.2.2 Responses (Design Elements)

### 2.3.3 Design Tools

Design tools are a way of how any design can be described and how its conceptual fiction can be expressed in reality. Supporting designing with descriptions and expressions, design tools become controllers of design processes, which work between the mind and reality, between concept and final product. Tools perform among the re-presentations and dictate them with regard to the concept and the design. Besides the 'three levels of representation'[54] of D. Marr, the study divides the design tools (the way of representation) in three categories:

- Drawing (free hand drawings, sketches, drafts, and technical drawings)
- Modeling (concrete and soft /digital copies)
- Image (renders, sketches, and photos)

#### Drawing

Ching emphasizes, "Drawing is the simplest and most direct way of expressing our visual thoughts and perceptions ..." (1990, p. 20) and he continues,

> The act of drawing ... can also enhance our understanding of things. By drawing something out, we are better able to understand visual concepts, underlying structural patterns, significant relationships, schematic organizations, and whatever else we cannot see except in the mind's eye. (Drawing: a creative process, 1990, p. 29)

Drawing of a conceptual fiction can be done by any method. While free hand sketching seems more sincere and casual, technical drawing, it refers here to 'architectural drawing', is generally comprised of 'orthographic and perspective drawing techniques'. Ching (1990) underlines the importance of the technical drawing, which provides a communication between "accurate information for the production of designed objects and constructions", and he states:

> Orthographic views portray the two-dimensional aspects of a three-dimensional whole. Because they offer fragmentary views of reality, they must be seen as a series of relate views. (Drawing: a creative process, p. 146)

[54] See page 30: The Section 2.2.1 The Act of Seeing and the Act of Perception

This statement of Ching explicates the aims of drawing and the needs of re-presentations to present. 'The fragmentary views', parts, in other words, 2D re-presentations of a 3D whole design, are simple tools to visualize the conceptual fictions in dimensional realms. Therefore, all primarily technical drawings narrate those parts of these fictions, which will be alive in space and time. For example, section views, vertical cut planes of a design are usually drawn to show both interior spaces and the structural systems. To give further expressions, continuity and grouping (repetitiveness) of columns and beams in skeleton framework are represented with the help of differentiations in line-weights and reference-lines, both of which are design elements. It means that design tools include and present design elements regulated by design principles. Other than orthographic drawing, a type of parallel projection in which, all the projection lines are perpendicular to the projection plane (online Collins English Dictionary), perspective drawing enables similar visions to the ones what the eyes see in perspective. That is why a perspective view (and section views) can be required for (ideal for seeing) real display of a space, unlike an orthographic view which is preferred much for a map (or a top view). In fact, these all respectively point to how conceptual fictions become real and be perceived preliminarily. Therefore, the design tools are quite important to alleviate the perceptual problems, which are mostly emerged from inconsistency between the concept and their re-presentations of the design.

## Modeling

- "a picture of reality" (Wittgenstein, 1921)
- "simplification" (Lowry, 1965)
- "ultimate representation" (Engineering Dictionary)

Guhathakurta cites the definition of Echenique (1972) about modeling:

> A model is a representation of a reality, in which the representation is made by the expression of certain relevant characteristics of the observed reality and where the reality consists of objects or systems that exist, have existed, or may exist. (2005, p. 14)

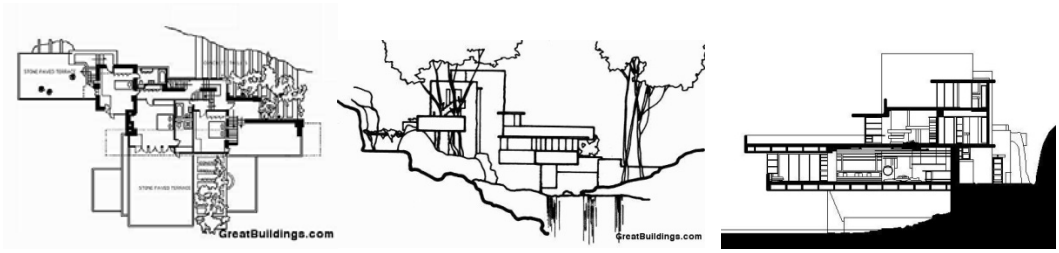
Modeling provides a quick-look over any design and it controls whether it becomes a re-presentation of the one in the mind or not because they give the closest information of real images. That is why they are helpful in design processes. In concrete models, it is easy to focus on ‘the whole’ and observe their balanced the solid-void relations in real dimensional realms. Furthermore, concrete models are usually preferred to control masses and their relations in urban architecture (being related to near environments). However, digital models are good at presentation of materials, colors, and details in a simulation-environment as they render various (similar to real one) views, in perspectives.

**Images**

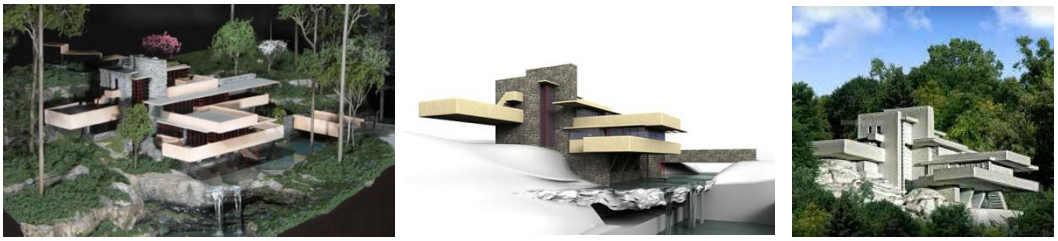
Images are visible impression and optical appearance, as well as reproduction of mental picture, offering symbolized and typified descriptions, or collages (descriptive representation for a whole environment) (online Thesaurus). There are several ways; in other words, tools, to produce ‘images’ such as

- sketching;
  a rough or unfinished drawing, preliminary study, a more finished picture, general account with basic details or outlines, literary composition
- rendering;
  depiction, computer graph, genesis of an image
- photographing;
  picture of something made visible and permanent


a) Fallingwater (greatbuildings.com)




b) architectural drawings (greatbuildings.com)



c) imaging, or rendering, by concrete and digital modeling

**Figure 2.15**: Fallingwater, F. L. Wright, a sample for design tools and re-representations
(The conceptual idea of the design is given the Section 2.2.2 Mental Imagery. See page 37)
(Source: Fallingwater –s [Google image search tool])

In summary,

- *design principles* organize conceptual fictions into graphs and modify them as a design;
- *design elements* strengthen, detail and characterize the design; and
- *design tools* support design process visualizing and representing conceptual fictions for real dimensional realms and control this process to reach the final product of *good* design consistent with the concepts.

Consequently, it could be proposed that proper and sufficient co-relations among design principles, elements and tools should be taken into consideration throughout the design processes because they can control the design from the mind to reality. In a design process, consistency in/among transfer and transposition could be achieved with design parameters with respect to conceptual-mental fictions.

# CHAPTER 3

# THE SURVEY

> *"... Wertheimer turned to perceptual facts which are present in practically all visual fields and had, therefore, simply been taken for granted by everybody."*
>
> (Köhler, The task of Gestalt psychology, 1969, p. 49)

> *"… To Wertheimer, truth was determined by the entire structure of experience rather than by individual sensations or perceptions."* (Encyclopedia Britannica)

*If the design parameters are applied **properly**, **sufficiently** and **inter-relatedly**, any kind of '**holistic** final product within **co-relative relations**' could be achieved, and those designed final products are defined as **'visually perceived good designs'** because of their suitably accommodated '**ordered** patterns with a sense of **balance** and a level of satisfactory **simplicity**',* as previously emphasized[55]. *Furthermore, good designs have the quality of being visually perceived **in consistency with the concepts of mental fictions**, which means that the final products are compatible with all outer and inner sensory information or stimuli.* Therefore, this chapter includes a survey examination relevant to appropriate research tool and survey methods that it seeks to exemplify and clarify the problems and its theoretical framework. What the chapter argues about the survey is the scope, the research tool, the sequential steps, the methods (which methods are chosen and why these methods are preferred), the analysis, the discussion of the results.

[55] See page 16: The Section 2.1 The Hypothesis

Therefore, the study aims to investigate the effects of each design parameter on visual perception of designed environments through '**the questionnaire with close-ended and open-ended questions**' and to discuss analytically through '**Cluster Analysis and Pearson Correlation**' with evaluations and interpretations of their effects on alleviating the problems and the consequential results.

## 3.1 The Survey of the Study

Since the study mentions about the aspects of a 'design' (within designing process) and its 'visual perception' (within cognitive process), the co-relation between a design and not only the design parameters but also the re-presentations should be examined in the context of visual perception. Depending on 'visual perception' and 'design', this survey should need to search interactions between human and its designed environment. Therefore, the examination requires a questionnaire to be devised, and survey sites to be selected. That is why **a face-to-face interview-like questionnaire at any survey site**[56] is decided as research instrument for the survey. While the questionnaire is devised concerning the five design principles[57] (*prägnanz, closure, good-continuation, grouping, and pattern*) with their relatedly expected elements and tools *(*color, alignment, and drawing*)*, the sites are decided according to their visual qualities, respectfully.

The questionnaire is done to the people who are interacting with an urban architecture in a designed environment, the survey sites of the study. They are the **laymen** randomly chosen among the passengers walking along the survey sites or the ones being at around, regardless of their professions (or, age and sex). It is required from them to concentrate on examining the visual aspects of designed environments and evaluating them with descriptive words such as 'good' or 'complicated'; 'easy-to-remember' or 'indirect'. Throughout the interview, these evaluations are documented on a scale in the questionnaire form. Such a scale

[56] The duo *face to face* and *sites* is equivalent with the duo of *people* and *design.*

[57] See page 46: The Section 2.3.1 Design Principles

enables to rating the evaluations because it seeks for a level among the descriptive words, between two bipolar words (or things, concepts, objects, means). This scale is named as **Semantic Differential Scale (SD)**[58] and it is used for marking the evaluations with a level aligned between two bipolar words. Bipolar words, here, refer to connotative meanings of five design principles. Thus, the questionnaire requires additionally from laymen two other tasks after the evaluations through SD. The former one is to answer to 'what could influence the evaluations about visual aspects of these environments' and 'how the better ones could be or how the designed environment could be improved to a better one', in order to reveal design elements and their relations. The latter one is to compare the design re-presentations such as architectural drawings, sketches, photos, and designed environment, in order to reveal design tools and their relations. In fact, the second question is also asked randomly to experts such as architects, designers, decorators, mechanical engineers to interpret about the design re-presentations and to compare them professionally. Asking also to the experts would contribute expert opinions to the survey enabling the responses and evaluations of laymen to be considered since experts are the people taking any design or/and drawing courses, experiencing and dealing with the designs and those designing processes.

To conclude, the questionnaire could provide to examine the design parameters and the visual aspects of designed environments by noting or signifying the levels for the *goodness*, 'prägnanz'. Furthermore, those evaluations and comparisons express *multivariate mutual relations* developed by the mutual affinities among the design parameters. These mutual relations have important tasks for a *good* design because they are the guiders for utilizations of the design parameters *properly* and *sufficiently* in any design, and they provide *consistency* throughout the design process.

How those co-relations could be rendered is resolved by **Cluster Analysis**, being acceptable method for the clarification of the co-relations since it attempts to

[58] Semantic Differential Scale (SD) was developed by Charles E. Osgood in 1957 and he proposed three major dimensions of meaning: *strength*, *value*, and *activity*. This technique measures stimulus or emotions by means of connotative meanings. See page 69.

make groups of similar or dissimilar things (here, design parameters) by measuring the distances[59], and in sequence, classifying them into clusters. Classifying or clustering, being a multivariate system, will set the design parameters into several groups, each member of which will be more related than the ones in any other groups; however, different groups might have some same members. The common members of these groups expose a hierarchy among the groups. In other words, the more the parameters are classified hierarchically; the more the multivariate interrelations, in other words, co-relations, are clarified.

**Hierarchical (Agglomerative & Divisive) Method** of Cluster Analysis could arrange the design parameters in clusters placing the parameters on a hierarchy graph, known as **dendrogram**[60]; the mutual relations among the parameters would be demonstrated, though. In addition to Hierarchical Method, these mutual relations could be shown by the analysis of the **Pearson Correlation Method** on a table, which outputs a hierarchically valued **matrix**[61] of dependent individuals (design parameters) to indicate the co-relations. All these explain why Hierarchical Clustering Method of Cluster Analysis (dendrogram) and the Pearson Correlation Method (matrices) are preferred for the survey. Lastly, it could be strongly underlined that the methods are not used to debate the survey sites, but instead, to cluster the design parameters regarding their co-relations and to present them with the help of visual qualities of these survey sites.

When it comes to the survey sites, some places in **METU Campus/Ankara**[62] (Appendix B) are selected for this survey. The places are preferred concerning their visual qualities, which depend on the design parameters, considering the

[59] The distance between the individuals/variances is calculated commonly by formulas of (Squared) Euclidean or Pearson Correlation methods.

[60] Output of agglomerative&divisive methods on which clusters members are placed:Tree diagram

[61] A matrix (of 'design parameters X design parameters') presents Pearson correlations by the values between '-1' and '+1' that any direct close relation is represented with the values close to '+1' and inverse one with '-1

[62] The sites are listed in Appendix B (DVD), which includes some re-presentations such as drawings, etc. and photos taken from determined location to examine the visuality and visual perception.

matter of visual perception. Therefore, it could be proposed that some of the survey sites are perceived *good* enough to be a *good* design, and in contrast, some of them, a bit troublesome. These two differences offer 'control and experiential groups' so that any of the designed environments could be interpreted by its parameters and *keys*[63] within co-relations.

- **The alley** could be exemplified for a *good* one. It is perceived as an undivided path and a nonstop continuity along with both sides having departments, which create all together a social academic zone. Therefore, it enables easy-follow and orients people to walk on or with this alignment. This simple sequential order facilitates finding places on the path.
  (for the footpath: 'undivided', 'social' and 'easy-to-follow' are the *connotative words of semantic scale*; 'continuity' is the *principle*; 'alignment' is the *element*; 'finding place' which comes out from the concept of 'simple order' is the *fiction.*)

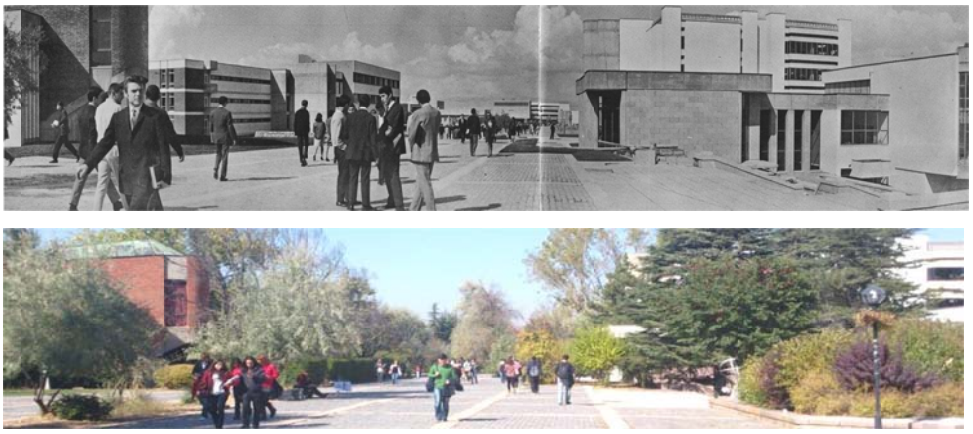


**Figure 3.1**: The Main Alley of METU Campus/Ankara
(Source Above: Çinici, 1975, pp. 10-11)
(Source Below: Author Photo Archive, 2013)

- One of the *good* examples is **the F&G Buildings in DBE** which have two different materials on its façade: wood and glass. The façade seems as if it is a glass wall on which only the wooden door (with wooden bands on

[63] See page 9 and page 13: Footnote 13 and Figure 1.10

floor lines) is pasted. This conceptual design creates such a pattern that the door stands like a figure on this transparent background wall. This organization makes the figurative door obvious and the door shows the 'entrance' to the people. It could be said that the figure-ground principle reinforces the door for a daily fiction of lives.

(for the building: 'figurative' is the *connotative word of semantic scale*; 'the figure-ground pattern' is the *principle*; 'material and color' is the *element*; the concept of 'entrance' based on 'organization' is the *fiction.*)

**Figure 3.2**: Site A_ Department of Basic English: F&G Buildings
(Source: Author Photo Archive, 2013)

- Another *good* example could be **the Faculty of Architecture**, proposed as a control group due to its ordered feature. This order can be expressed, as seen in Figure 3.3, that 'similar units (spaces) come closer to generate other larger units; these different larger units are characterized by the orientations of their previous forms and by their functions, and finally, the larger units are combined around a central unit'. In other words, they are combined inter-relatedly by the center. This grouping here makes the units (or locations) be easy-to-distinguish and helps the users to be aware of finding their ways easily because their locations can be perceived easily. To sum up, any 'order' constructs any 'simple'r final product.

  (for the building: 'similar', 'different' and 'easy-to-distinguish' are the *connotative words of semantic scale*; 'grouping' is the *principle*;

'orientation' and 'inter-relation' are the *elements*; the 'simply ordered' concept of 'center and groups', which provide physical and socially close-relations, is the *fiction.*)

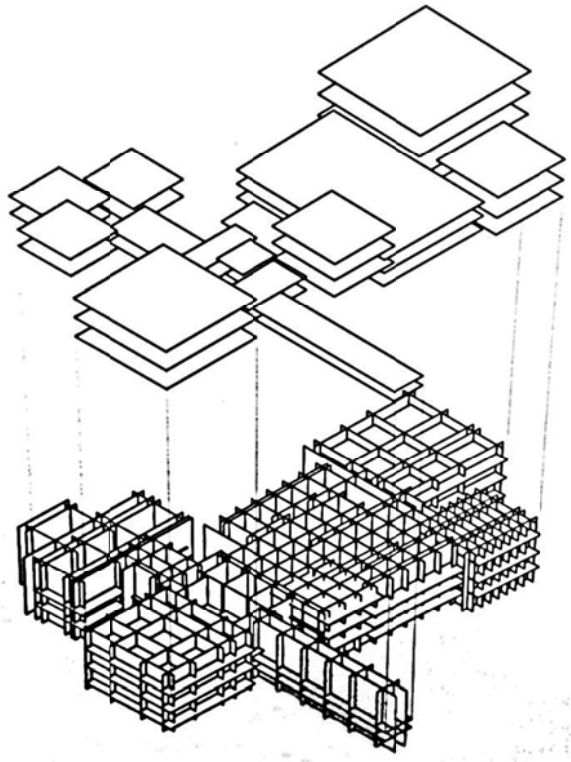


**Figure 3.3**[64]: Site B_ the Faculty of Architecture: "*formation of volumes*"
(Source: B, Gür, *curator*. October, 2013, 50th Anniversary Exhibition)

- For a bit troublesome example, there is another site in campus with some similar buildings, **the Accommodation Zone and the Dormitories**. The circulation among the buildings is provided by non-continuous (dead-end) and severally branched (various in proportions) paths which causes confusion and complexity: hard-to-distinguish or hard-to-find another. The paths with this orientation and these proportions force the users to 'stop for a while then flow', consistently. In fact, the similarity of the buildings and

[64] Figure 3.3 was prepared by Seray Türkay and Hayri Dörtdivanlıoğlu in the course, whose lecturer is Berin Gür, 'ARCH 778: Formal Analysis of Buildings' in 2012.
It is retrieved from '50th Anniversary Exhibition: Readings on Altuğ and Behruz Çinici's METU Campus Buildings' at METU Faculty of Architecture on 01.01.2013, and it is edited only into *threshold* version for this study.

their landscapes in near environments creates confusion; because, due to this similarity, one cannot perceive any differences which enable to distinguishing the locations for fluent navigations. Deductively, the site does not seem to have any ordered circulation pattern for an easy-daily life. (for the site: 'flowing', 'complex' and 'hard-to-distinguish' are the *connotative words of semantic scale*; 'similarity' and 'continuity' are the *principles*; 'orientation' and 'proportions' are the *elements*; 'similarity' and 'dead-end' are the concepts of an accommodation zone, but they interrupt easy-circulations.)

**Figure 3.4**: Site C_ the Accommodation Zone: Dormitories (Google Earth View, 2013)

- The other example could be **the MM Building**, the highest building in the campus. This building with its two other building-blocks is quite easy-to-find because of their simple forms, figurative and specific orientations, in contrast to each other, which makes the building classifiable. This contrast also defines the alley with an impressive end as a space of passage-path[65]

[65] Alley mainly means 'a well-defined passageway lined with trees, bushes, or stones between or behind buildings' on both sides.

with a starter point (the courtyard of the Faculty of Business Administration). Moreover, differences in their forms (orientations and proportions) create a pattern within not only horizontal and vertical balance but also a holism.

(for the buildings: 'easy-to-find', 'simple', 'classifiable' and 'figurative' are the *connotative words of semantic scale*; 'balance' and 'holism' are the *principles* of *'patter- prägnanz'*; 'orientation' and 'proportion' are the *elements*; the concept in this composition might be to create 'contrast' and 'impression'.)

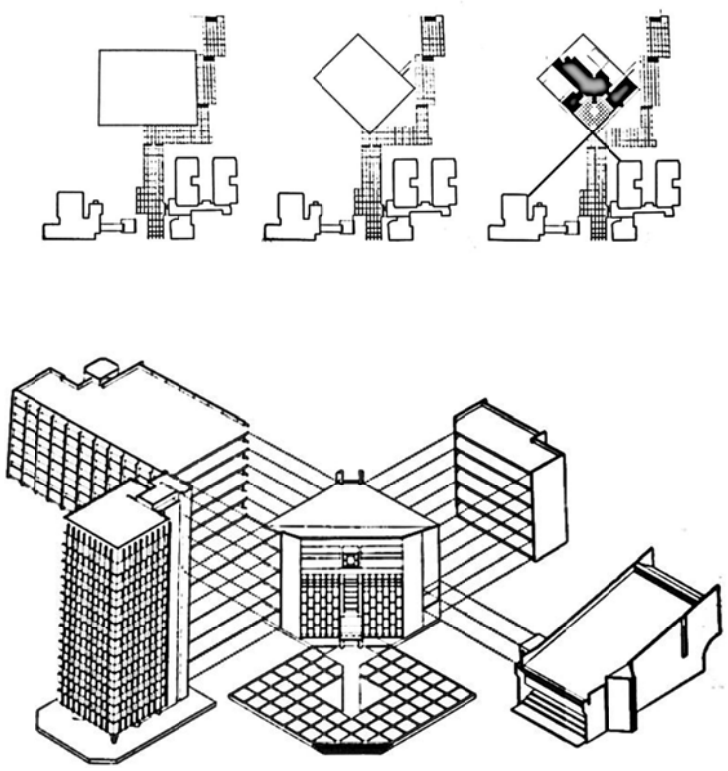


**Figure 3.5**[66]: The Faculty of Engineering Building:
"*positioning of building*" (above) and "*articulation of units*" (below)
(Source: B, Gür, *curator*. October, 2013, 50th Anniversary Exhibition)

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Definition of a space with a start and a finish (in a lock-key relation): 'a unification of a path having a start and an end with various facilities'

See page 119: Figure 3. 26

[66] Figure 3.5 was prepared by Görkem Demirok and Yasinalp Örsel in the course, whose lecturer is Berin Gür, 'ARCH 778: Formal Analysis of Buildings' in 2012.

It is retrieved from '50th Anniversary Exhibition: Readings on Altuğ and Behruz Çinici's METU Campus Buildings' at METU Faculty of Architecture on 01.10.2013, and it is edited only into *threshold* version for this study.

It needs to remind that there could be some **constraints** about both the laymen and the designed environments throughout the survey:

- The number of basic information about laymen; sex (man or woman), age (young or old), profession (designer or non-designer), could not be equally distributed.[67]
- It could be hard to examine some urban environments because of their scales and sizes since human-eye has limited field of vision. In addition to this, greens could block some visions of designed environments, as well. Therefore, it might be required from some laymen to walk in the sites and look around the buildings to visualize interiors or exteriors (sometimes bird's-eye-view).
- The landscape of the campus by which laymen admire could influence the decisions and evaluations of laymen.
- Connotative words or some 2D and 3D re-presentations could not be understandable enough for laymen. Therefore, the laymen could find the context hard. They would not examine precisely, or they would have difficulties not only in expressing their evaluations about what they perceive, but also (maybe) in drawing what they want to illustrate. Moreover, they could misunderstand and think more about aesthetics and the nowadays urban architectures[68] (they could be confused about the differences in characteristic features of architectural periods of buildings or urban sites). Besides, the laymen could answer the questionnaire unwillingly or with personal pleasures and experience; moreover, they could force themselves to find any correct answers. Thus, it could be hard for these laymen to get rid of their obstinacy although the questionnaire and connotative words are expressed or exemplified in details.

To conclude, this face-to-face questionnaire needs to be devised a bit as an interview by which it could be congruous to explain some words, to indicate some

[67] See page 83: Figure 3.13

[68] Different from any art movement or contemporary but rather much more like fashion, trend, fast moving consumer or profit-oriented which means, intention of the public

evaluations, and to ask more questions spontaneously, and, in this way, most of the constraints (misunderstandings, psychological manners, and visual barriers) could be eliminated.

## 3.2 Methods of the Survey

In this section, the methods, which aim to have results of the examination with regard to the hypothesis and the problem of this study, are explained in detail, theoretically. Before the explanations, it needs to remind briefly the context again that the survey examines visual communication and perceptual interactions between humans and designs because the study searches for the relationships between 'human visual perception' and 'designs and designing'. Therefore, a *'face-to-face interview-like questionnaire'*[69] consisting of *'Semantic Differential Scale'* together with open-ended questions, enabling to record the responses of the laymen about visual perception of designs and the designed environments (five survey sites)[70], was preferred as a research tool for this survey.

To turn back to the matter, to analyze the questionnaire results, some statistical methods were conducted and executed by the statistical software 'SPSS'[71] (PAWS Statistics 18). Twenty-five pairs of design parameters (bipolar connotations of design principles, 25 DPs: see Appendix A) of the SD Scale were entered in the software as 'variables'. The values, between '-2' and '+2', of the variables of each survey site were listed as separate data sets to execute individually (for comparisons). Each data set was analyzed in several steps. Firstly, the values of

[69] Appendix A (in English and in Turkish)

[70] Appendix B (DVD)

[71] This software is generally preferred for the analysis of any studies in Social Science such as Psychology, Sociology, Anthropology, and in Medicine, especially genetic researches.

Furthermore, it should be considered that 'Design/ing' is explicitly related to Social Science (sociology and psychology). Therefore, it is used in this study for the analyses of the survey, for Mean Distribution Dot-Scatter Graphs, Bivariate Pearson Correlation Matrices, Cluster Analysis, Hierarchical Method, and Dendrogram. The first two can be also obtained in M. Office Excel.

variable were illustrated by a *'Scatter Graph'* to interpret *'Mean Distributions'*, which shows the distributions of the variables (here, the DPs). Secondly, the variables (DPs) were clustered according to the distances of scatters on graphs by the *'Hierarchical Clustering Method'* concerning their relations of similarity or dissimilarity hierarchically. These clusters were shown within a table and these hierarchical relations were graphed in a tree diagram, *'dendrogram'*. Thirdly, their co-relations were shown in matrices executed by the *'Pearson Correlation Method'* generating another hierarchy among the variables (DPs). Finally, all the analyses: results (principles), responses (elements), evaluations (tools), were discussed with regard to the hypothesis and the aim of this study. It could be declared that these methods were highly appropriate for analysis of this survey.

### 3.2.1 The Research Instrument of the Survey

Questionnaire, sort of a research instrument, includes a set of close-ended or/and open-ended questions and prompts to both get information and compile data about a matter. The questionnaire of this study aims to examine the relationships among the design parameters (design principles, elements, and tools), *good* design and *good* perception, and to proclaim their importance. Therefore, this questionnaire was prepared in order to not only figure out but also document how the designs are visually perceived[72], what visual perception depends on and be influenced by. Concerning the scope of the study, it is composed of two parts: the former, an introduction, which mentions about the study and the survey to inform laymen, and the latter, SD Scale with close-ended and open-ended questions, which consists of five design principles with 'connotative words (DPs)'[73] referring to these principles: *prägnanz, closure, good-continuation, grouping, pattern (figure-ground)*. For instance, 'pattern', one of the design principles, and its connotative words: Pattern means 'unification by orders' and '*good* organization'; in other

[72] Whether it is good or bad, based on parameters or not, relevant or irrelevant to concepts

[73] Connotative words, meaning of 'intention' according to 'semantics (expressions through a language)', are proposed to translate *design terms or jargons* into pertinent words for the laymen.
Connotation describes *positive and negative emotions* in a semantic scale, and here, positive connotative word stands on right end and negative one is on the left.

words, it could be said that it is 'ordered'; and if it does not, it is perceived as 'mixed-up'. This signifies why the scale includes bipolar connotative words placed from negative meaning through its positive version, *from mixed-up to ordered*: similarly, for prägnanz *bad~good*; for closure *unfinished~completed*; for good-continuation *inert~flowing*; for grouping *non-repetitive~repetitive.* Correspondingly, the range between the connotative words in the SD scale was arranged from '*-2*' *and* '*+2*' [74] with the value-levels: '-2', '-1', '0', '+1', '+2'. Explicitly, in the scale, if anything needs to be rated to the right, *from bad to good*, the level of *goodness* is marked with '-2' for *least,* '-1' for *less*, '±0' for *average,* '+1' for *more*, '+2'for *most*; or vice versa, if anything needs to be rated to the left, *from good to bad*, the level of *goodness* is marked with'-2' for *most*, '-1' for *more*, '±0' for *average,* '+1' for *less*, '+2'for *least*.

After the close-ended questions of SD scale for the examination of the design principles, the open-ended questions to the laymen about their recent ratings were idealized for the examination of the design elements and the tools. Moreover, they were sometimes asked to interpret, or instead, to re-draw the things, which were not satisfactory in the matter of visual perception (evaluated negatively). Consequently, not only the design principles and elements but also the tools were examined, compared, and interpreted.

**Semantic Differential Scale**

If someone thinks of how linguistic expressions of any perceptual phenomenon could be possible, the first thing recurring to the mind is the term *'meaning' (semantic)*. Osgood (1957) describes 'meaning' as a "code system" of any status and as the disciplines "which deal with language", adding that it is like "emotion" which responds to "the psychological sense" of language (pp. 2-9). To put the states differently, perceptual phenomenon can communicate through means, or 'meaning'ful words. As they are diverse and rich, each of meaningful words has

[74] Semantic Differential Scales are generally composed of seven value-levels (from '-3' to '+3'); however, it could be rearranged in more or less.

In this study, since much detail is not required and the comparative and superlative forms are sufficient, five steps could be considered.

different directions and intensities in their meanings (Osgood, Suci, & Tannenbaum, 1957). This implies that any status could be connoted or explicated by any of other 'meaning's. The book 'The Measurement of Meaning', tells that "intimate relation between perceptual and meaningful phenomena"[75] has been interpreted lots of time and finally instructed by some experiments of Carmichael, Hogan and Walter (1932), in which "different meaningful words [are] in association with the same abstract forms" (Osgood, Suci, & Tannenbaum, 1957, p. 15). The way of *'measurement'* could be applied for such variety to indicate their both directions and intensities and to distinguish the meaningful words. Therefore, the measurement of meaning takes this necessary action by means of *'scaling the meanings and semantics'*. Respectively, *'semantic scale'* mediates "expressions of ideas" graduating them by *seven (level) steps*[76] which is formed between a pair of words or a set of bipolar adjectives (Osgood, Suci, & Tannenbaum, 1957, pp. 18-20). To sum up, it is the way of 'scaling' the differentiations of semantics.

Furthermore, the scale of 'Semantic Differentiation' has the logic of "systematic attempts to subject meaning to quantitative measurement ... for 'common-sense grounds' ", and such systematic attempts of "using polar adjectives ... grew out of research on synesthesia [77] with Theodore Karwoski and Henry Odbert at Dartmouth College" (Osgood, Suci, & Tannenbaum, 1957, pp. 1-20). Synesthesia is "a phenomenon characterizing the experiences of certain individuals, in which certain sensations belonging to one sense or mode attach to certain sensations of another group and appear regularly whenever a stimulus of the latter type occurs" (Warren, Dictionary of Psychology, 1934) (Osgood, Suci, & Tannenbaum, 1957, p. 20). Osgood, Suci & Tannenbaum (1957) exemplifies synesthesia, concerning semantics, that "adequately described the music; a slow, melancholic selection might be visualized as 'heavy', 'blue' " or "a man is said to

[75] Some of the phenomena (language resembling perception) are interpreted by Barlett's "semantic dynamics" (1932), by Koffka's "perceptual dynamics" (1935), and by Skinner's "verbal summator" (1936).

[76] This seven-step scale could be re-arranged in different steps. More or less than seven step scales are considered in relation with the level of detail desired to reach.

[77] Condition of a concomitant sensation in which one sense occurs while the other is stimulated

feel ‘high’, a sad man ‘low’ ” or “hope is ‘white’ and despair is ‘black’ ” (p.21). Here, the words ‘heavy’ and ‘blue’ means the word ‘slow’, and ‘white’ and ‘black’ are other bipolar words of the words ‘hope’ and ‘despair’. Those differentiations signify that there could be another meanings in semantics for all expressions and those meanings are ‘the connotative words’ used in a SD scale. That is why some bipolar connotative words were applied in the SD scale of the survey examination and they were preferred regarding the semantic expressions of the five design principles, summary of the expressions of Colin and Köhler, previously [78] (underlined ones at below, Appendix A):

- **Prägnanz**

As prägnanz refers to *good* Gestalt or *good* perception, it is related to a final product or a completed design. The connotative words used in this part of the examination were considered that they should also be related to this context. Consequently, re-definition of this principle might be explained in this way: if a uniform and simple design is perceived as full/holistic, it is probably good, and this design could be articulated as successful or/and satisfactory.

- **Closure**

The study needs to examine the perception of enclosure of some places such as backyards, inner-courtyards, gardens because they are not fully enclosed. Since the space begins to be perceived as enclosed with their surrounding sides (within the relationships[79] of these sides), this completed/finished-like vision could give the impressions of being inside. (In addition, the word ‘communicative’ is also added to the SD scale since ‘a place with much people’ is sometimes felt as if it is enclosed, or like depressive as in claustrophobia.)

- **Good-continuation**

A continuation can be described with a perceptually connection of separate things (parts) which are actually not connected because their characteristics such as

[78] See page 43: Footnote 51 and Footnote 52

[79] ‘The perception of enclosure’, See page 46 and page 48: The Design Principles and Figure 2.10

closeness, repetition, similarity, proximity make them be perceivably sequentially linked to each other. This connection is perceived undivided, directing, and flowing. At the end, the things (the parts) turn into (a whole) easy-to-follow; for example, a path or a corridor linked to the other designed environments.

- **Grouping**

In this study, grouping is generated as re-identifications of some Gestalt Principles: similarity, symmetry, proximity, repetition, rhythm, and so on. The reason is that the act of seeing and the act of perception tend to form what the eyes see into groups, then wholes, by means of Gestalt Theory. That is why the connotative words of this principle are the words used in SD scale (Appendix A) such as similarity, fragmentary, repetitive, which creates perceptual groups, and classifiable, memorable, so easy-to-find, which the groups are described as.

- **Pattern (figure and ground)**

If things are ordered by some rules, they are finalized within a composition, which means pattern. The things are perceived as figurative/descriptive, distinguishable, and repetitive/rhythmic figures (due to orderly arrangements) on a balanced ground since balance is constituted among the rules of patterning.

### 3.2.2 Analysis of the Survey

#### Cluster Analysis

According to Evenitt, Landau, Leese & Stahl, clustering could be defined that

> cluster analysis techniques are concerned with exploring data sets to assess whether or not they can be summarized meaningfully in terms of a relatively small number of groups or clusters of objects or individuals which resemble each other and which are different in some respects from individuals in other clusters. (Cluster Analysis, 2011, p. 13)

Cluster Analysis, being one of the quantitative statistical methods which estimate similarity to enable classifications, communicates easily because it states directly and simply. (Romesburg, 2004). That is to say, classification

> ... (may) simply represent a convenient method for organizing a large data set so that it can be understood more easily and information retrieved more efficiently. ... [It describes] ... of patterns of similarities and differences in the data. (Everitt, Landau, Leese, & Stahl, 2011, p. 3)

Throughout the classification, cluster analysis conducts some steps: 'standardizing the data in matrices', 'determining the number of clusters', 'executing the methods via the formulas', and 'finalizing the matrices according to co-relations' (Everitt, Landau, Leese, & Stahl, 2011). However, before the executions, the necessity of number of clusters should be considered, and determined. There are some ways[80] to determine the number of clusters ($k$) by using of the number of variables ($n$) (here, the DPs). One of them is '*the rule of thumb*', being the simplest formula and commonly used one for a quick and approximate calculation, $\boldsymbol{(k = \sim\sqrt{n/2})}$.

Correspondingly, the study needs four clusters $\boldsymbol{(k = \sim\sqrt{25/2} = \sim 4)}$. After all executions, clusters and members of the clusters are skeletonized with dendrogram illustrating the co-relations (effects of parameters) hierarchically.

### Hierarchical (Agglomerative & Divisive) Methods and Dendrogram

> In a hierarchical classification the data are not partitioned into a particular number of classes or clusters at a single step. Instead the classification consists of a series of partitions, which may run from a single cluster containing all individuals, to *n* clusters each containing a single individual. (Everitt, Landau, Leese, & Stahl, 2011, p. 71)

This two-way partitioning identifies another two methods. One of them should "proceed by a series of successive 'fusions' of the *n* individuals into groups", 'agglomerative', and the other one should "separate the *n* individuals successively into finer groupings", 'divisive' (Everitt, Landau, Leese, & Stahl, 2011, p. 71). Operating in the opposite direction of the agglomerative method, the divisive method is needed for catching homogeneity among the variables. Unlike the

[80] The Elbow Method, Information Criteria (AIC, BIC, DIC), the Average Silhouette of the Data, Cross-Validation, Text-Databases, etc. (for quick approximate calculation: 'the rule of thumb')

divisive method, which is rarely used, and not preferred for the study, the agglomerative method is generally preferred for classifying the similarity. This method is usually proceeded by a proximity matrix (rather than raw-data matrix) to define the quality of similarity 'between clusters (between groups)' or 'within clusters (within groups)'. The similarity or clustering is resolved by measurement of the distances through the formulas of mostly the 'Squared Euclidean Distance' (squ. Euclidean Distance) and sometimes the 'Pearson Correlation' using 'average linkage' calculations among the variables, which means an average distance between or within clusters are computed by a function of performing over all pairs of variables (individuals) (Everitt, Landau, Leese, & Stahl, 2011).

The distance between two clusters defined by the average distance between all possible pairs of variables in the cluster could also result for their combination. In detail,

> The average-linkage-between-groups method[81] ... defines the distance between two clusters as the average of the distances between all pairs of ... [variables] in which one member of the pair is from each of the clusters .... A variant of it, the average-linkage-within-groups, combines clusters so that the average distance between all cases in the resulting cluster is as small as possible. Thus, the distance between two clusters is the average of the distances between all possible pairs of ... [variables] in the resulting cluster. (Norušis, pp. 387-388)

As mentioned before, the average distances can be computed with some formulas[82]; however, the Squared (squ.) Euclidean Distances is regularly used. It is the simplest way of measuring a distance since it computes the metric distance between two variables (individuals). Furthermore, Squared Euclidean Distance is frequently preferred to optimize comparisons of distances, which is based on distribution of the variables (individuals). On the other hand, Pearson Correlation formulates strengths and directions of any relationships between two variables; so does the semantic differential scale between bipolar words. To sum up, it measures their interests; in other words, how well they are related to each other.

[81] UPGMA (unweighted pair-group method using arithmetic averages)

[82] Euclidean, Sq. Euclidean, Cosine, Pearson Correlation, Minkowski, Chebychev, Chi-squared, etc.

Pearson Correlation Distance presents the results by a range between '-1' and '+1' and all the values between '-1' and '+1' express the correlations within direct (+) and inverse (–) proportion (the value '±0' means that there is no correlation):

- *High correlation:* 0.5 to 1.0 or -0.5 to -1.0
  *Medium correlation:* 0.3 to 0.5 or -0.3 to -0.5
  *Low correlation*: 0.1 to 0.3 or -0.1 to -0.3

In this study, the levels of correlation were re-considered within new ranges:

- ±0.7 to ±1.0 (high correlation)
  ±0.5 to ±0.7 (medium correlation)
  ±0.3 to ± 0.5 (low correlation)

| Method | Alternative Name | Usually Used With | Distance Between Clusters Defined As | Remarks |
|---|---|---|---|---|
| Single Linkage Sneath (1957) | Nearest Neighbour | Similarity or Distances | Minimum distance between pair of objects, one in one cluster, one in the other | Tends to produce unbalanced and straggly clusters (chaining), especially in large data sets. Does not take account of cluster structure. |
| Complete Linkage Sorensen (1948) | Furthest Neighbour | Similarity or Distances | Maximum distance between pair of objects, one in one cluster, one in the other | Tends to find compact clusters with equal diameters (maximum distance between objects). Does not take account of cluster structure. |
| (Group) Average Linkage Sokal & Michener (1958) | UPGMA | Similarity or Distances | Average distance between pair of objects, one in one cluster, one in the other | Tends to join clusters with small variances. Intermediate between single and complete linkage. Takes account of cluster structure. Relatively robust. |
| Centroid Linkage Sokal & Michener (1958) | UPMGC | Distance (require raw data) | Squared Euclidean distance between mean vectors (centroids) | Assumes points can be represented in Euclidean space (for geometrical interpretation). The more numerous of the two groups clustered dominates the merged clusters. Subject to reversals. |
| Weighted Average Linkage McQuitty (1966) | WPGMA | Similarity or Distances | Average distance between pair of objects, one in one cluster, one in the other | As for UPGMA, but points in small clusters weighted more highly than points in large clusters (useful if cluster sizes are likely to be uneven). |
| Median Linkage Gower (1967) | WPMGC | Distance (require raw data) | Squared Euclidean distance between weighted centroids | Assumes points can be represented in Euclidean space for geometrical interpretation. New group is intermediate in position between merged groups. Subject to reversals. |
| Ward's Method (1963) | Minimum sum of squares | Distance (require raw data) | Increase in sum of squares within clusters, after fusion, summed over all variables | Assumes points can be represented in Euclidean space for geometrical interpretation. Tends to find same size, spherical clusters. Sensitive to outliers. |

**Figure 3.6**: Agglomerative Methods
(The table is re-drawn by the *author* in Microsoft Office Word)
(Source: Everitt, Landau, Leese, & Stahl, 2011, p. 79)

After all these computing and clustering, average linkages of the Standard Agglomerative Method of Hierarchical Clustering produce a diagram (hierarchy graph) known as 'dendrogram'. Being "a mathematical and pictorial representation of the complete clustering procedure", dendrogram indicates similarity of variables in their clusters (Everitt, Landau, Leese, & Stahl, 2011, p. 88). In a dendrogram, the agglomerative method can be observed in the direction of bottom-up, which means this method resembles to cognitive and design processes in the matter of running the implementations.

To exemplify, Figure 3.7 illustrates separate individuals: [a], [b], [c], [d], [e] and subgroups through the fusion one: [a,b], [d,e], [c,d,e], [a,b,c,d,e]; Figure 3.8 defines two clusters with their individuals and the average linkage; and Figure 3.9 shows hierarchical relations of clusters with a tree-structure diagram.

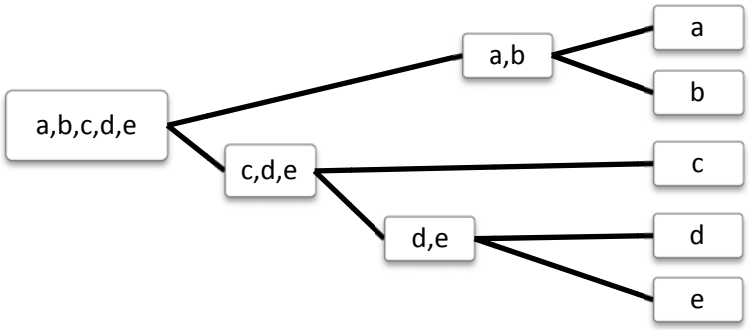



**Figure 3.7**: A sample for hierarchical tree structure
(Agglomerative Method: from right to left from [a],[b],[c],[d],[e] to [a,b,c,d,e])
(Divisive Method: from left to right [a,b,c,d,e] to [a],[b],[c],[d],[e])

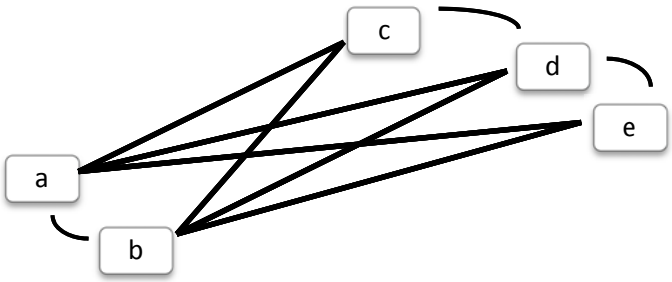



**Figure 3.8**: Diagrammatic presentation of distance measurements
(Average Linkage of the Standard Agglomerative Method)

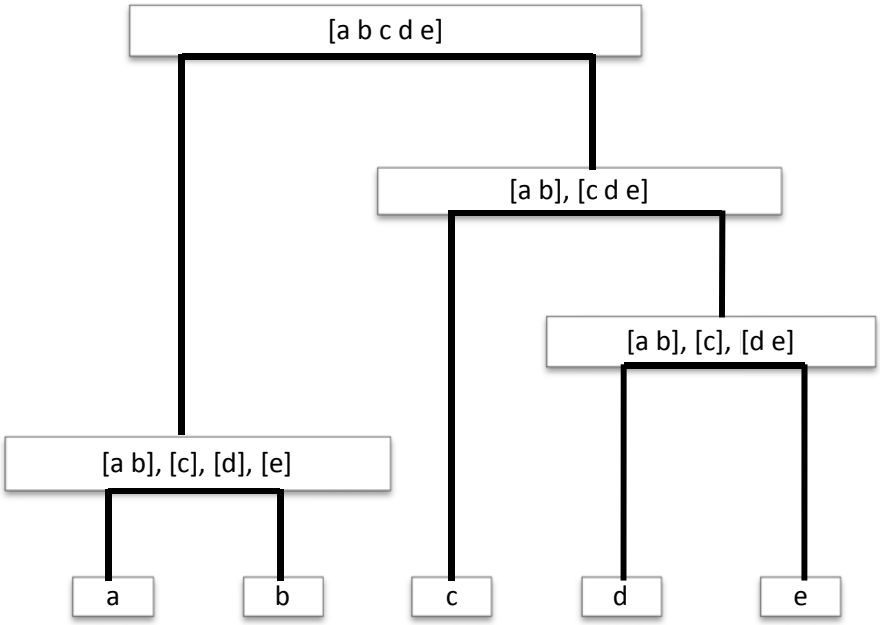



**Figure 3.9**: The Dendrogram of Figure 3.7

(The graphs, Figure 3.7, Figure 3.8, and Figure 3.9 are drawn by the *author* in M. Office Word)

To remind again, the hypothesis of the study proposes that design parameters should be used in *properly* and *sufficiently* generating a *holism* and a *balance* because they have the ability of controlling visual perceptions and alleviating 'visual-dimensional-perceptual troubles' in any designed environment. Thus, designs in *good* gestalt could enhance experiential daily lives. At this point, it is expected from the survey to confirm that design parameters can generate, reinforce, and develop the designs as long as they are *interrelated* and *holistic*, and to mention more about experiential life-relationship regarding the designed environments, about thoughts and predictions for conceptual fictions of designs, about compatibility of design parameters and dimensional realms.

To sum up, this section explained the preferences of the methods and their contributions to this study, up to now. From now on, it will deal with analyses, first, 'results' (outputs of scatter plots, clusters, dendrogram, correlation matrices), second, 'responses' to open-ended and close-end questions, and third, 'evaluations' about re-presentations, interpreting with respect to the hypothesis (Sample 6).

SAMPLE 6:

- First, some DPs[83] are expected to be in the same (or intersecting) cluster:
  - DP1 (*bad~good*), DP2 (*failure~successful*), DP3 (*disturbing~arranged*), DP4 (*weak~satisfactory*);
  - DP5 (*complicated~simple*), DP6 (*half done~holistic*), DP9 (*interrupted~completed*), DP24 (*disordered~ordered*) and DP25 (*unbalanced ~balanced*);
  - DP17 (*mixed up~classifiable*) and DP20 (*continuous~fragmentary*)

In Figure 3.10, while DP5 and DP24, DP25 *(simple* and *ordered,* then *balanced*) are in a cluster, DP9, DP2, DP6 and DP4 *(completed,* then *successful,* then *holistic* and *satisfactory)* are in another cluster, as almost expected. In Figure 3.11, *order(ed)* and *balance(d),* members of the same cluster, creates another *simple* and *arranged* cluster with the participations of *successful* and *satisfactory*, which defines *holis(tic)m* with *good* and *completed* clusters (DP24 and DP25 with DP2 and DP4, DP5 and DP3, then DP1 and DP9, then DP6).

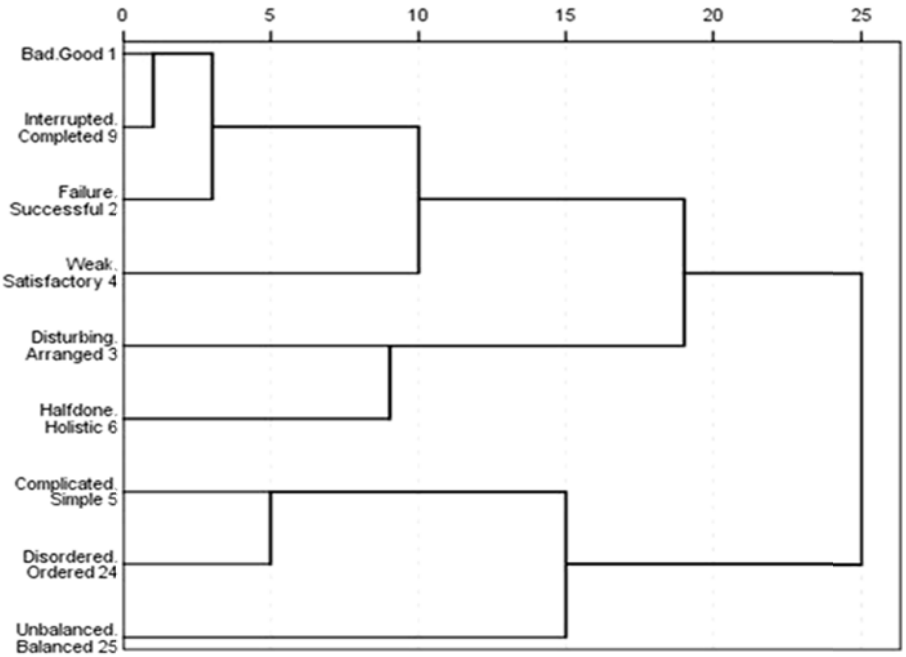



**Figure 3.10**: A dendrogram; output of cluster analysis of Site A (Average Linkage within groups) which is executed with only the parameters dedicated to the hypothesis

[83] A proposal for the parameters related to key-reasons: Hypothetical Parameters

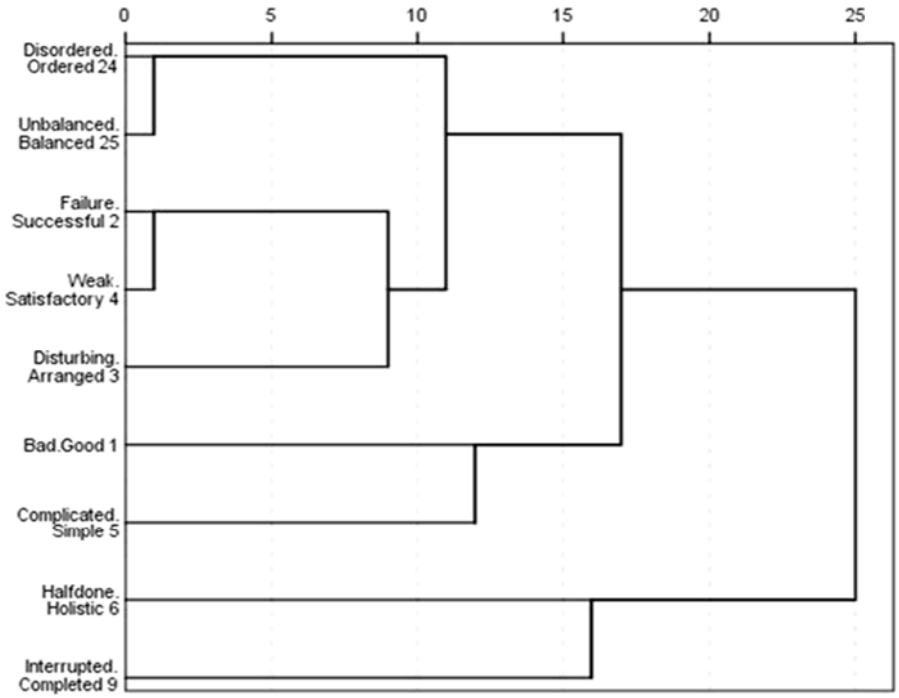



**Figure 3.11**: Another dendrogram; output of cluster analysis of Site D (Average Linkage between groups) which is executed with only the parameters dedicated to the hypothesis

(Figure 3.10 and Figure 3.11 are the outputs of Hierarchical Clustering Method in software SPSS)

- Second, it is expected from laymen to predict the *concept*s of the designed environments, the (visualized) thoughts of the designer about the final products (designs), deducting from their visuality which varies in the contexts of daily lives; function, form, topography, typology, and so on.

**Figure 3.12**: The Bridge Building (Site D),
which stands above the entrance floor preserving the transition on the alley (an assumption)
(Source: Author Photo Archive, 2013)

- Third, it could be indicated that some designs require more section drawings or more cross-section drawings together to describe themselves better whereas others need to be re-presented with more side-view drawings. However, the most powerful re-presentations are conceptual concrete and digital models, then cross-sections and plans. It means they are in need of each other and they, together, could be comprehended and interpreted precisely; because, models give some ideas about the whole of final products, and while sections illustrate real interior views (in space and time), plans overlap with mental maps as humans see and visualize while walking inside. To conclude, the evaluations about the re-presentations by the laymen and the experts draw attention to co-relations and the consistencies among re-presentations of the final products.

## Analyses of the Examination


Average of age = ~30
The number of persons surveyed = 150 people

**Figure 3.13**: The statistical data about the examination (sex, age, profession)
(The charts are drawn by the *author* in Microsoft Office Word)

The survey reveals some conclusions that ***design principles*** *organize conceptual fictions and modify them as a design;* ***design elements*** *reinforce, detail and characterize the design/ing;* ***design tools*** *present designing, control and conduct design process (patterning and consistency); and* ***concepts*** *form fictions through the final product.* They are illustrated and explained in following parts: design principles are illustrated with outputs of analysis, design elements and tools are clarified with evaluations, and they are discussed throughout following sections.

### 3.2.2.1 Results (Design Principles)

The laymen tried to examine the visuality (visual perception) of the designed environment and to evaluate on the SD scale of the questionnaire. After the executions of each survey sites individually by the methods (Mean Distributions, Pearson Correlations, Dendrogram), the outputs were presented with tables in sequence. Firstly, Mean Distributions of variances (DPs) were graphed with scatter plots to get descriptive statistics. Secondly, the Pearson Correlations of the DPs were tabled on matrices to show mutual relations. Lastly, DPs were clustered hierarchically on tree diagrams (Dendrogram, Cluster Analysis Method) with the average linkage distance measurement between groups and within groups.

**i. Site A _ Department of Basic English: F&G Buildings**

- Mean Distribution Charts
- Table of Correlation
- Cluster memberships and Dendrogram

**ii. Site B _ the Faculty of Architecture**

- Mean Distribution Charts
- Table of Correlation
- Cluster memberships and Dendrogram

**iii. Site C _ the Accommodation Zone: Dormitories**

- Mean Distribution Charts
- Table of Correlation
- Cluster memberships and Dendrogram

**iv. Site D _ CC&EE: The Bridge Building**

- Mean Distribution Charts
- Table of Correlation
- Cluster memberships and Dendrogram

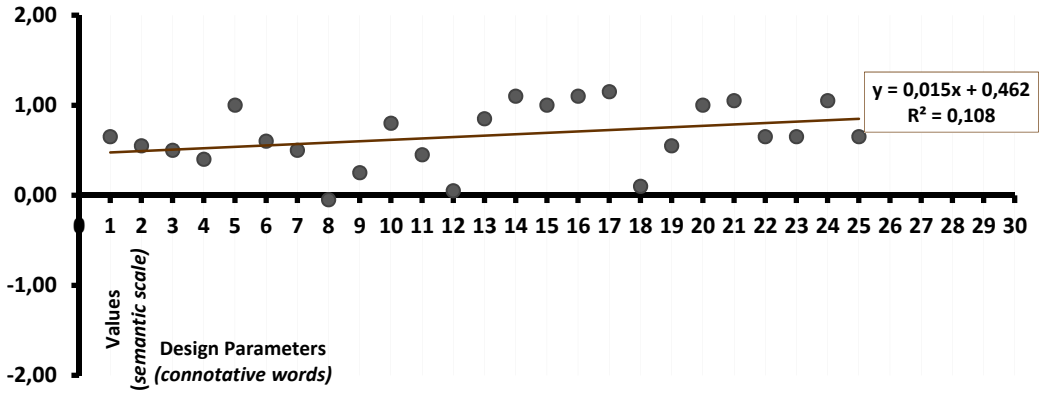
**v. Site E _ the Shopping Center: Çarşı**

- Mean Distribution Charts
- Table of Correlation
- Cluster memberships and Dendrogram

**Figure 3.14**: The list of the analyses of the examination; site by site

## i. Site A_ Department of Basic English: F&G Buildings

**Table 1**: Site A_ Mean Distribution Dot Chart




| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 0,65 | DP7 | 0,50 | DP11 | 0,45 | DP15 | 1,00 | DP21 | 1,05 |
| DP2 | 0,55 | DP8 | -0,05 | DP12 | 0,05 | DP16 | 1,10 | DP22 | 0,65 |
| DP3 | 0,50 | DP9 | 0,25 | DP13 | 0,85 | DP17 | 1,15 | DP23 | 0,65 |
| DP4 | 0,40 | DP10 | 0,80 | DP14 | 1,10 | DP18 | 0,10 | DP24 | 1,05 |
| DP5 | 1,00 | | | | | DP19 | 0,55 | DP25 | 0,65 |
| DP6 | 0,60 | | | | | DP20 | 1,00 | | |

**Table 2**: Site A_ Correlations of design parameters (Appendix C)

| | |
|---|---|
| **High Correlations** | **DP1&DP2**, DP1&DP9, DP1&DP20, **DP4&DP20**, DP5&DP10 DP6&DP12, DP13&DP15, DP13&DP20, DP14&DP23 DP15&DP20, DP21&DP22<br>DP8&DP21, **DP8&DP22**, DP8&DP24, DP9&DP18, DP15&DP17, DP18&DP19, DP21&DP24<br>**DP11&DP12**, **DP16&DP17** |
| **with respect to Hypothesis** | **DP2&DP9**, **DP3&DP6**, DP4&DP18, DP4&DP19, **DP5&DP25** DP6&DP10, **DP11&DP16**, **DP12&DP21**, DP13&DP23 **DP17&DP20**, DP176DP23, DP20&DP23 |

**Table 3**: Site A_ Cluster membership and Dendrogram (between groups, squ. Euclidean Distance)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 2 | DP11 | 4 | DP15 | 2 | DP21 | 2 |
| DP2 | 1 | DP8 | 2 | DP12 | 4 | DP16 | 2 | DP22 | 2 |
| DP3 | 1 | DP9 | 3 | DP13 | 2 | DP17 | 2 | DP23 | 2 |
| DP4 | 2 | DP10 | 1 | DP14 | 2 | DP18 | 3 | DP24 | 2 |
| DP5 | 2 | | | | | DP19 | 3 | DP25 | 2 |
| DP6 | 1 | | | | | DP20 | 2 | | |

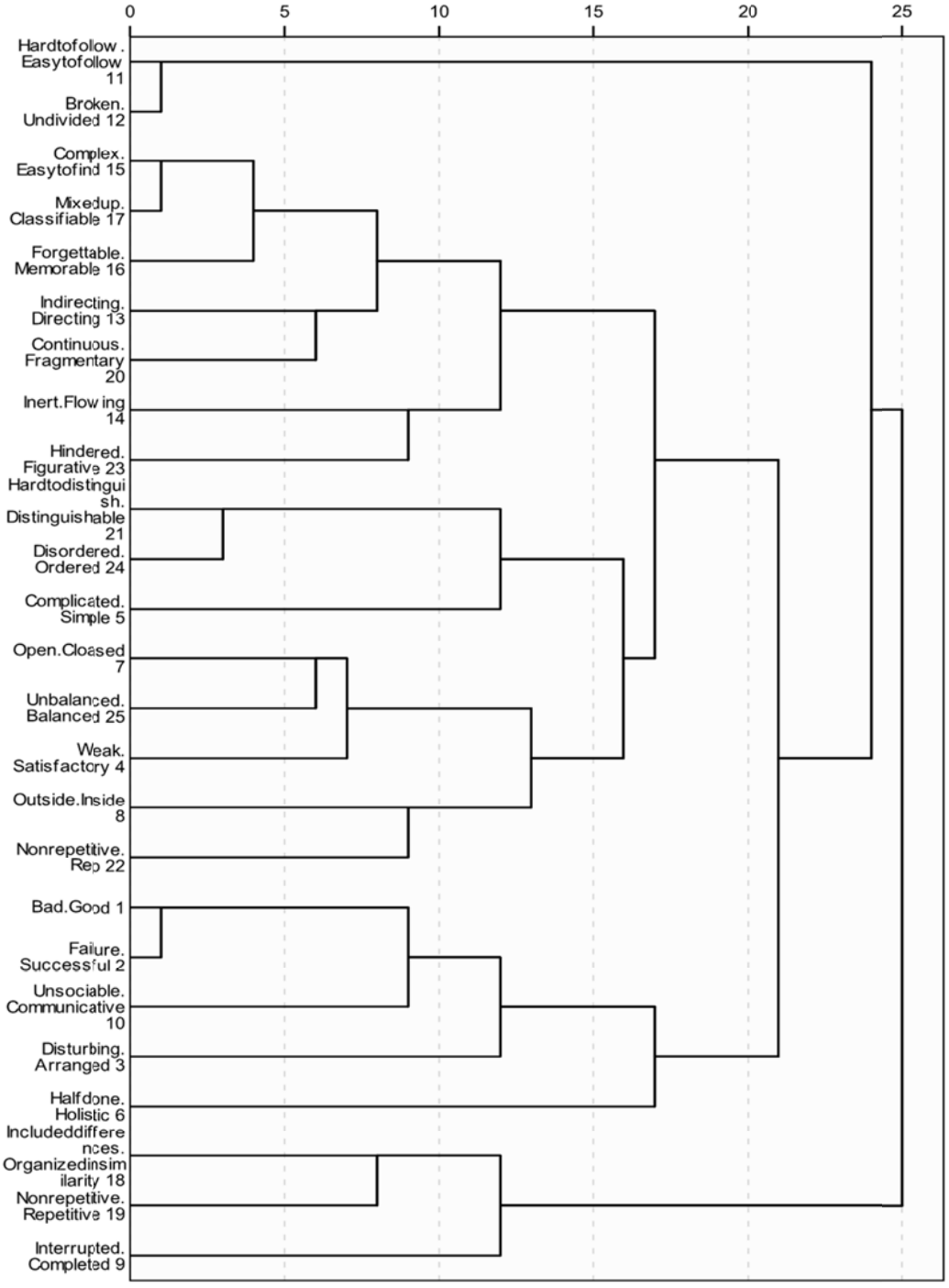
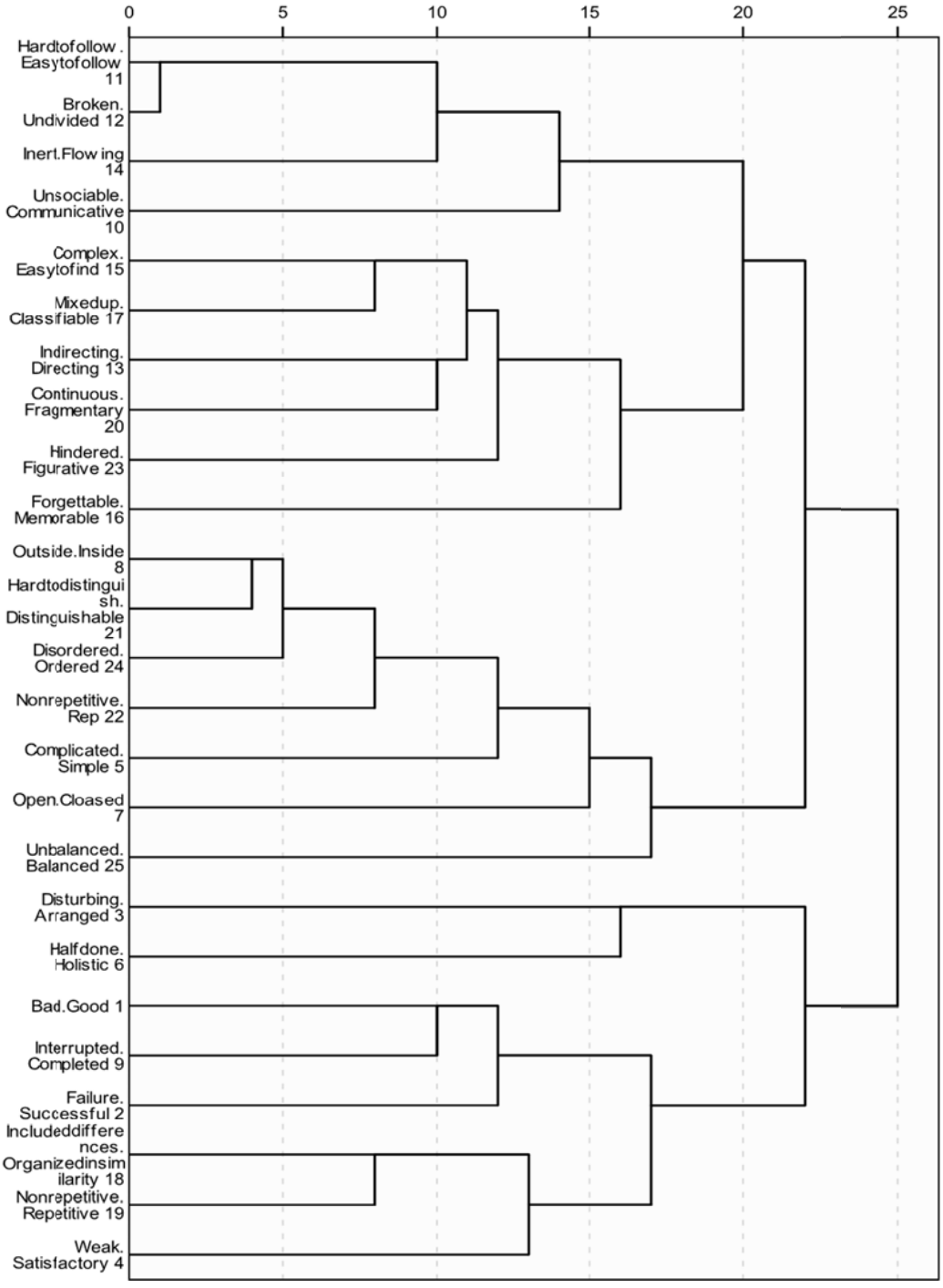


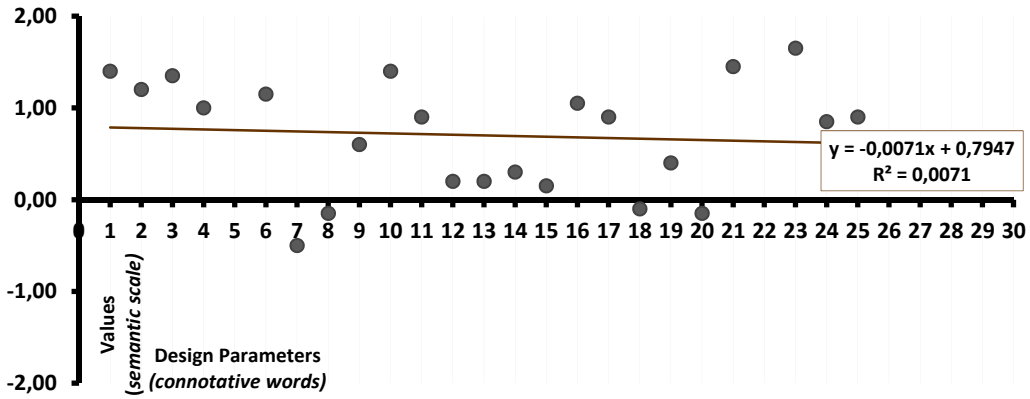
**Table 4**: Site A_ Cluster membership and Dendrogram (within groups, Pearson Correlation)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 3 | DP11 | 4 | DP15 | 4 | DP21 | 3 |
| DP2 | 1 | DP8 | 3 | DP12 | 4 | DP16 | 4 | DP22 | 3 |
| DP3 | 2 | DP9 | 1 | DP13 | 4 | DP17 | 4 | DP23 | 4 |
| DP4 | 1 | DP10 | 4 | DP14 | 4 | DP18 | 1 | DP24 | 3 |
| DP5 | 3 | | | | | DP19 | 1 | DP25 | 3 |
| DP6 | 2 | | | | | DP20 | 4 | | |



## ii. Site B_ the Faculty of Architecture

**Table 5**: Site B_ Mean Distribution Dot Chart




| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1,40 | DP7 | -0,50 | DP11 | 0,90 | DP15 | 0,15 | DP21 | 1,45 |
| DP2 | 1,20 | DP8 | -0,15 | DP12 | 0,20 | DP16 | 1,05 | DP22 | -0,30 |
| DP3 | 1,35 | DP9 | 0,60 | DP13 | 0,20 | DP17 | 0,90 | DP23 | 1,65 |
| DP4 | 1,00 | DP10 | 1,40 | DP14 | 0,30 | DP18 | -0,10 | DP24 | 0,85 |
| DP5 | 0,30 | | | | | DP19 | 0,55 | DP25 | 0,40 |
| DP6 | 1,15 | | | | | DP20 | 1,00 | | |

**Table 6**: Site B_ Correlations of design parameters (Appendix C)

| | |
|---|---|
| **High Correlations** | **DP1&DP4**, DP1&DP16, **DP1&DP24**, **DP3&DP24**, DP4&DP16, **DP5&DP12**, DP6&DP11, DP8&DP22, DP16&DP17, DP16&DP23, DP16&DP24, DP19&DP24, **DP20&DP24**, **DP24&DP25**<br>DP2&DP16, **DP3&DP6**, **DP3&DP17**, DP13&DP14, DP16&DP25, DP23&DP25<br>**DP1&DP2** |
| **with respect to Hypothesis** | DP1&DP17, **DP2&DP4**, DP2&DP23, **DP2&DP24**, **DP2&DP25**, **DP3&DP22**, **DP4&DP6**, **DP6&DP17**, DP7&DP13, DP11&DP14, DP14&DP18, DP14&DP21, DP15&DP22, **DP17&DP23**, **DP22&DP24** |

**Table 7**: Site B_ Cluster membership and Dendrogram (between groups, squ. Euclidean Distance)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 2 | DP11 | 1 | DP15 | 3 | DP21 | 1 |
| DP2 | 1 | DP8 | 2 | DP12 | 1 | DP16 | 1 | DP22 | 2 |
| DP3 | 1 | DP9 | 1 | DP13 | 3 | DP17 | 1 | DP23 | 1 |
| DP4 | 1 | DP10 | 1 | DP14 | 3 | DP18 | 3 | DP24 | 1 |
| DP5 | 1 | | | | | DP19 | 2 | DP25 | 1 |
| DP6 | 1 | | | | | DP20 | 4 | | |

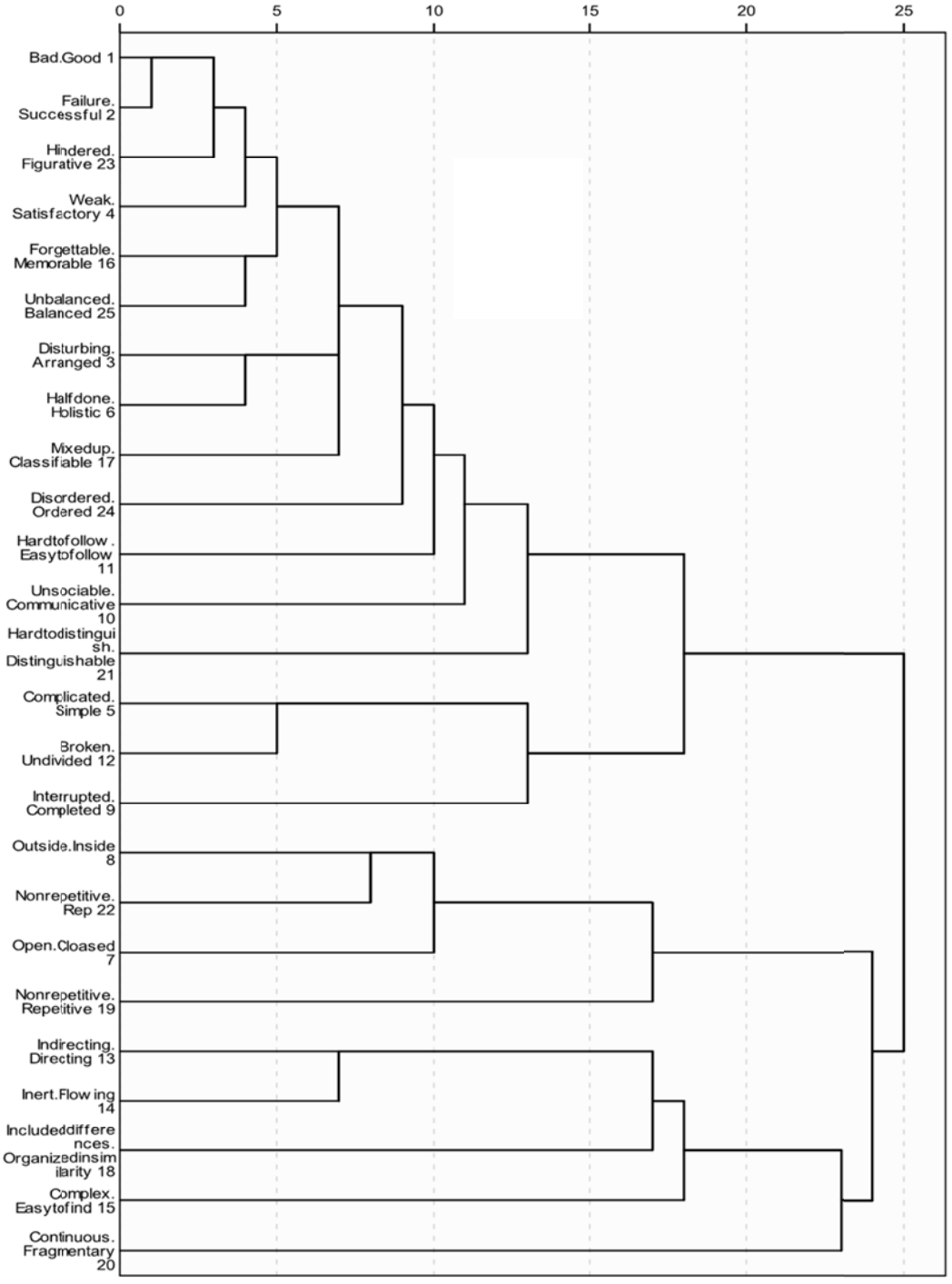
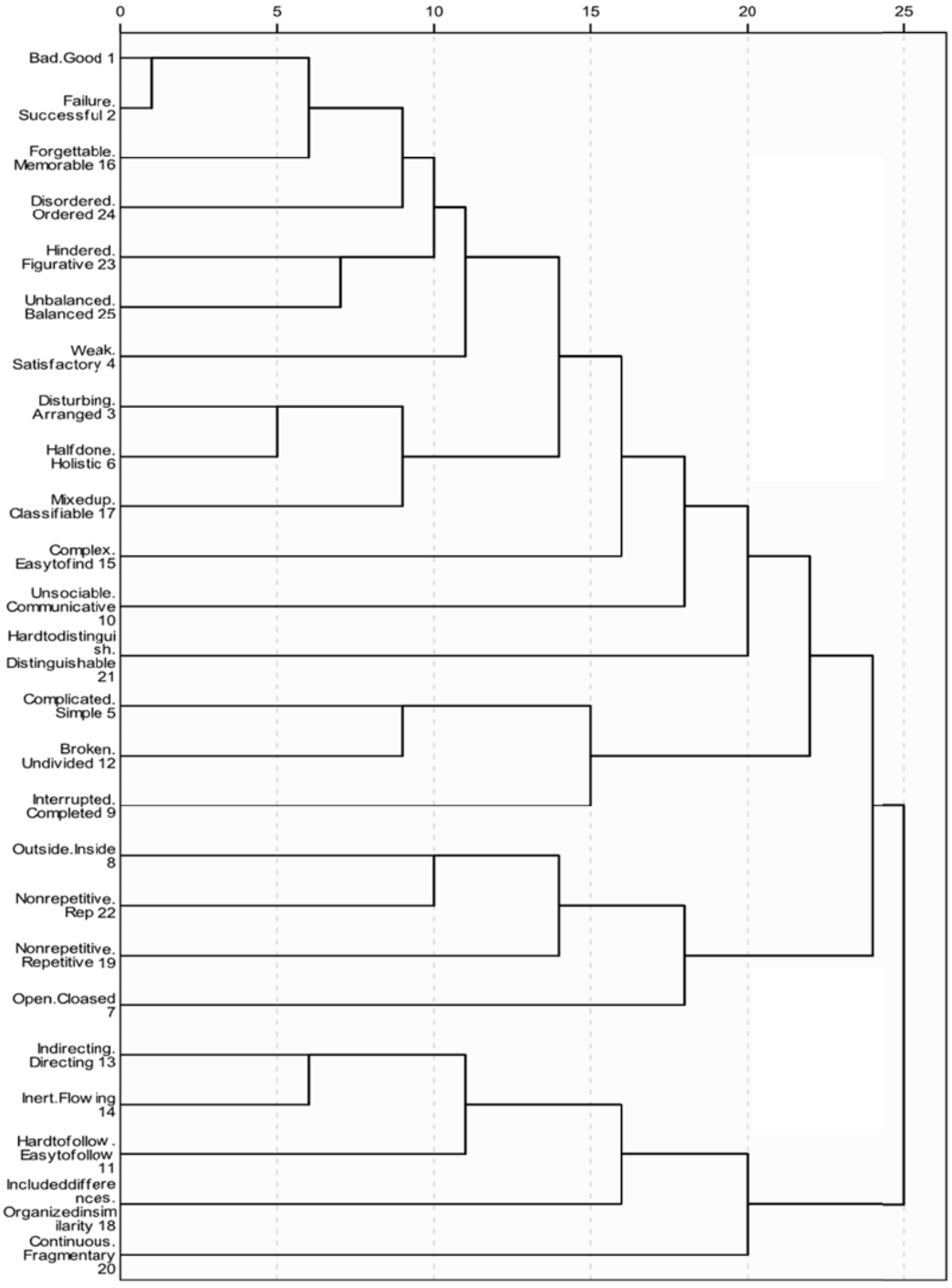


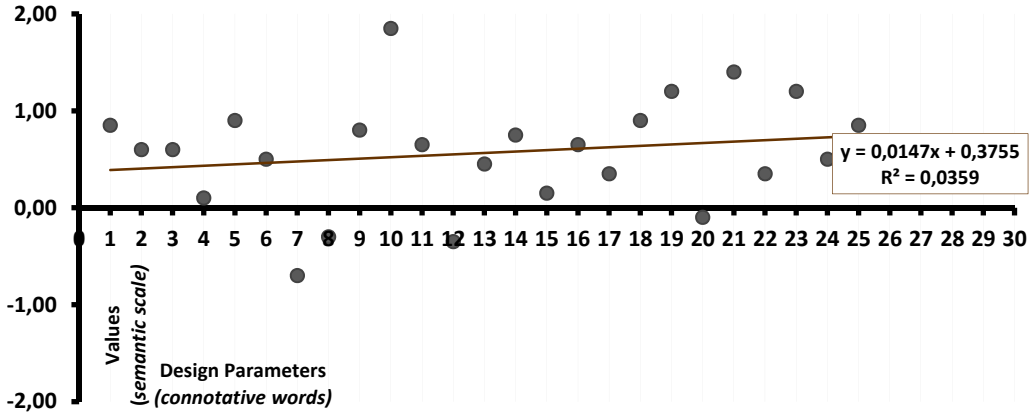
**Table 8**: Site B_ Cluster membership and Dendrogram (within groups, Pearson Correlation)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 3 | DP11 | 4 | DP15 | 1 | DP21 | 1 |
| DP2 | 1 | DP8 | 3 | DP12 | 2 | DP16 | 1 | DP22 | 3 |
| DP3 | 1 | DP9 | 2 | DP13 | 4 | DP17 | 4 | DP23 | 1 |
| DP4 | 1 | DP10 | 1 | DP14 | 4 | DP18 | 1 | DP24 | 1 |
| DP5 | 2 | | | | | DP19 | 3 | DP25 | 1 |
| DP6 | 1 | | | | | DP20 | 4 | | |



### iii. Site C_ the Accommodation Zone: Dormitories

**Table 9**: Site C_ Mean Distribution Dot Chart




| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 0,85 | DP7 | -0,70 | DP11 | 0,65 | DP15 | 0,15 | DP21 | 1,40 |
| DP2 | 0,60 | DP8 | -0,30 | DP12 | -0,35 | DP16 | 0,65 | DP22 | 0,35 |
| DP3 | 0,60 | DP9 | 0,80 | DP13 | 0,45 | DP17 | 0,35 | DP23 | 1,20 |
| DP4 | 0,10 | DP10 | 1,85 | DP14 | 0,75 | DP18 | 0,90 | DP24 | 0,50 |
| DP5 | 0,90 | | | | | DP19 | 0,55 | DP25 | 1,20 |
| DP6 | 0,50 | | | | | DP20 | 1,00 | | |

**Table 10**: Site C_ Correlations of design parameters (Appendix C)

| | |
|---|---|
| **High Correlations** | **DP1&DP2**, DP2&DP11, **DP5&DP6**, DP5&DP12, **DP10&DP21**, DP10&DP22, **DP14&DP23**, DP17&DP22, DP17&DP23<br>DP5&DP14, DP11&DP14, DP11&DP17, DP14& DP20, DP16&DP23, **DP18&DP19**<br>DP14&DP17 |
| **with respect to Hypothesis** | **DP1&DP4**, **DP2&DP4**, **DP2&DP24**, **DP4&DP22**, **DP6&DP25**, DP7&DP20 |

**Table 11**: Site C_ Cluster membership and Dendrogram (between groups, squ. Euclidean Distance)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 3 | DP11 | 4 | DP15 | 1 | DP21 | 1 |
| DP2 | 1 | DP8 | 3 | DP12 | 2 | DP16 | 1 | DP22 | 3 |
| DP3 | 1 | DP9 | 2 | DP13 | 4 | DP17 | 1 | DP23 | 1 |
| DP4 | 1 | DP10 | 1 | DP14 | 4 | DP18 | 4 | DP24 | 1 |
| DP5 | 2 | | | | | DP19 | 3 | DP25 | 1 |
| DP6 | 1 | | | | | DP20 | 4 | | |

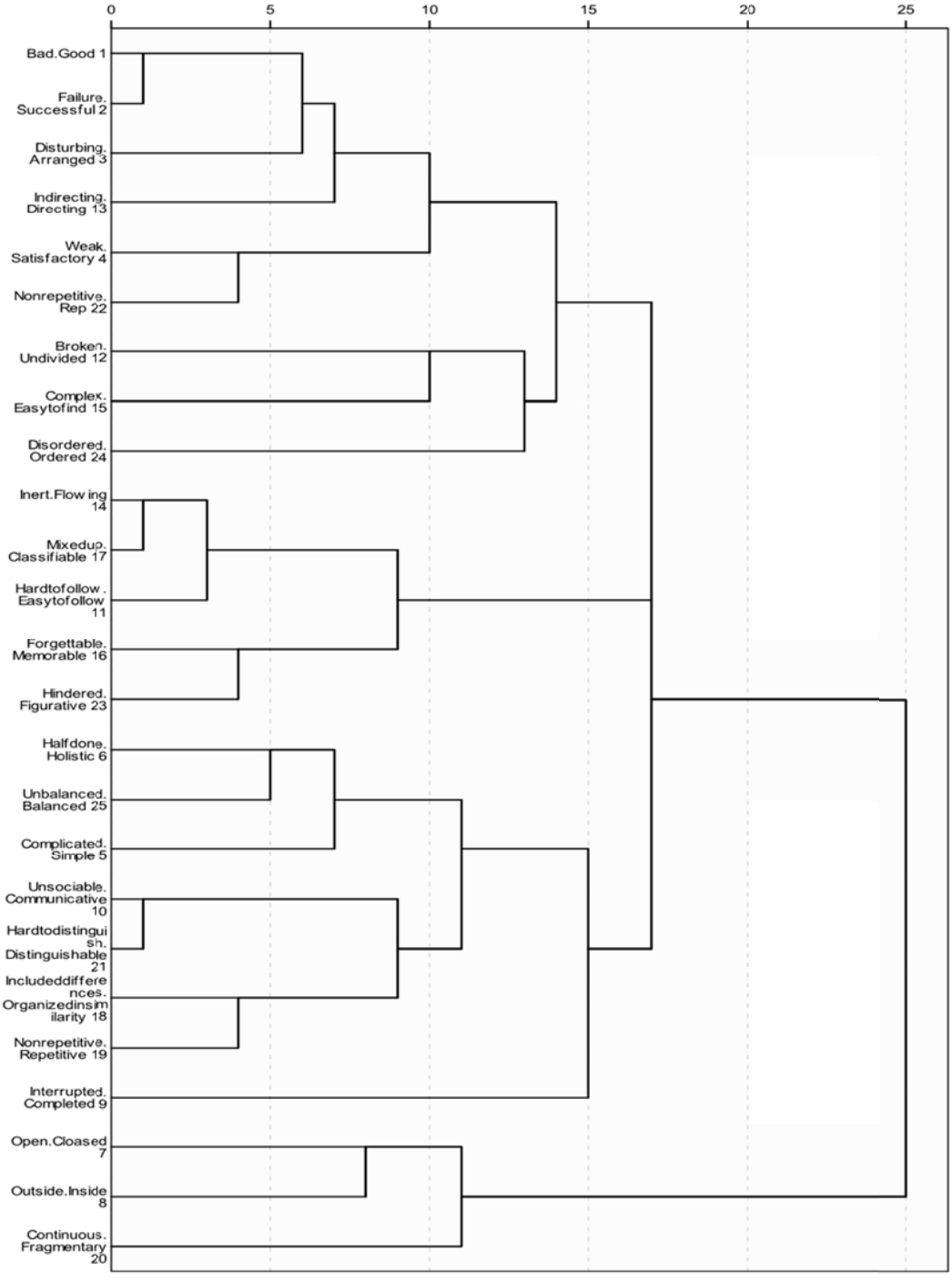
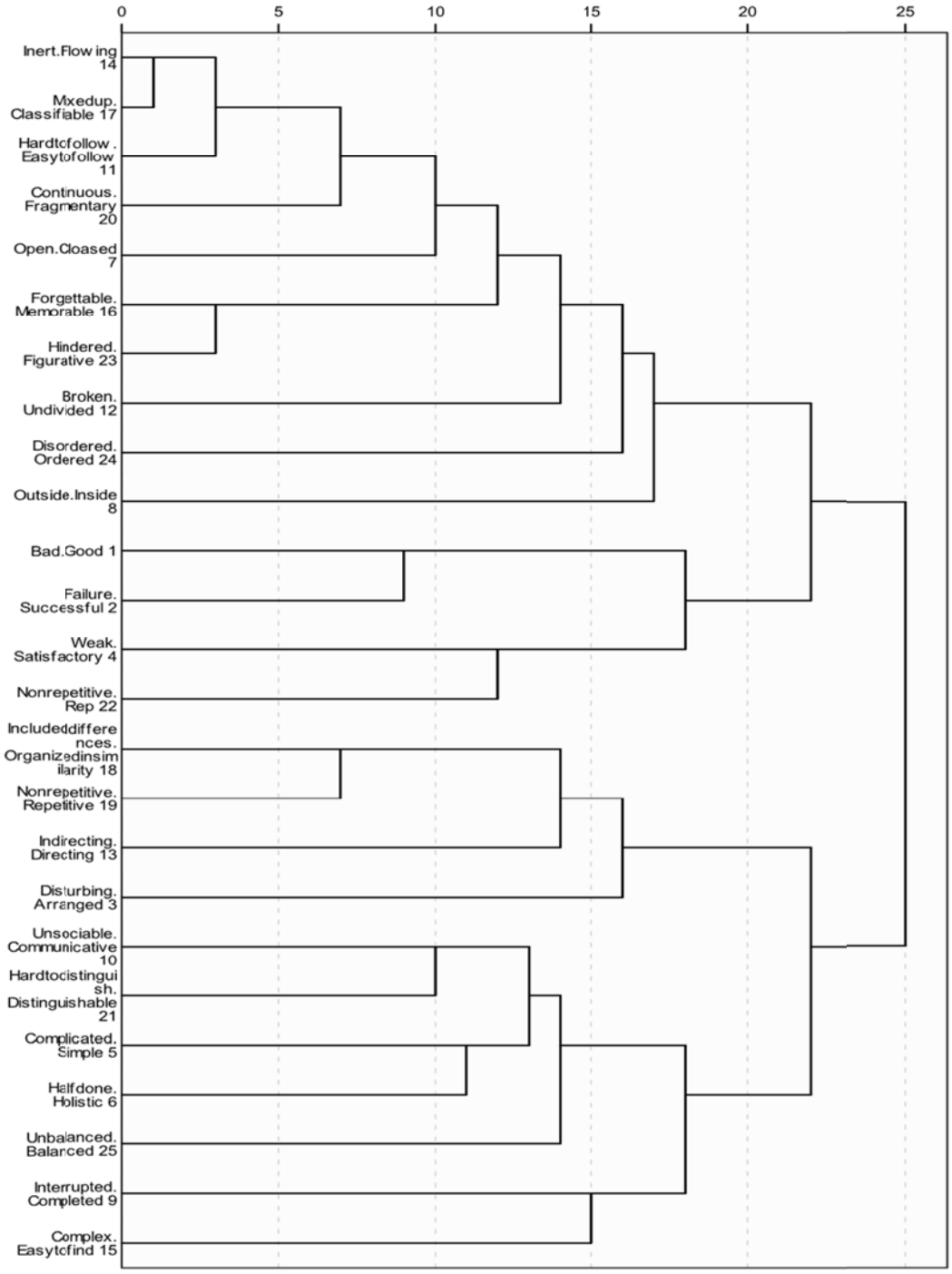


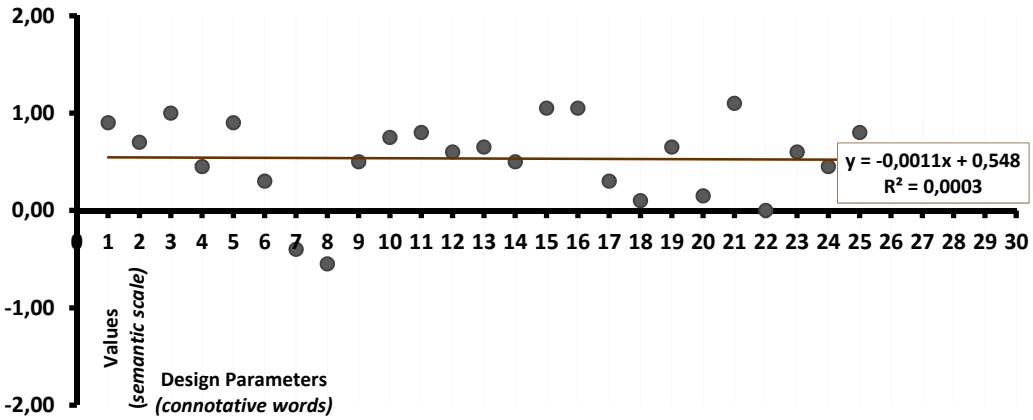
**Table 12**: Site C_ Cluster membership and Dendrogram (within groups, Pearson Correlation)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 4 | DP11 | 4 | DP15 | 3 | DP21 | 3 |
| DP2 | 1 | DP8 | 4 | DP12 | 4 | DP16 | 4 | DP22 | 1 |
| DP3 | 2 | DP9 | 3 | DP13 | 2 | DP17 | 4 | DP23 | 4 |
| DP4 | 1 | DP10 | 3 | DP14 | 4 | DP18 | 2 | DP24 | 4 |
| DP5 | 3 | | | | | DP19 | 2 | DP25 | 3 |
| DP6 | 3 | | | | | DP20 | 4 | | |



## iv. Site D_ CC&EE: The Bridge Building

**Table 13**: Site D_ Mean Distribution Dot Chart




| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 0,90 | DP7 | -0,40 | DP11 | 0,80 | DP15 | 1,05 | DP21 | 1,10 |
| DP2 | 0,70 | DP8 | -0,55 | DP12 | 0,60 | DP16 | 1,05 | DP22 | 0,00 |
| DP3 | 1,00 | DP9 | 0,50 | DP13 | 0,65 | DP17 | 0,30 | DP23 | 0,60 |
| DP4 | 0,45 | DP10 | 0,75 | DP14 | 0,50 | DP18 | 0,10 | DP24 | 0,45 |
| DP5 | 0,90 | | | | | DP19 | 0,55 | DP25 | 0,65 |
| DP6 | 0,30 | | | | | DP20 | 1,00 | | |

**Table 14**: Site D_ Correlations of design parameters (Appendix C)

| | |
|---|---|
| **High Correlations** | **DP1&DP25**, DP4&DP15, DP5&DP7, DP5&DP10, DP7&DP14, DP11&DP14, DP12&DP21, **DP12&DP24**, DP15&DP24, DP15&DP25, DP18&DP19, DP18&DP20, DP21&DP23<br>**DP2&DP4**, **DP2&DP25**, DP6&DP19, DP7&DP8, DP9&DP15, DP9&DP19, DP11,DP12, DP12&DP15, DP13&DP21, DP15&DP16, DP18&DP22<br>**DP24&DP25** |
| **with respect to Hypothesis** | **DP1&DP5**, DP1&DP15, DP1&DP16, **DP2&DP3**, **DP2&DP6**, **DP2&DP24**, **DP3&DP4**, DP3&DP18, **DP3&DP24**, DP4&DP9, **DP4&DP24**, **DP5&DP25**, DP6&DP9, DP8&DP11, **DP9&DP12**, DP9&DP24, DP9&25, DP11&DP21, DP14&DP21, DP16&DP21, DP17&DP24, DP17&DP25, DP19&DP25 |

**Table 15**: Site D_ Cluster membership and Dendrogram (between groups, squ. Euclidean Distance)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 2 | DP11 | 1 | DP15 | 1 | DP21 | 1 |
| DP2 | 1 | DP8 | 2 | DP12 | 1 | DP16 | 1 | DP22 | 2 |
| DP3 | 1 | DP9 | 1 | DP13 | 1 | DP17 | 1 | DP23 | 1 |
| DP4 | 1 | DP10 | 3 | DP14 | 1 | DP18 | 2 | DP24 | 1 |
| DP5 | 1 | | | | | DP19 | 1 | DP25 | 1 |
| DP6 | 1 | | | | | DP20 | 4 | | |

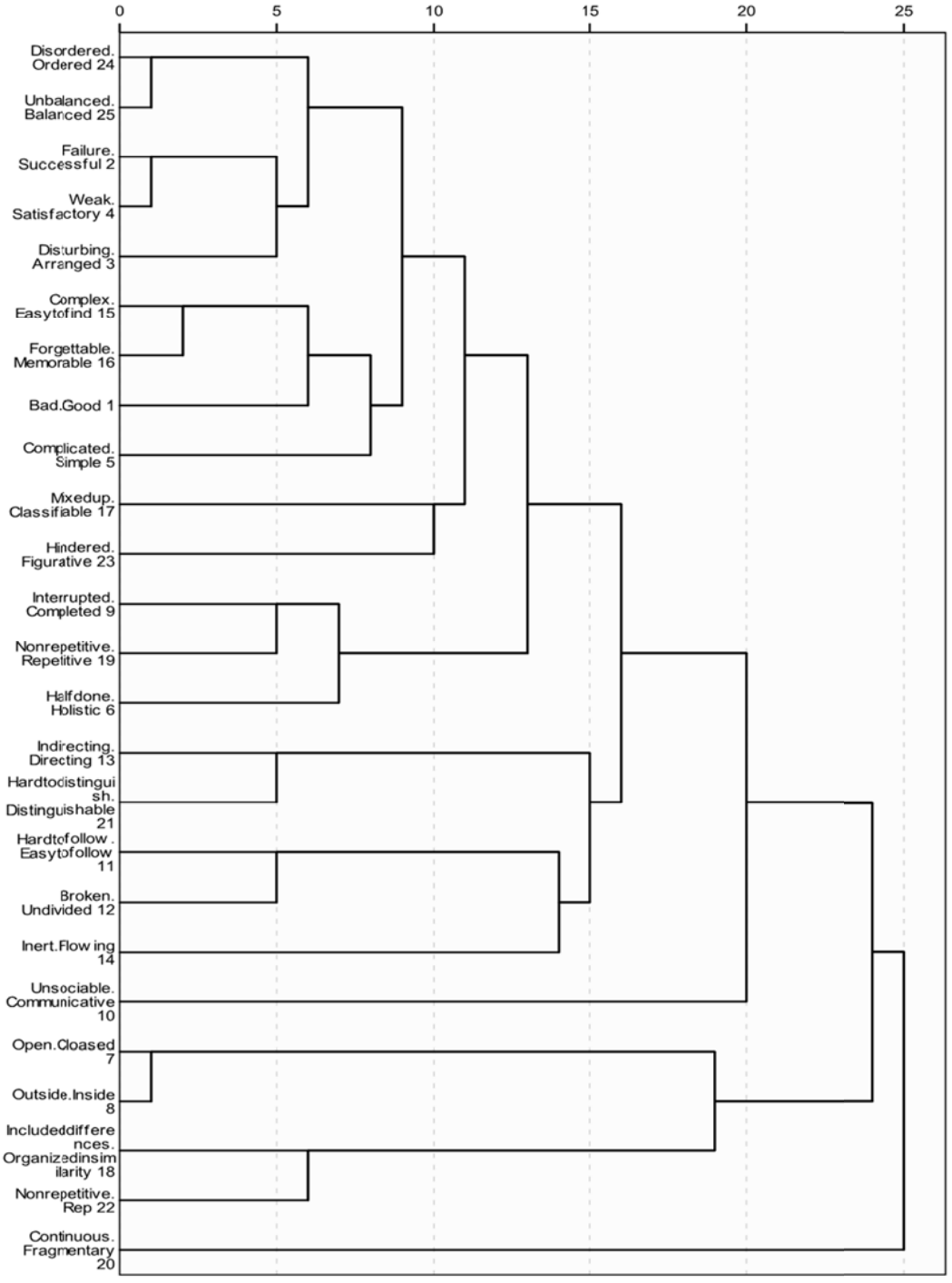
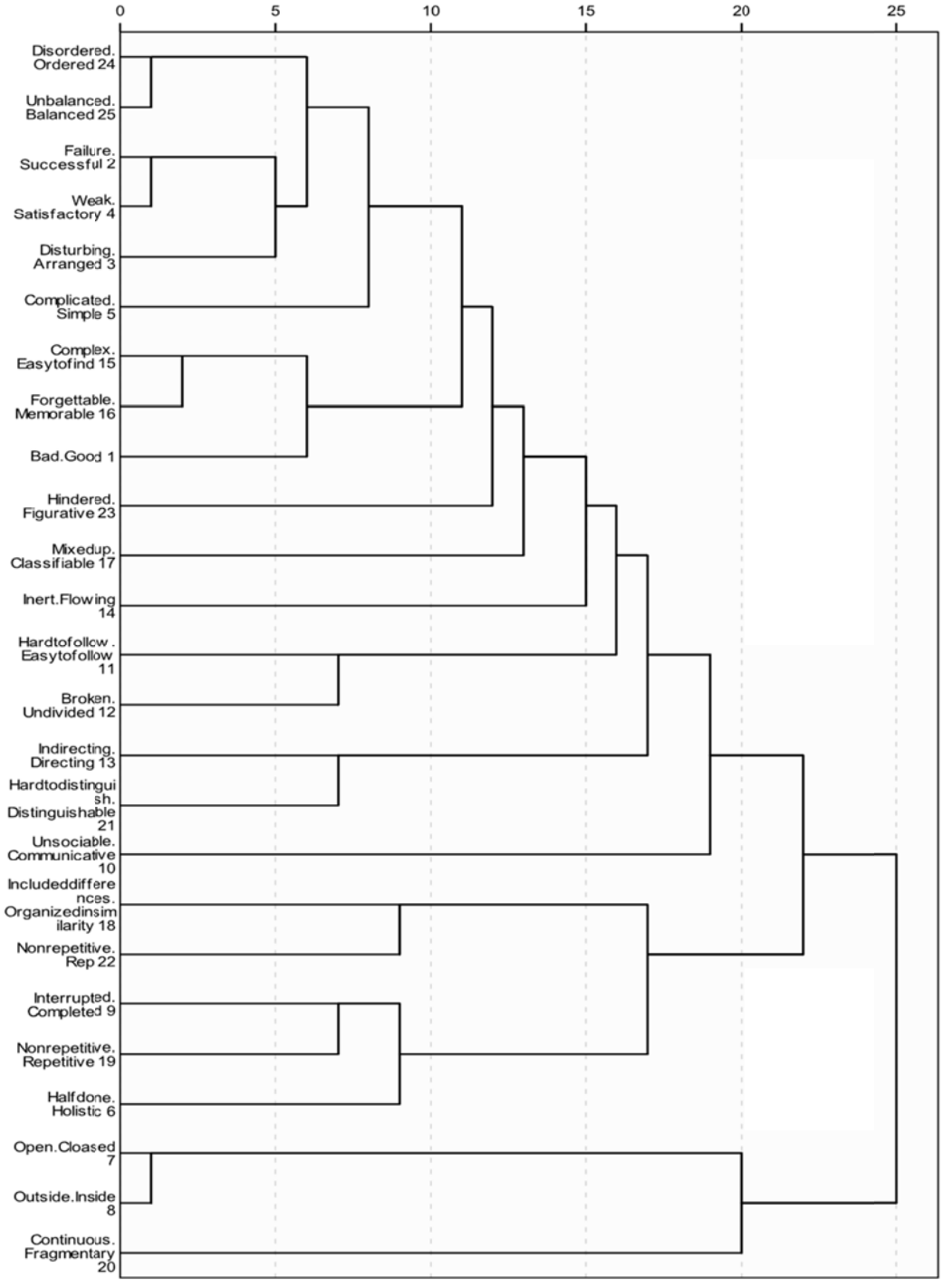


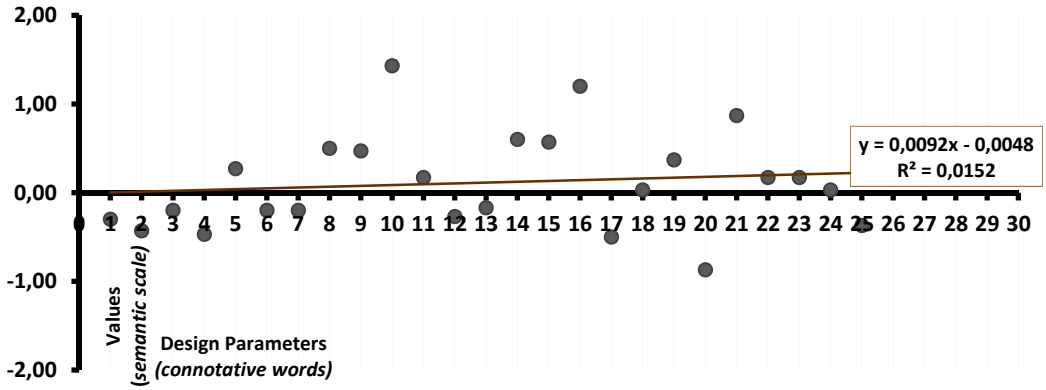
**Table 16**: Site D_ Cluster membership and Dendrogram (within groups, squ. Euclidean Distance)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 3 | DP11 | 1 | DP15 | 1 | DP21 | 1 |
| DP2 | 1 | DP8 | 3 | DP12 | 1 | DP16 | 1 | DP22 | 2 |
| DP3 | 1 | DP9 | 2 | DP13 | 1 | DP17 | 1 | DP23 | 1 |
| DP4 | 1 | DP10 | 1 | DP14 | 1 | DP18 | 2 | DP24 | 1 |
| DP5 | 1 | | | | | DP19 | 2 | DP25 | 1 |
| DP6 | 2 | | | | | DP20 | 4 | | |



## v. Site E_ the Shopping Center: Çarşı

**Table 17**: Site E_ Mean Distribution Dot Chart




| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | -0,30 | DP7 | -0,20 | DP11 | 0,17 | DP15 | 0,57 | DP21 | 0,57 |
| DP2 | -0,43 | DP8 | 0,50 | DP12 | -0,27 | DP16 | 1,20 | DP22 | 0,17 |
| DP3 | 0,20 | DP9 | 0,47 | DP13 | -0,17 | DP17 | -0,50 | DP23 | 0,17 |
| DP4 | -0,47 | DP10 | 1,43 | DP14 | 0,60 | DP18 | 0,03 | DP24 | 0,03 |
| DP5 | 0,27 | | | | | DP19 | 0,55 | DP25 | 0,37 |
| DP6 | -0,20 | | | | | DP20 | 1,00 | | |

**Table 18:** Site E_ Correlations of design parameters (Appendix C)

| | |
|---|---|
| **High Correlations** | **DP1&DP9**, **DP1&DP24**, **DP1&DP25**, DP3&DP4, **DP3&DP21**, DP4&DP18, DP4&DP23, DP5&DP23, DP7&DP15, DP7&DP16, DP8&DP25, DP11&DP16, DP11&DP23, **DP12&DP23**, DP13&DP16, **DP14&DP24**, DP15&DP17, DP15&DP22, DP15&DP23, DP17&DP23, DP18&DP21, DP21&DP23<br>DP1&DP3, DP1&DP4, DP2&DP3, DP2&DP4, DP2&DP24, **DP4&DP24**, DP11&DP15, DP11&DP17, DP11&DP24, DP12&DP13, **DP12&DP17**, **DP12&DP18**, DP12&DP24, DP13&DP15, **DP13&DP17**, DP21&DP22, DP23&DP24, **DP24&DP25**<br>**DP1&DP2**, **DP11&DP12**, DP11&DP13, DP15&DP16 |
| **with respect to Hypothesis** | DP1&DP23, DP2&DP23, **DP3&DP24**, DP4&DP11, DP4&DP12, **DP4&DP25**, DP7&DP25, DP8&DP23, DP12&DP15, DP14&DP15, DP16&DP17, DP16&DP23, DP16&DP24, DP16&DP25, **DP17&DP18**, DP19&DP23 |

**Table 19**: Site E_ Cluster membership and Dendrogram (between groups, squ. Euclidean Distance)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 2 | DP11 | 1 | DP15 | 3 | DP21 | 1 |
| DP2 | 1 | DP8 | 2 | DP12 | 1 | DP16 | 3 | DP22 | 2 |
| DP3 | 1 | DP9 | 1 | DP13 | 1 | DP17 | 1 | DP23 | 1 |
| DP4 | 1 | DP10 | 3 | DP14 | 3 | DP18 | 1 | DP24 | 1 |
| DP5 | 1 | | | | | DP19 | 1 | DP25 | 1 |
| DP6 | 1 | | | | | DP20 | 4 | | |

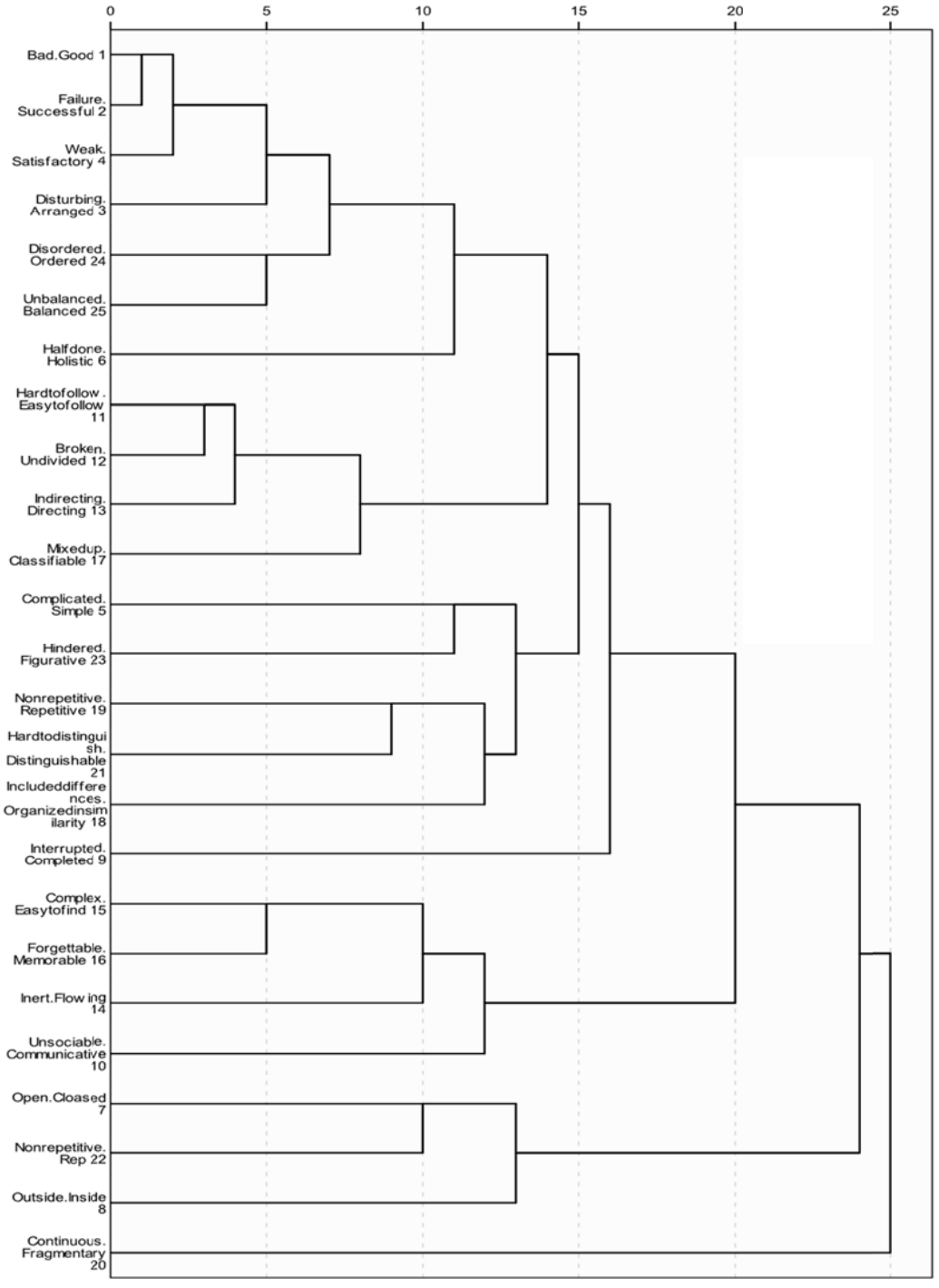
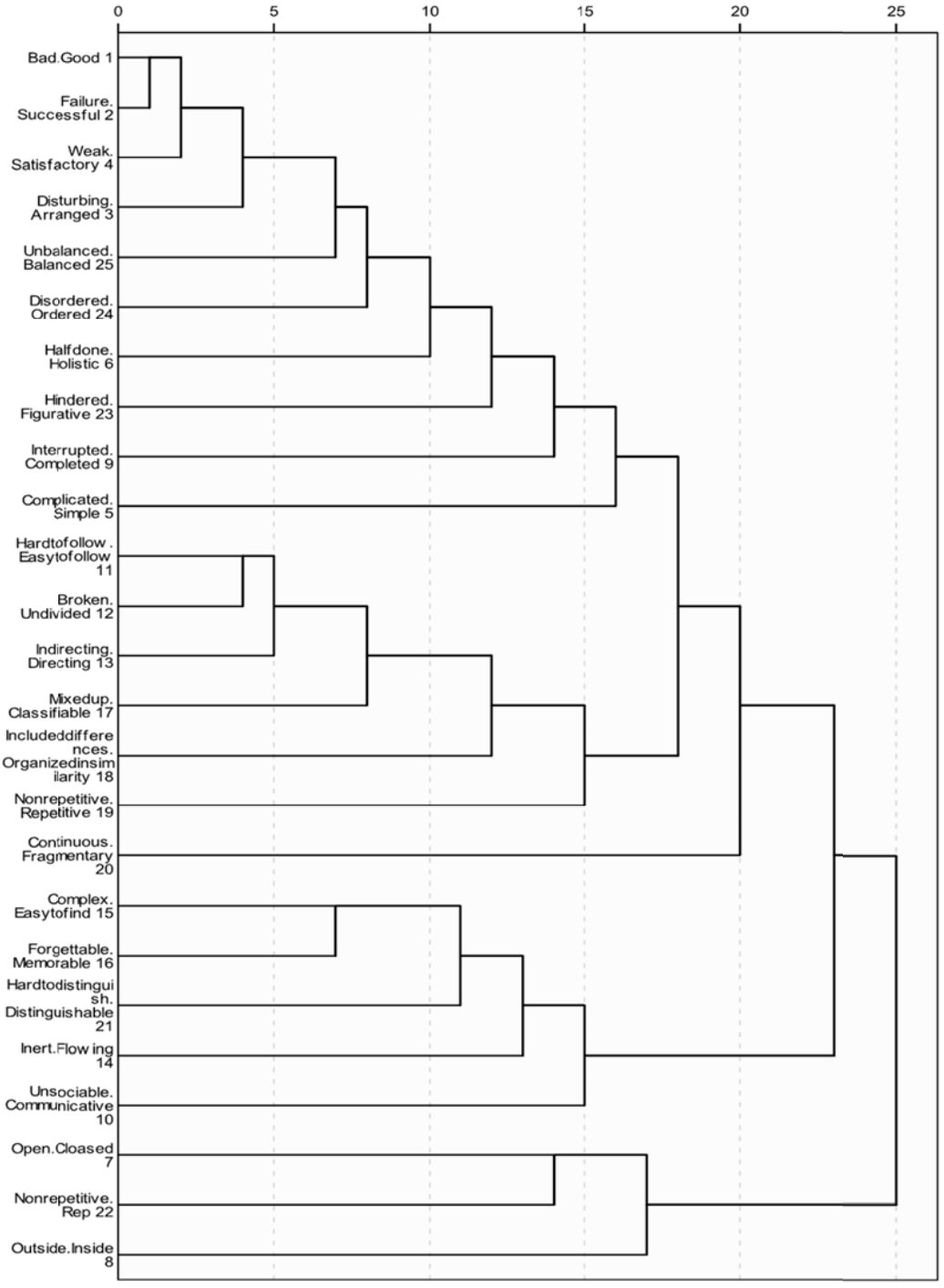


**Table 20**: Site E_ Cluster membership and Dendrogram (within groups, squ. Euclidean Distance)

| Prägnanz | | Closure | | Continuity | | Grouping | | Pattern | |
|---|---|---|---|---|---|---|---|---|---|
| DP1 | 1 | DP7 | 2 | DP11 | 1 | DP15 | 3 | DP21 | 3 |
| DP2 | 1 | DP8 | 2 | DP12 | 1 | DP16 | 3 | DP22 | 2 |
| DP3 | 1 | DP9 | 1 | DP13 | 1 | DP17 | 1 | DP23 | 1 |
| DP4 | 1 | DP10 | 3 | DP14 | 3 | DP18 | 1 | DP24 | 1 |
| DP5 | 1 | | | | | DP19 | 1 | DP25 | 1 |
| DP6 | 1 | | | | | DP20 | 4 | | |



**Interpretations**

According to the study, a *good* design can alleviate the perceptual problems of dimensional realms. It is proposed that a *good* (gestalt) design needs to be not only *holistic*, which is achieved by a *balance* of visual qualities composed of *orders* and *simplicity*, but also *co-relative*, in other words *inter-related* achieved *properly* and *sufficiently*. It could be re-stated that a *good* design respects Gestalt Theory and the design parameters which strengthen the theory. Therefore, the survey was conducted to examine these proposals. That is why the discussion of the outputs requires to be taken in this context in relation with the aim of the study.

Statistical outputs, adapted from SPSS and given in previous tables[84], show the relations among the design principles and enable comparisons of their effects on the design in the context of visual *good'ness*. The outputs should be interpreted with respect to some DPs[85] (**DP2, DP3, DP4, DP5, DP6, DP9, DP24, DP25;** and **DP11, DP12, DP17, DP20, DP21**), in this way, it could be easy to make comments focusing on *keys*[86]. To emphasize the context again, balance among spaces, between designs and their environments, is needed to provide order, hierarchy, and relation, which pattern a whole, and satisfactions in experiential daily lives. Similarly, consistency among the re-presentations, between the concepts and their designs, is asked for better proper and sufficient re-presentations.

However, some of the DPs needed to be eliminated or ignored (maybe or not for analysis) for the interpretations and the discussions because they were included in the questionnaire to support the examination of the five design principles, for example, the enclosure of some specific places such gardens, courtyards, etc. (**DP7, DP8, DP10**). Additionally some of them, which are based on recognition and experiences, could be considered apart from the whole of the designs (**DP15, DP16**).

[84] See page 81: The Section 3.2.2.1 Results (Design Principles)

[85] Hypothetical DPs: See page 78 and page 79: Figure 3.10 and Figure 3.11

[86] See page 9 and page 11: Footnoe 13 and Figure 1.10

The interpretations of the outputs are discussed sequentially site by site:

**Site A_ Department of Basic English: F&G Buildings**

Table 1 shows that scatters of the DPs are approximately normally distributed on graph, except for three DPs which have low correlation towards the normal due to their conceptual differences. For example, DP12 means that the design is perceived as partial; in other words, it has two blocks (DVD-pdf-p.14). In addition to this, Table 2 indicates the correlations among the DPs with respect to the Pearson Matrix, shown in Appendix C, p. 140. A set of high correlations are taken into consideration for interpretations, narrowing down through the hypothetical DPs. When those correlations in Table 2 are examined, it draws attention to the mutual DPs and mutual correlations between these two sets. It is highly deductible according to the Pearson Correlation Matrix that a *good design* is expected to be completed and consequently, successful. To interpret, the design is grouped with the help of similarity (and continuity), and then, turned into perceptually distinguishable, easy-to-find/follow and satisfactory. To sum up, if it is *simple*, it is *balanced* and if it is arranged, it means it is *holistic*. On the other hand, clusters analysis and the dendrogram present similar close relations as in the outputs of the matrix, more clearly. These close-relations are displayed in the same clusters. For example, Table 3, 'goodness', 'success', 'holism' are in a cluster (**DP1, DP2, DP6**) whereas 'classifying', 'similarity', 'follow', 'order and balance', 'completeness' in another. To conclude, Table 2, Table 3 and Table 4 support the discourse of the study pointing out that *balance* works together with *simplicity* and *order* (**DP5, DP24, DP25** are in same clusters with high correlations) despite executed by different formulas (squ. Euclidean Distance and Pearson Correlation).

**Site B_ the Faculty of Architecture**

The scattering of mean values shows that this site is unusual (not conventional) and not easy to perceive since it has different generating patterns for its various spaces as Figure 3.3 illustrates. In other words, this design seems as constructed with special *conceptual fictions*. The graph in Table 5 describes the site: it is not *sufficiently* and *consistently simple* which affects the *balanced* situation, but it is quite (differently) *ordered* among the spaces which makes them classifiable. In

addition to this, Table 6 indicates similar correlations with Site A. According to its matrix on p. 141, the site is perceived precisely *good* by means of being ordered/arranged which qualifies the design as successful and satisfactory (**DP1, DP2, DP3, DP24**). It could be interpreted concerning the matrix that its *simplicity* is perceived from *ordered* continuation (**DP5, DP24, DP12**) of repetitive fragments (gathered in figurative spaces), consequently, it is *full/holistic* and perceptually satisfactory (**DP22, DP20, DP23, DP17**). Table 7 and Table 8 support this interpretation because all prägnanz parameters in one group including also 'closure', 'continuity', 'grouping', and 'pattern', which means *simplicity* and *order*, easy-to-follow and good-continuation, *holism* and *goodness* are related and needed for satisfactory visual perception.

**Site C_ the Accommodation Zone: Dormitories**

As in Site A, mean values are approximately normally distributed, except DP7, DP8, DP10, and DP12, eliminated ones for the clustering. According to the graph in Table 9, the DPs, 'social', 'organized in similarity', 'repetitive', 'distinguishable', 'figurative' (**DP10, DP18, DP19, DP21, DP23**) show extreme mean values. This could depend on its typological feature, the concept of being an accommodation zone, approving *consistency* between the concept and the design. Moreover, Table 10 clarifies that any conceptual fiction is finalized in *good* design and in perceptual success and satisfaction (**DP1, DP2, DP4**) if it is *holistic* and patterned by *order* (**DP2, DP6, DP24, DP25**). When it comes to the dendrogram, Table 11 marks a cluster which includes order, balance, holism referring a good design, too (**DP1, DP6, DP24, DP25**). To sum up, Table 11 and Table 12 notifies that similar fragments create a harmony for easy-to-follow and a *simple* continuation forms completeness **(DP5, DP9, DP12**).

**Site D_ CC&EE: The Bridge Building**

Table 13 shows mean distribution of this site pointing it as the best one among the sites, concerning the normally distributed scatters on the graph, where the distribution increases the number of the correlations among the parameters. However, Table 14, Table 15 and Table 16 present the same correlations with the mutual ones of other outputs of sites, but more within high levels, referring to the

discourse of the study. This means Pearson Correlation and Cluster Analysis, between groups and within groups, render similar outputs for this site. To interpret and repeat again, if a design is *good*, it means it is *holistic, simple* and *ordered* and probably in *balance*, correspondingly, the design makes the users perceive as satisfactory (**DP1, DP 24, DP25;** and **DP2, DP3, DP4, DP5, DP6**).

**Site E_ the Shopping Center: Çarşı**

The laymen had difficulty in describing or in evaluating this design, comparing to the other sites. Therefore, the scatter graph in Table 17 could not show normally distributed mean and could not present any information explicitly about the site; because, the cluster members are not qualified enough to indicate the relations in detail and there are nearly same members both between groups and within groups. However, Table 18 and the Pearson Correlation Matrix reveal many correlations, which are usually the mutual ones with the other site. For example, **DP1** is in high correlation with **DP9**, **DP24**, **DP25**, and in strong relationship together with **DP2**, **DP3**, **DP4**. In addition to this, Table 19 illustrates that there are other inter-relatedly defined DPs, which could be expressed perceptually: similarity describes groups and groups follow each other though undivided directions (**DP12, DP13, DP14, DP17, DP18**). According to Table 20, the dendrogram narrates all parameters hierarchically. The first cluster in above of the tree-diagram explains prägnanz and *holism* with *simplicity*, *order*, *balance*, completeness, success, and satisfactory. The second cluster in the middle signs *patterning* (*parts & whole relation*) with a continuation of similar and repetitive parts as mentioned recently in this paragraph. The third cluster in below of the tree-diagram reflects the specific conditions (DP16 reminds of recognition and experiences and the other study the semi-open/close spaces) which cloud be thought as eliminated groups.

To sum up, whether any design, differently conceptualized, could be perceived as *good* or *ill*, there are always similar and repetitive interpretation about the survey sites in the context of the visual perception: *simplicity* and *order*, *balance*, *holism* are in a cluster, which means their correlations are strong and together they pattern a good whole.

### 3.2.2.2 Responses (Design Elements)

**Table 21**: Design elements revealed by the examination (responses to open-ended questions)

| design principle | DP * | **design elements** (Which elements? How? Why?) Site A | Site B | Site C | Site D | Site E |
|---|---|---|---|---|---|---|
| ***Prägnanz*** | DP 1 | | *balance between inside and outside, solid-void* | | | |
| | DP 2 | *differentiation materials and colors* | *both similar and hem dissimilar* | | *position, location* | *form, compact, undivided-continuous wall* |
| | DP 3 | *contour, similarity, typology (plan), hierarchy* | | *form, typology (plan)* | *plain, simple* | |
| | DP 4 | *materials, coding, typology* | *regularity, form, original (character)* | *too much similar* | *plain and simple form* | *not well-defined, unbalance solid-void* |
| | DP 5 | *symmetry, similarity in typology, number of floors* | *modular, plain, order, neutral orientation* | *form* | | *proportion, wall* |
| | DP 6 | | *form, similarity in proportions* | | *plain* | *arrangement, chaos, proportions in voids* |
| ***Closure*** | DP 7 | *border-like wall and their proportions* | *border, disproportions in forms* | | | *disproportions in heights and width* |
| | DP 8 | *border and edge* | *landscape, illumination* | | *surfaces above and sides* | *disproportions, crowdedness* |
| | DP 9 | | | *landscape, but not well-defined space* | *feeling of transition* | *disproportions, crowdedness* |
| | DP 10 | *central position, orientation* | | | *disproportion, amorphous* | *crowdedness, narrowness, unbalance* |
| ***Good-cont.*** | DP 11 | *reference line and paths, unbalance distribution* | *without signboards, no marks* | *position, location, landscape* | *regularity, alignment, location, orientation* | *form (too much solid, just mass)* |
| | DP 12 | *transportation* | *reference-line, too much groupings* | *orientation, order in solid-void, landscape* | *alignment, arrangement differentiations in materials and width* | *structure, columns, arrangement, furnishing, huge and unbalance proportions* |
| | DP 13 | *common fate,* | *staircases, typology, gallery, too much branches from center* | *signboards* | *disproportions of corridor in height and width, coding* | *staircase, much colorfulness* |
| | DP 14 | | *lighting, spacious* | | | *differentiation in form, centralization (stairs)* |
| ***Grouping*** | DP 15 | *discriminative features* | *much entrance, much orientation, position and location on alley* | *orientation, much similar, not well-defined in paths* | *landmark* | |
| | DP 16 | *integration of groups,* | *modular typology* | | | *form, function, typology* |
| | DP 17 | *contour, style, material, landscape, form, border* | *regularity, order* | *farness among mass, much similarity* | *closeness, explicit staircase* | *discrimination, lack of lighting and air-conditioning* |
| | DP 18 | *facade articulation typology* | *elongation, number of floor, typology, function* | *facade typology* | | *much colors, much furnishings* |
| | DP 19 | *form, structure* | *differences in inside and outside, form too much variances* | | *functional typology, form, proportion* | *much colors* |
| | DP 20 | *symmetry, groups, form* | *fabric arrangement, modular volumes* | *facade articulation* | *imbalance in solid-void* | *colorfulness, crowdedness* |
| ***Pattern*** *(Figure-Ground)* | DP 21 | *material, sensible to urban environment, integration* | *elongation, arrangement, one-floor structure* | *location, orientation, transition, neighborhood typology* | *shape* | *similarity in material but different in typology* |
| | DP 22 | *landscape, orientation within environment* | *interior fabric system* | *typology (facade), landscape, settlement* | *landmark-bridge, original (character)* | |
| | DP 23 | *material, typology and function,* | *entrance, articulations, landscape, landmarks* | *typology (facade-similar in housing units)* | *form, orientation, proportion, position* | *central orientation, typology, topography* |
| | DP 24 | *integration, similar rules for generating space* | *orientation, hierarchy, modular typology* | *location, orientation, transportation, order in positioning* | *consistency, wholeness* | *undefined orientation, without order, much solid* |
| | DP 25 | *proportion, integration with urban environment, consistency-style* | *balance in solid-void, arrangement, location, consistency-style* | *consistency in form and material, housing environment, elongation* | *order, material, form, facade articulation* | *shape, form, much solid, level differences, topography* |

Some noteworthy responses of the laymen group to open-ended questions about designed environments are gathered in compositions:

- In urban context, any design should be considered with its environment, not only the landscape but also the interiors because the urban has tendency to be comprehended *as a whole* together with its interiors and exteriors, with its open and closed spaces. According to the considerations of some laymen, if a person intends to describe any architectural design, he first thinks of the urban environment and visualizes the whole. In fact, these visualizations could be resembled 'cognitive maps' (Lynch, 1960) which are the mental re/presentations of any spatial (urban) environment. However, humans tend to create these mental maps generally in two-dimension as the 2D images of 3D urban, from which it can be inferred that they try to *simplify* a space. These maps contain figures on a ground *patterning* the solid-void relationships of the urban environment and these (whole) patterns are constituted by the characteristics (in the context of relationships of the architectures and any other designs, the parts): closeness, orientations, proportions, etc.) of urban environment.

  In addition to this, the laymen signified that any designed environment sustains and revitalizes as long as they interact with the users in their daily life, mostly through visual perception. In other words, visual perception seems as a communication tool between the designed environments and the users. Therefore, it is expected that these environments are *designed* with regard to the act of seeing and perception and *conceptualized* to serve the users, to sense and to be accustomed to the designs. To sum up, the overall discourse focuses on the co-relations among designs with its environment and the users of them in space and time and it is precisely proposed that a *perceptually good* design which patterns with its environment could interact and affect anyone's human live, positively.

  Furthermore, urban space, with exteriors and interiors, are expected to be qualified with the feature of being *easy-to-find.* The laymen thought, if any

designed environment is not reinforced with design qualities of *orienting* or *directing* its users, identifiable signboards or landmarks are often searched for and they are needed substantially. Touching briefly upon, five elements of Kevin Lynch (The image of the city, 1960) might be matched up with some key words of the study: *district* and *urban environment* with *grouping* might be resembled each other; so do *edge* and *surface* with *figure-ground*; *node* and *point* with *center*; *path* and *continuity* with *closure*; *landmark* and *separation*. Since the proposals of these five elements are accepted significant for 'the image of a city', these design parameters should also be considered as important, for any (visually, perceptually) *good* urban environment (design).

However, interiors (the forms of interior spaces) are perceived explicitly and much more easily than exteriors unless they do not have *too much* complexity and chaos. In fact, some laymen tried to categorize interiors and exteriors together, regarding functions, formal orders, circulation scenarios. This categorization is re-defined as 'typology' with the words of the laymen: 'kind', 'type', 'character' and 'style', and in fact, typology means systematic characterization of anything, in other argument, arrangements of spatial relations, or of being *order*ed forms. Correspondingly, a *balance* in these spatial environments (exterior-interior) is required for their control. 'Balance' could be between both exteriors and interiors in a designed environment and between (semi) open and closed areas in design architecture since it is generally described by the laymen as 'being compatible' and 'consistent with the environment, the function, the conceptual fiction, and so on'.

For example, a layman expresses this statement with Figure 3.15 which shows an unbalanced condition of a design in the context of the solid-void relationship. It explains that while getting closer to the entrance space (sheltered and semi open) of the building, the building seems as falling down the front because of the sense of unbalanced. This unbalance between solid and void makes the layman feel that the entrance is too

weak to carry the floors above, which seems like a heavy (rigid) mass above a spacious semi open entrance (two sides are open).

**Figure 3.15**: The entrance of Building E (Department of Basic English)
(Source: Author Photo Archive, 2013)

In fact, exteriors and interiors (or open-closed spaces), and, solids and voids are visually perceived differently from each other, in general. Supposing that, human eye normally perceives exteriors in panoramic views whereas it perceives interiors in vistas as interrupted visions or limited sights, framed by interior elements. Therefore, volumetric (spatial) *orientation*s, *proportion*s, and *hierarchie*s of these spaces should be taken into consideration. Relevantly, Ching states (2004), *"*Visual balance should be thought in the content of 3D*"*[87] (p.141).

[87] *"Görsel denge üç boyutlu olarak düşünülmelidir."*

Ching, F. D. (2004). İç mekan tasarımı: resimli: Interior design illustrated. (B. Elçioğlu, Trans.) İstanbul: Yapı-Endüstri Merkezi Yayınları. Translated into English.

What is more about the spatial perceptions, some laymen perceived semi open/closed areas such as courtyards, backyards, gardens, generally as open spaces, not closed. However, if their surroundings (*edges* or *borders*) began to be obvious to the eye, the laymen felt as they were inside. In other words, the more well defined they are, which means the proportions are *sufficient* and *proper* [88] in order to follow the borders (*edges* and *corners*); the more these spaces turn into closed a whole, which evokes a sense of enclosure. The proportions and the number of border surfaces (rather than the upper surface) are quite important to achieve this state. If disproportions and insufficient number of border surfaces appear, the space loses its spatial quality and intertwines with voids around. Therefore, the sense and the perception of 'enclosure' in semi-open spaces could be achieved by the side coatings (it can be greens as well) which are much powerful than the shelters. Here, it could be stated that enclosed systems are composed of borders following each other in sequence with the help of *reference-lines*. On the other hand, *continuity* generates linear directions and *simplicity* of linearity eases the perception, which all provides easy-follow. Otherwise, (if the continuity is broken) the more ramified; the more turned into chaos.

For example, one layman focused on the *consistency* in the *dimensions* and in the *materials,* and in simplicity, continuity, following. Pointing at the alley (Metu Campus/Ankara), the layman expressed her thought that the consistency can reinforce continuity; otherwise, it becomes weak (like dead ends[89]). As Figure 3.16 shows, the path begins to narrow down in two segments and to be paved with different materials. Therefore, such changes should be avoided and considered over and over for a well-defined space with *proper* and *sufficient* proportions and *simplicity* in directions and a *balance* between solids and voids.

[88] 'The perception of closure' of Spreiregen, See page 48: Figure 2.10

[89] See page 64: Figure 3.4

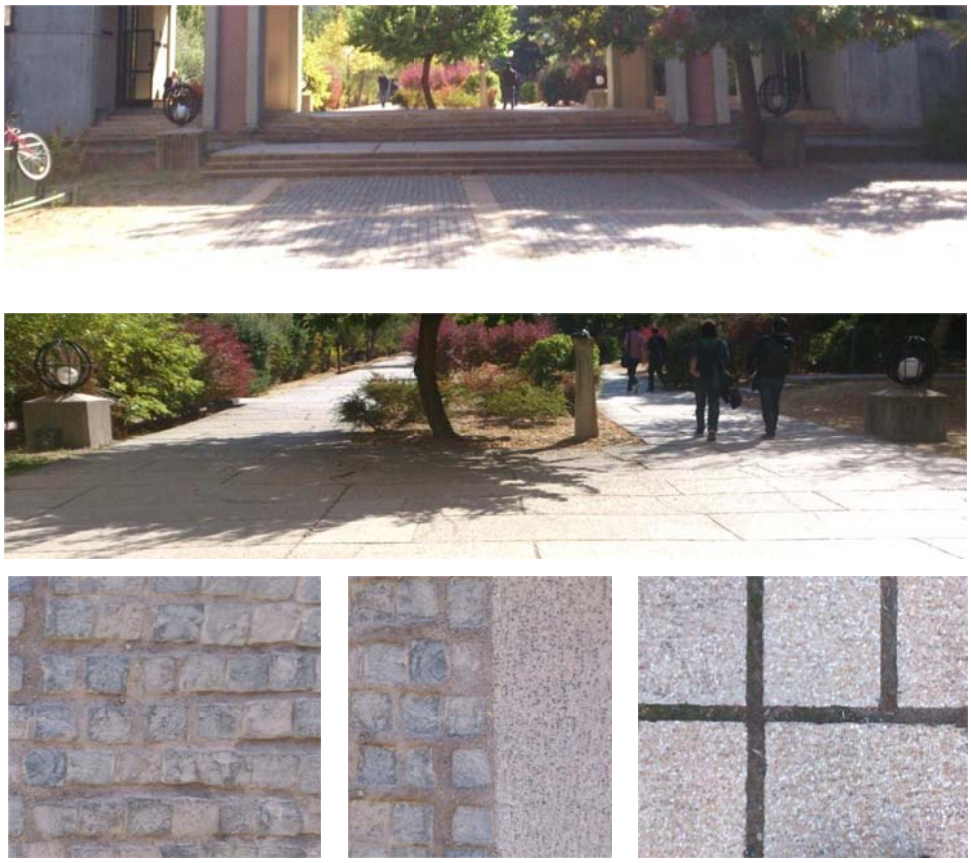


**Figure 3.16**: Changes in dimensions and materials of the Main Alley
(The part of the alley beneath the Bridge Building at Site D_ CC&EE)
(Source: Author Photo Archive, 2013)

- Even though the changes here could not have been conceptualized precisely and not designed well enough, they can indicate that the context or concept ends-up and turns into another. The laymen, at this point, had some opinions about the conceptual fictions of the survey sites with respect to their perceived visuality since they need to be supported by visual qualities of any design which reinforce the design with design parameters. Indeed, during the interactions with designed environments, laymen paid attention primarily to the visual qualities displayed by *forms*, *materials* and *colors*, and subsequently *typologies, functions* or functional utilities which usually indicate the conceptual fictions[90]. For example, the dormitories (Site C_ the Accommodation Zone) have nearly same facades

[90] See page 119: Table 22

and quite similar interior features; however, they are different from the other urban architectures in the campus. It can be said that their typological features (both appearance of facades and interior decorations) match with 'housing/accommodation unit' *function*, but not with other facilities (academic, sport, culture center). This sameness or similarity could be a mark of a unique concept, which desires a socio-economic equality, and a fiction (or neighborhood), which narrates a residential district having gastronomic facilities and recreational areas surrounding the dormitories. This conceptual fiction makes the zone alive and sustainable. That is why an accommodation zone can sustain only if it meets experiential and daily needs of the inhabitants.

Furthermore, experiential daily lives are sustained in space and time, too, as in the accommodation zone or in the academic zone of the campus. Space and time is formed in three-dimensional realm by three and two-dimensional matters, which refers to a genesis of a whole from its parts. According to some laymen, whole designs (architectural masses) are more dominantly perceived characters rather than the parts (facades, paths). However, those parts unit the wholes and make them visually obvious to human eye provided that some (*sufficient* and *proper*) design parameters have enough *simplicity* and *ordered* relations. Agreed with this proposal, the laymen add that the users have tendency to prefer simpler designs with well-defined features (such parts of whole construction as; entrances, openings, circulations, and so on.) unlike the complex ones (too much parts/modules with various orders) which complicate visual perception.

*To deduct, the more design principles and elements are organized properly (ordered) and sufficiently (simplified), the more (urban) designed environment is good and satisfactory, attaining well-perceived visual quality (good perception) which these parameters generate; meaning that concepts make the fictions real, and correspondingly, the designs would be constituted and constructed for daily lives surviving in 4D,3D,2D realms.*

### 3.2.2.3 Evaluations (Design Tools)

Some substantial explanations are cited as summary, according to the evaluations of the laymen and the experts about the re-presentations of survey sites:

To remind before the summary, laymen are not familiar with architecture, architectural drawings, professional jargon or related terminology, which made it hard for them to evaluate the re-presentations or to make comparison between them; therefore, it was required from the laymen to express their perceptions and to make some interpretations about designed environments with respect to the re-presentations. Throughout the examination, in fact, it was impressively noted that they generally repeated the words *'simplicity', 'order', 'consistency'* and *'sufficiency'* in their interpretations.

- Site B

Most of the laymen were confused when they look at the plan of the Faculty of Architecture (DVD-pdf-p.16) standing in front of them and they claimed that the designed environment looks much narrower. In addition to this, they also stated that not only some proportions in interior spaces but also some distances among them (much farther in reality) seem incompatible with its re-presentations, except for the main staircase in the center, which stands like a landmark. According to the laymen, the staircase undertakes the responsibility of controlling the circulation and the center, thus, orients the users of the building. Although there are many details, they signified that the plan has the aspects of *simplicity* and *order*. When asked about some of those details, the laymen responded that they are not observable, according to them, from inside, for example, the extruded parts of studios, which seem as they are not. Correspondingly, Figure 3.17, a plan sketch of the building drawn by one layman, illustrates this inconsistency.

Nonetheless, the Google Earth view[91] (DVD-pdf-p.15) satisfied the laymen because it contains few details contrary to the plan and realistic renders with its

[91] Bird's-eye view

surroundings (with other buildings). This view, similar to a site plan, is adapted to daily life much, because of being useful for navigation, informing the users about *location*, *orientation*, *position* and *alignment*, etc. Consequently, it could be inferred that humans can interact with a designed environment in their daily lives through any kind of re-presentation.

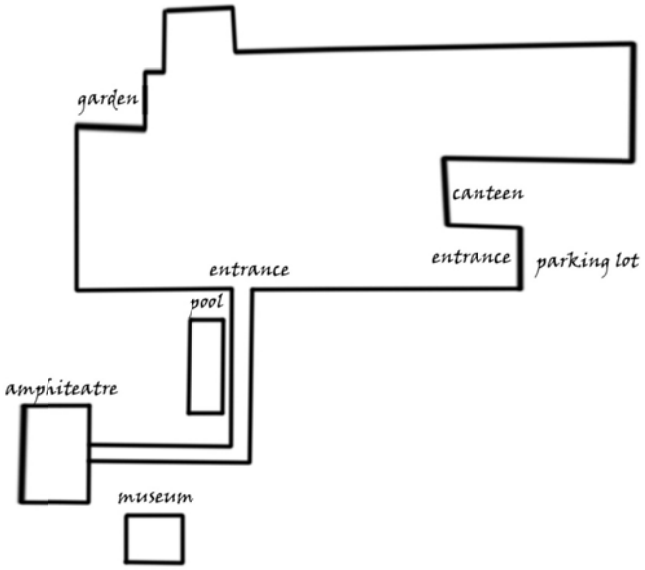



**Figure 3.17**: A mental map of the Faculty of Architecture, which was sketched by one layman (The sketch is re-drawn without any change by the *author* for a digital copy.)

As interpreted, if a plan of any design is reinforced with section drawings which illustrate the space, the space becomes more apparent and consistent with the final product (design). The reason is that these sections extrude the 2D plan through 3D form of the design, as laymen meant too, it could be underlined that section drawings (together with the plans) are quite fundamental for much better re-presentations and re-descriptions of any space of any design. Therefore, spaces need to be narrated by the *sufficient* number of section drawings and plans taken from *proper* locations and levels so that sequential pieces of those drawings could form the space. That is why at least two section drawings (cross-sections) with a plan are required for preliminary re-presentations of a design. In other words, continuation of/between the sections and a layout for them patterns the whole of whose the boundaries are controlled by side-view drawings. (DVD-pdf-pp.19-20)

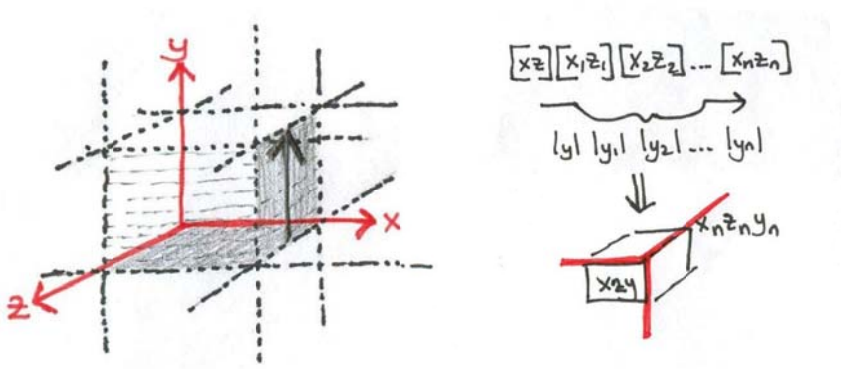



**Figure 3.18**: The generation of a space with vertical and horizontal planes by grid frameworks (The sketches are drawn by the *author* to express the relations among dimensions and presentations.)

Despite being different from section drawings which narrate inner spaces, side-view drawings reminded the laymen of more complicated 'sections' which emphasize outer views (DVD-pdf-pp.17-18). It was hard for them to examine the building with orthographic views, rather than in perspectives, the way of which designed environments are often observed. Therefore, the laymen asked for some additional features such as shade, color and different line-weights, or some perspectives in order to visualize the spatial qualities of side-view drawings, more like a real effect. In brief, those design elements add perspective and depth of three-dimension to 2D drawings. However, they realized how a side view drawing presents itself after looking at the model of the building (DVD-pdf-pp. 22, 24-27). As the model presents the whole in a space (3D), it would be easy to perceive the whole in perspective, (how the eyes see). That is why the laymen deducted that it is the most descriptive and realistic re-presentation of the design. Consequently, it is highly possible that 'modeling' can control the consistency between the final product and the re-presentations, and among the re-presentations, in design process (patterning or re-presentational processes) to the final whole.

According to the experts, the plan of the Faculty of Architecture presents a *simple*, *ordered* and *well-defined* pattern for circulations of inside, contrary to its complexity in reality. This ordered pattern is explicitly constant and consistent during the generation of all spaces in the building, which are functionally grouped in variety and hierarchy. Those spatial-groupings (with their projections from the

body of the building) are quite perceivable in the plan with the help of horizontal relations since outer and inner spaces of any design need to be re-presented with both horizontal and vertical relations. That is why 're-presentational process' (transposition) consists also re-presentations of vertical relations in a design to present *holistic* (the whole) spatial-expression of the design. To repeat again, the order of this design, the generating rhythm, can be perceived from both interiors and exteriors; in other words, from the section drawings, the side-view drawings (vertically) and the plans (horizontally). However, the side-views illustrate 'sides' as if they are straight (like a basic rectangular prism) since they do not indicate the projections of spatial-groupings. They seem to be yielded in visual perception and consequently, they are insufficient to give any perceptual satisfaction about the designed environment by themselves. It could be deducted that re-presentations need more design elements to reinforce the techniques of the design tools.

Furthermore, this design has several 'levels' (instead of floors); in other words, various vertical relations (and respectively horizontal relations). Owing to the fact that the design has intersecting and encouraging free movement among the spaces produced by the levels of the building, it is needed to have section drawings in order to express these vertical relations of spaces. Indicating levels (and the landscape) also on the plan creates a realistic space and provides a preliminary control of the (whole) space, which the users would interact with, walk in and live inside. Any plan can also demonstrate mental maps visualized by the user during walking inside or while examining the plan; therefore, the sections need to present both all circulation patterns (horizontal) and the vertical (structural) systems because the spaces are formed by the extrusions of their plans. In additional to the re-presentation of a space constituted from the extrusion of the plan, the same space is expected to be presented by section drawings so that *holism* could be attained *consistently (co-relatedly)* and in *balance*. Explicitly, the plan and section drawings, the pieces or parts, are finalized in a whole together by the order of vertical continuations of the plan (same for the 'side-views') provided by design element, *reference-line*. It could be deducted from the expressions of Ali Cengizkan about the (modular) volumetric orders generated by reference-lines that mutual relations and intersections among re-presentations seem fundamental:

In the case of plan, the building is composed by a series of orders and harmonized with topography ... as if it is generated by squares which share everything with each other. For example, while standing in two-floor deanship department, you don't feel a square, but you are in the square ... like the courtyards. The squares of the whole generated by groups of various (square) parts are also obvious from outsides. The order of this plan is passed this consistency through the three-dimension. [92] (Behruz Çinici ile söyleşi, 2005, pp. 35-36)

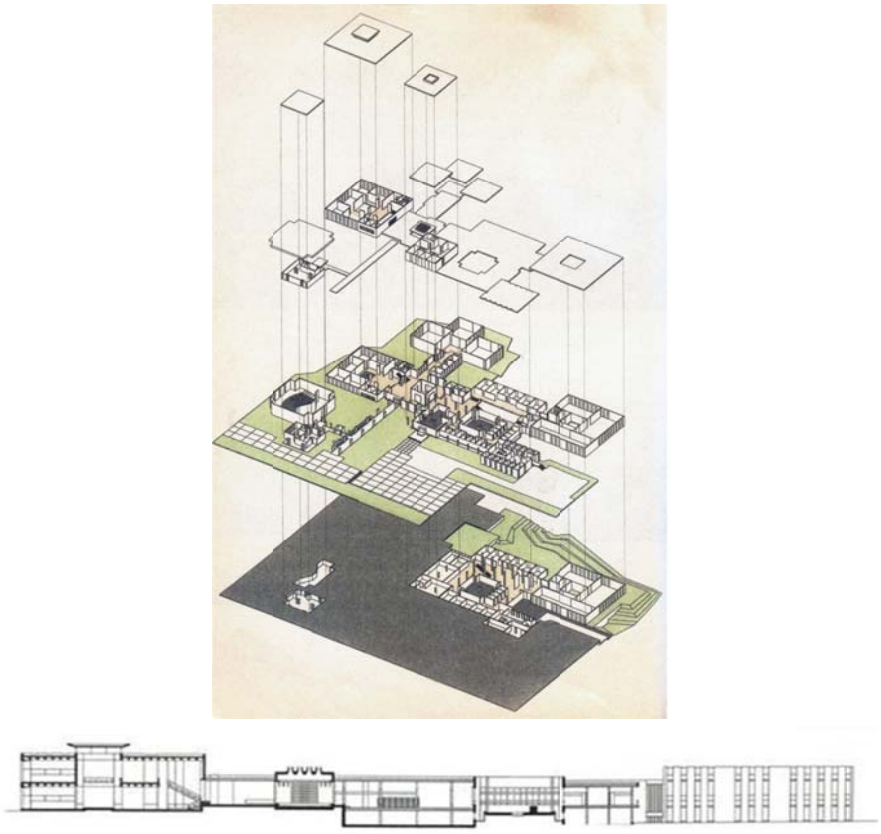


**Figure 3.19**: Modules, or orders, of the Faculty of Architecture (in plan, in section, in facade)
(Source Above: n.d., 2001, Behruz Çinici, p. 14)
(Source Below: Tanyeli, 1999, pp. 42-43)

[92] *"Plan bazında baktığımızda bina bir kompozisyonlar silsilesinden ... oluşuyor ve topografyayla çok iyi uyuşuyor. ... sanki karelerden oluşuyor. Birbirleriyle her şeyi paylaşan... örneğin iki katlı dekanlık bölümü, gittiğiniz zaman kare içerisinde olduğunuzu hissetmiyorsunuz ama karedesiniz. ... onlar da kare. Hatta çok farklı parçaların yan yana gelmiş olmasından oluşan tanımlanmış dış alanda da kare çok net olarak okunuyor. Plandaki bu kompozisyon birlikteliği Ve uyumu üçüncü boyuta da yanslyor. ..."*

ODTÜ Mimarlık Fakültesi: Behruz Çinici ile söyleşi, Ali Cengizkan. (2005, Ağustos 4).*Betonart: Beton, Mimarlık ve Tasarım, 8,* 30-41. Retrieved and traslated into English from http://anibal.gyte.edu.tr/hebe/AblDrive/75357016/w/Storage/326_2010_2_256_75357016/Downloads/odtu-mimarlik-fak.pdf

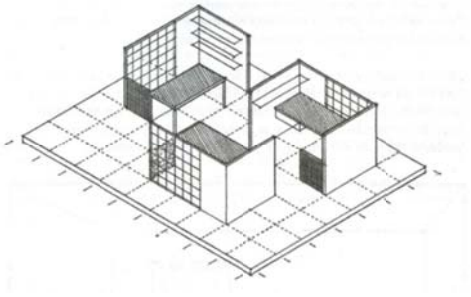


**Figure 3.20**: A sample for modular order; modular proportions
(Source: Ching F. D., 2004, p. 134)

- Site D

Before examining some plan re-presentations of the site, the Computer Center (the Bridge Building) and the Department of Electrical and Electronics Engineering (DVD-pdf-pp.43-48), the laymen complained about the narrow corridors of the buildings which results in confusion about the circulation. After looking at the plans (DVD-pdf-pp.38-39), they began to hesitate about their complaints because the plans seem more *arranged*, *simple*r, and *easy-to-follow* rather than the reality in this context (circulation). On the other hand, some laymen noted that the plans are nearly the same with the mental re-visualizations of the designed environment. This contradiction seeks to answer: how it could be possible. Consequently, the laymen decided on that the disproportions (*imbalance)* among the spaces, between the corridors and the classes create spatial-chaos. However, section drawings offer the laymen more compatible views with the design and re-visualization of the reality (DVD-pdf-pp.41-42). In view of the fact that sections present vertical views of any design, they are more than side views drawings (DVD-pdf-p.40). In addition, even though the side-views seem like photographic images of outer designed environment, the laymen had difficulty to decide which facades were represented by the drawings due to the inconsistencies between them. Therefore, they drew attention again to the design elements, *color*, *shade,* and *line-weight* proposing a more perceptible language for the side-view re-presentations.

Briefly, the transfer and transposition (re-presentational process, as mentioned previously in Chapter 2) can be used as powerful controllers of entire design

processes because each re-presentation behaves a part of its final product and all representations provide a continuation with the previous one through the whole. Therefore, *consistency* among re-presentations in these processes could be taken into consideration by means of feedbacks. The concept with the representation in dimensional realms could be implemented with these feedbacks among the re-presentations emerged from the mutual relations of the *satisfactory*, *successful* and *holistic* final product. To conclude, the experts underlined the necessity of the mutual relationship among the re-presentations. That is why *wholeness* of any design could be achieved with consistent re-presentations prepared *properly* and *sufficiently*. It could be exemplified with a simple dice modeling made from a paper, if the model of the dice is assumed as a whole design and all surfaces on paper as the re-presentational drawings of dice.

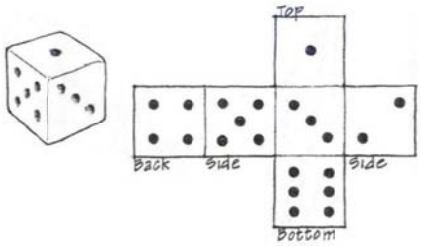



**Figure 3.21**: A dice and the presentations of its surfaces
(Source: Ching F. D., 1990, p. 146)

Furthermore, two experts who had never visited this designed environment or even passed near the site, mentioned about (hierarchical) troubles of 'the transitions among the spaces' they noticed from the drawings. They stated that although there is a perceivable (*good*) order, it does not turn into a generating (hierarchic) system for all the spaces. Same goes for simplicity, which could not be achieved neither in designed environment and nor the re-presentations.

Besides, some section drawings could present any space alone whereas some need their cross-sections to narrate the spaces in a better way. According to one of the experts, if these cross-sections had been drawn co-relatedly with all other re-presentations, aforementioned trouble could probably be overcome. Contrarily,

when the design is explicated within its environment; in other words, the whole site, *simplicity*, *inter-compatibility* and *continuation* among the building-blocks could be perceptible, except some places. For example, the node in Figure 3.22 (DVD-pdf-p.43) interrupts transitions (*common fate* of movement) on the alley with not well-defined separations and disturbs panoramic (*the whole*) view of the site because of unordered composition of the building-blocks and disproportions in dimensions.

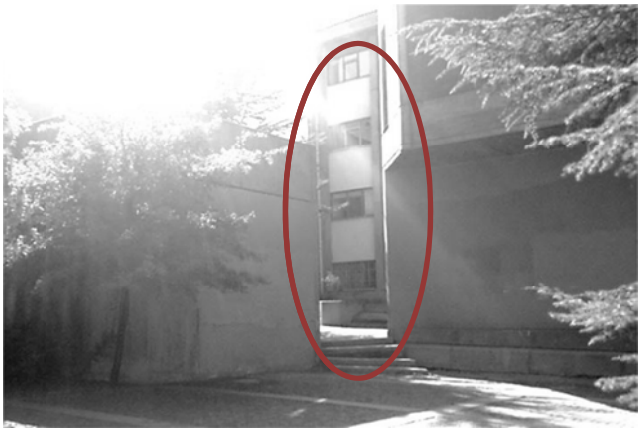


**Figure 3.22**: The critical node (Computer Center and Department of Electrical Electronics Engineering) (Source: Author Photo Archive, 2013)

During the visit of two experts (the designed environment), they faced some other (*imbalance*) troubles between the spaces of corridors and classes: the darkness of corridors and the highly illuminated classes (DVD-pdf-p.47-48). They declared that this condition could not directly be inferred from drawings, but instead, from a glance over details. Therefore, a 'simulation-model' was proposed considering it influential in controlling such conditions throughout design processes.

What is more, it could be pointed out that there is a circulation scenario in designs generally experienced from outside to inside of an urban environment, subsequently, from outer spaces of a building through the inside of the building. That is why firstly the environment and later the facades and consequently the interior spaces are hierarchically perceived. In brief, exterior spaces move into interiors (or vice versa). To sum up, a satisfactory *balance* and a comfortable

*hierarchic order* between outer and inner spaces could provide *good* transitions among these spaces.

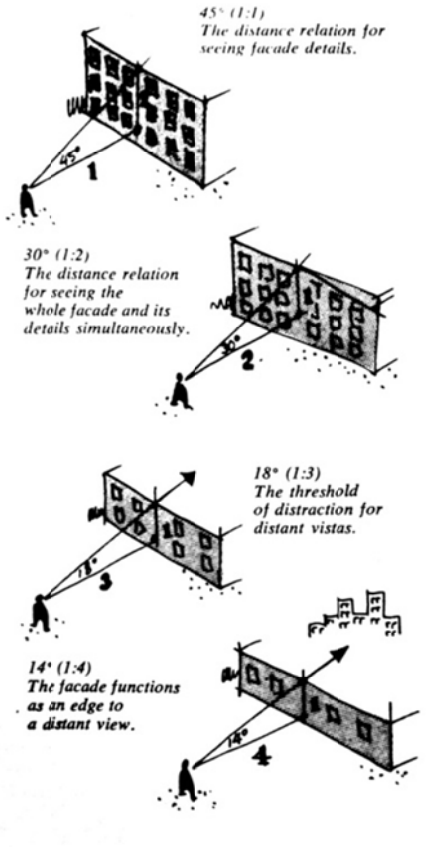



**Figure 3.23**: The field of vision of a construction (facades in designed environment)
(Source: Spreiregen, 1965, p. 78)

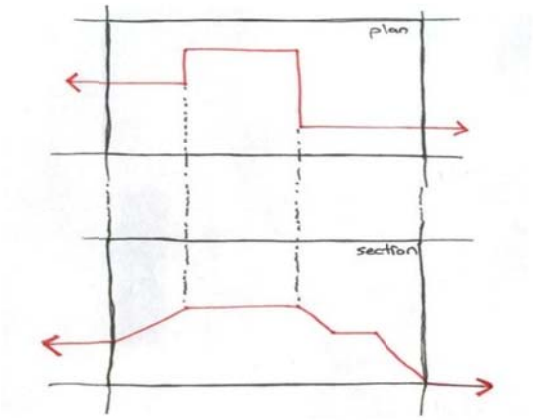



**Figure 3.24**: A circulation scenario presented in a plan and a section (followed by reference-lines)
(The sketch is drawn by the *author* in free-hand drawing. Above: plan; Below: section)

- The library

With a repetitive simplicity and three building-blocks in different forms (DVD-pdf-pp.84-87), the library seems the one which has consistency between its re-presentations and itself, according to the laymen who pointed the schematic diagrams on the interior walls (DVD-pdf-p.71, 73, 75, 77). These diagrams are prepared with respect to the (conceptual) concept of 'library' and used by the visitors for navigation, compared to other plans (DVD-pdf-pp.70, 62, 74, 76) since they show the interior spaces of the library with 'furnishing': saloons, staircases, desks, and so on. Representing the concept of 'library map', they are simple and realistic, and appropriate for the library. Correspondingly, it could be declared that 'furnishing' on drawings, being another design element, are quite important because it provides much similarity and consistent with the real interior. In brief, the diagrams are *'consistent with the concept'* and presented *'properly and sufficiently'* in a *'simple order'*. In addition to this, some experts signified that a concept should be designed with respect to the functions or the typology. A library requires such large spaces that it can provide the visitors more reading places together with the book (material, document) shelves. Similarly, Louis Khan (1996) gives the answer of "a library is the people who are reading nearby the windows" to his question of "what is a library" during the visit of Behruz Çinici (Tanyeli, 1999, p. 109). In conclusion, this library is *'simple'* and *'ordered'* with respect to its typology as the plans and the sections prove this respect.

In addition, the laymen notified that side-view drawings and section drawings are documented with the same order and pointed the compatibility in materials and also colors, while comparing the side-views with the image rendered from the digital model which controls the generations of overall design in perspectives throughout a design process (DVD-pdf-pp.78-83 and DVD-pdf-pp.86-87). Moreover, the longitudinal section of the building describes three different forms (building-blocks) of the whole; so does the main facade. It means that vertical plots (drawings) on a horizontal layout are gathered to form the whole in a composition. A plan or a top view needs to be qualified to enable prediction for the final form of design as in Figure 3.25 (qualified with the design elements: signs or legends like datum levels, dashed or dot lines, differences in line-weights).

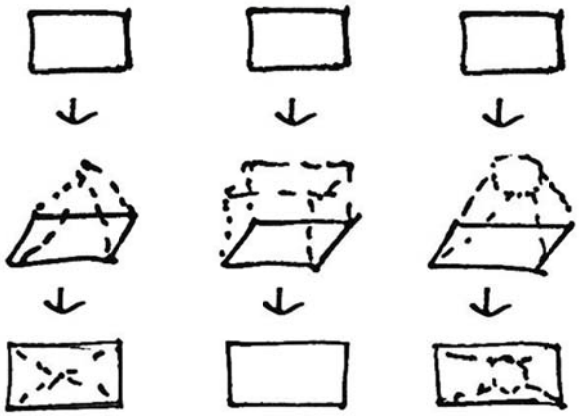


**Figure 3.25:** Forms and the re-presentations (without [above]; with [below] design elements) (The sketch is drawn by the *author* in free-hand drawing.)

- Faculty of Engineering Building _MM

The building is composed of such simple forms in different volumes that their verticality and horizontality strike a visual balance defining the design as perceptually *good* one, according to the laymen (DVD-pdf-p.66 and Figure 3.5). Moreover, its re-presentations illustrate these simple forms in an ordered way, especially side-views and concrete model (DVD-pdf-pp.59-60, 65-68). However, the laymen had difficulties to match the positioning of the forms with the forms in their mind when they saw the Google-Earth view (DVD-pdf-p.55).

Experts interpreted that MM presents itself better in section drawings and with the concrete model (DVD-pdf-pp.60-61). Moreover, the sections help facade drawings be perceived well, which explains the reason why the side-views are even better. It is appreciable that the side-views and the plans are designed and drawn co-relatively in their design process because the side-views have every detail of the plans similar to this *simple* and *ordered* form'ation, which overlap in all drawings (DVD-pdf-pp.56-61). This consistency is the result of the *balance* in this formation. It could be proclaimed that this co-relation or co-operation is succeeded in transition among the re-presentations. However, side-view drawings could not reveal their position/ings clearly. As the eye can see in perspectives and orthographic drawings can make these drawings difficult-to-comprehend, drawing in perspectives could be an alternative for overcoming such perceptual troubles.

### 3.2.2.4 Concepts

**Table 22**: The concepts, which the laymen predicted about the designed environments

| **What is the concept here?** (the concepts) | | | | |
|---|---|---|---|---|
| **Site A** | **Site B** | **Site C** | **Site D** | **Site E** |
| *. socializing*<br>*. contemporary architecture*<br>*. less space much work*<br>*. transparent*<br>*. simple and plane*<br>*. functional*<br>*. original in site near environment*<br>*. self-consistent* | *. neutral and plane*<br>*. special*<br>*. variance and volumetric grouping*<br>*. original*<br>*. modular, from parts through the whole*<br>*. 'form follows function'*<br>*. systematic and hierarchic*<br>*. central typology and scattering form center*<br>*. compatible with nature or its landscape*<br>*. functional, for an architecture education, a designing environment* | *. stand-alone*<br>*. integrated*<br>*. social living place*<br>*. neighborhood*<br>*. socialist*<br>*– same, similar, equal* | *. holism with buildings and continuation of alley*<br>*. simple and plane*<br>*. close relations*<br>*. original, explicit*<br>*. orient itself with the environment and landscape*<br>*. harmonize integration of spaces* | *. entrance from four different leveled sides*<br>*. central control mall typology*<br>*. shopping center*<br>*. compact* |

Throughout the study, 'conceptual fiction' is always took into consideration and 'design process' is considered with respect to cognitive process. During the survey, laymen were asked to comment on the concepts of the designs which could be manifested through their visual features. They tried just thinking of the design processes from the end to the beginning, from reality to imagery.

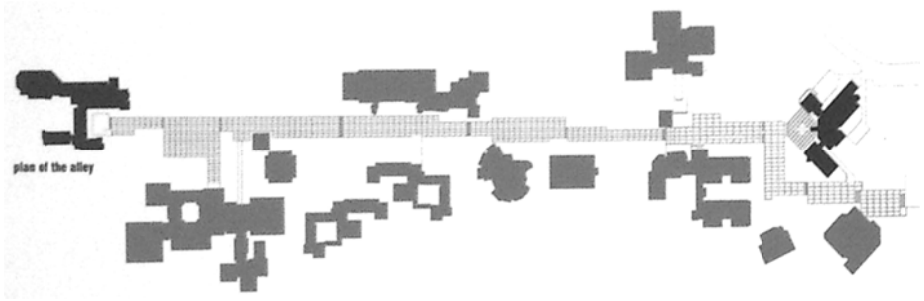



**Figure 3.26**[93]: The Main Alley: the urban architecture in early times of the METU Campus/Ankara (Source: B, Gür, *curator*. October, 2013, 50th Anniversary Exhibition)

[93] Figure 3.26 was prepared by Görkem Demirok and Yasinalp Örsel in the course, whose lecturer is Berin Gür, 'ARCH 778: Formal Analysis of Buildings' in 2012.

It is retrieved from '50th Anniversary Exhibition: Readings on Altuğ and Behruz Çinici's METU Campus Buildings' at METU Faculty of Architecture on 01.10.2013, and it is edited only into *grey-scale* version for this study.

There are some ideas commented by not only the laymen and the experts but also the designer as Table 22 shows. Most of the participants of the examination pointed the similarity in materials, in appearance, and in other features of the urban architectures in the campus defining the similarity as typology, balance, style. They associated this consistency with the order, which patterns the designed environments on the alley. Kemal Aran (12.12.2003) says, in other words, that

> Even though each design is a unique representation of its individual functions ... exterior spaces of Metu Campus are the parts which have tendency to pattern one design to another. (ODTÜ Mimarlık Fakültesi: Behruz Çinici ile söyleşi, Ali Cengizkan, 2005, p.38)

However, Behruz Çinici, the designer of the campus, expresses his proposals for the alley, the spine of the campus providing a social and academic pattern:

> Here is the courtyard of our social-complex (kulliye), or like it, and here is my actual class (big institute) and like conventional squares, streets where people interact each other and exchange their ideas.[94] (Behruz Çinici, 22.09.2003, Beton Çocuklarım, GİSAM)

There are also comments for the first constructed building, the Faculty of Architecture. Behruz Çinici (2005, p. 34) shares his admirations to the Faculty of Architecture of Saarinen in Cranbrook, and the one of Mies van der Rohe, and then Architecture Schools of Paul Rudolph; however, he responses that the Faculty of Architecture (METU) was an "improvisation". He underlines that there is no differentiation between exterior and interior spaces: how interiors exist is same for the exteriors which revive lives, too (2005, p. 35). On the other hand, it can be deducted that he wanted the building be qualified with such a design for architectural education as a publicity (vivid) example, which exhibits an innovation and creativity. In fact, he conceptualized a balanced environment with respect to experiential daily lives.

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[94] *"İşte burası da bizim külliyelerimizin bir orta mekanıdır, onun gibidir ve benim asıl dersanem büyük dersanem burasıdır ve insanların birbirleriyle ilişki kurduğu fikir alışverişi yaptığı o meydanlar, geleneksel meydanlar, sokaklar gibi…"*

Tiryaki, A. (2012, January). Behruz çinici 5 gün 5 anı. *Odtülü, 48,* 24-27. Retrieved and translated into English from http://mezun.edu.tr/_docs/dergi/48/Dergi/odtulu48.pdf

# CHAPTER 4

# CONCLUSION

*"Human brain disclaims uncertainty. That is why a design needs stipulation a simple descriptive order." (Conceptual fiction)*

*(Lynch, 2010)*

The final chapter briefly summarizes the study reminding the problems and proposals again, discussing the survey (results, responses and evaluations), and suggesting for further researches.

In the beginning of the study, the problem was defined as ***visual-dimensional-perceptual troubles*** of any (graphic, architectural, urban, etc.) designs, throughout the transfer from the mind into reality and transposition from one-dimensional realm to other realms. It was claimed that the problem arises mainly from reasons such as 'high level of complexity' and 'disability of generating the whole' without communicative relations among the parts, which cause problematic outcomes as ***perceptual chaos***; consequently, ***dissatisfactions in experiential and daily lives*** *(in the inner and outer environments)*. Another problem could also be introduced as the inconsistencies [95] between dimensional realms and their indefinite communication (*it is presumed*), or differences in utilizations of the tools 'free-hand drawing' and 'drawing in CAD', hard to adapt to the scales, details, reference-lines, and line weights. Chapter 3 discussed these matters related with

[95] There could also be differences in dimensional realms in mind and in reality. The spaces in reality are the Euclidean spaces, but the dimensions of mind and of mental imageries are unidentified.

the survey sites: disorientation of paths and buildings in Accommodation Zone which creates confusion in finding a place (visual trouble); contradictions and inconsistencies between the construction and the architectural drawings of the Department of Electrical and Electronics Engineering which result in inner circulation patterns and adaptation to the interior (dimensional trouble); and the chaos in the Shopping Center which was caused due to the disordered locations of shops and complexity of excessive colors and excessive number of people because of which the terrace on the first floor is perceived almost as enclosed space (perceptual troubles).

Subsequently, it was hypothesized that those problems and troubles can be alleviated with the utilization of ***the design parameters (principles, elements and tools)*** which control designs throughout their entire conceptual processes (in the mind: designing) and re-presentational processes (in reality: transferring and transposing) with respect to the visual perception theories and cognitive processes in which they work as partners. The resemblance between theories (Gestalt) and the processes of seeing and perception was explained in Chapter 2 with expressions of Köhler (1940, Dynamics in psychology) and Colin (2008, Visual Thinking for Design): *continuations of contours* through *the close systems of shapes and forms* which appeared as in *groups or patterns in figure-grounds* finalized in *holism*. *In brief, if the design parameters are applied to a design* ***properly, sufficiently*** *and* ***inter-relatedly*** *with respect to visual perception, any* ***'holistic*** *final product within* ***co-relative*** *relations' could be achieved. Those* ***designed final products****, constructed by '****order****ed patterns with the sense of* ***balance*** *and a level of satisfactory* ***simplicity****', are defined visually* ***'good perception'*** *or* ***'good Gestalt'****.*

On the other hand, the designs (final products) need to be visually perceived in consistency with the conceptual-mental fictions, which means the final products should be compatible with all outer and inner stimuli. It was quite difficult to examine both conceptual fictions and thoughts about the designs of the designers and to compare them with the comments of the laymen and the experts. However, it was examined according to the responses and evaluations of these people. The

facilities, formations, orientations of the buildings in relation with the urban environments, their design patterns (the whole-part, figure-ground, and solid-void relationships), and their visual qualities (respectfully the principles and Gestalt) gave some opinions about the conceptual fictions: the apprentices were inspired from modular orders in generating system of spaces of the Faculty of Architecture during the design education, and dormitories were designed with living space typology and qualified with other facilities in their close environment in order to sustain daily lives and to become a neighborhood-like accommodation zone.

Consequently, human (minds) would be satisfied and the relations between human and its environment would be improved. In other words, the more there would be final product designs in *good* gestalt quality, the more experiential daily lives in better quality would be produced in humans' environment. To conclude, paying attention to ***the principles, elements and tools*** is quite indispensible and determinant to control the visual perception and to alleviate 'visual-dimensional-perceptual troubles' during the design processes.

Deductively, the study includes the cognitive process, the design process, and the related subjects concerning the scope and the discourse of the study. Cognition, deals with the relationship between ***conceptual mental fictions*** in the mind and designs in reality (representations); similarity between ***seeing and perceiving*** and visualizing and imagining; differences in dimensional spaces in the mind (***transfer***) and reality (***transposition***) in design processes. Design/ing depends on being holistic and co-related with all parts, all phases, and all re-presentations. The former means failing in forming a pattern due to the unbalanced situation between the parts and their whole caused by not providing enough perceivable simplicity and order. The latter means being inconsistent due to the lack of interrelations of any 'systematic progress' among dimensional realms since all the re-presentational designs need to be seen as a *unique* and the *same* of one conceptual-mental fiction with properly and sufficiently used elements and principles. The related subjects are briefly explained with cognition as definitional structure and idea representation; with fiction as imaging, designing or problem solving re-presentation as layouts for real dimensions; with cognitive process as

mental activity (seeing, perceiving, thinking, visualizing, understanding, living) and with design process as problem solving and creative thinking (design principles, design elements, design tools). In short, the study aimed to emphasize not only the significance but also the necessity of (good) designs (and processes) by means of utilization of design parameters (regarding cognitive process) for the human vital, experiential, and lives in the field of visual perception.

In the view of the fact that the study was structured with 'cognition and design' or 'visual perception and seeing' or 'people and environment', for the survey research tool, ***face-to-face interview-like questionnaire***, was devised. It was composed of ***semantic differential scale,*** which is formed by connotative meanings in bipolar words to examine the level of design principles according to visual perception of the design, and ***open-ended questions*** to remark design elements and tools according to the observed levels of visual perception (design principles). Throughout the survey, some places in ***METU Campus/Ankara (Appendix B)*** were examined in the context of the hypothesis (design principles: as *prägnanz, closure, good-continuation, grouping, pattern;* design elements and tools*: color, alignment, drawing- see Tables from 1 to 22)*. For the analysis, SPSS (a statistical software) was used and the methods ***Cluster Analysis*** (agglomerative method, ***dendrogram***) and ***Pearson Correlation Matrix*** were executed to show groups in hierarchically close or further relations of design parameters (the former) and to give detail about these interrelations (the latter).

To sum up, this study mentions how design parameters, especially design principles, affect the visual perception of any designed environment which is subjected to daily interaction, examining the importance and the implementation of those design parameters, not introducing a new theory. Therefore, visual perceptions of designs (entire design process) were observed, examined and discussed with respect to the outputs of the analyses of the interview-like questionnaire in the context of theories. The communications between the laymen and designed environments with the experiential daily lives tried to be expressed with level of satisfaction (through discomfort) of the designed environments. It could be deducted that the feature people seek in the *good* visuality of designed

environments is *simplicity.* The level of the simplicity changes from one person to another which results in noticing different *order*s in the same designs. This means that people designate the (level of) simplicity regarding the order which they see in the design. On the other hand, they draw attention to the consistency in designs which depends on *balance*: balance of forces, visual constructions, and hierarchy. However, the thing they strongly signify is that the *whole* composition of any design (environment) and their contribution to the life (to meet the needs) because they communicate and interact *co-relatively*. It means there is relationship between human and its environment and this relation already begins patterned in mind through the reality. As Barlas (2006) says, the built environment is characterized with the meaning of human manners attributed by the man. With the words of Piaget (1952), "every living being constitutes a totality which tends to conserve itself and consequently to assimilate itself to the external elements it needs" (p. 388).

To conclude, human beings, composed of biological systems, apprehend the environment by sight, with the act of seeing. (online Meadline Plus, online Medical Dictionary). When the act of seeing or the act of perception is examined, it could be interpreted that they refer to Gestalt Theory and the design process (Colin, 2008). This analogy calls attention to significance of 'design' and 'perception' within their conceptual combinations, and it promotes a common language of visual perception for designs, between the designer and the user (Denel, 1979, p. 7).

Last, but not least, 'Basic Design Education' is needed to be mentioned since 'visual perception' (at basic levels of cognitive process: bottom-up, (Colin, 2008)) necessitates design parameters by means of Gestalt Theory, the controllers of designs. Basic Design Education leads to focus on basic levels of the 'visio-spatial' design target and design fundamentals with related topics: dimensions, principles, elements and tools, processes, concepts, re-presentations, "Its journey begins with basic elements and culminates in Spatial Perception" (Parashar). This means Basic Design Education, which organizes the (education or practices) experiences on environment by design parameters, is a part of learning, training, and

implementing procedures of Gestalt Principles. It improves cognitive abilities such as creative thinking, problem solving, visualizing for future designing, and promotes active professional life (in design and design process). The rules of design/ing, or Gestalt, endeavor "to conceive, perceive, organize and communicate as wholes as opposed to fragmented and unrelated information" (Denel, 1979) and underline their requirement for/in a basic design education (Günay, 2007, p. 95). Basic Design Education consists of, and even should, "*effective vehicles"* which connote the design principles, elements, and tools: rules, balance, order, frame of references, scale, proportion, orientation, rhythm, texture, color, alignment, sketching (Günay, 2007, pp. 95-98). The function of design parameters, patterning in a correlated balance, is a proficiency phase "to convert the vision into visuals" (Parashar, p. 4) "making composition and producing forms that have shapes" within a whole-part relationship (Günay, 2007).

*Through the consistent 'whole-part relationship', every holistic final product sustains as visual reflections of mental expressions, where the conceptual fictions turn into concrete bodies.*

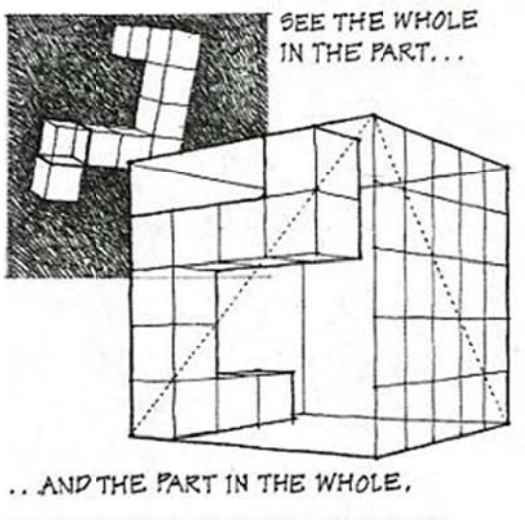


**Figure 4.1**: The part and the whole
(Source: Ching F. D., 1990, p. 193)

## 4.1 Suggestions for Further Studies

To review the study which depends on ‘cognition and ‘design processes’; in other words, ‘visual perception’ and ‘design parameters’, various approaches which will be the further research topics relevant to this context could be asserted. Any two of the suggestions are mentioned briefly below:

- The first suggestion could be innovative for designing approach. The design parameters, constructed by conceptual fictions, could be re-defined as individuals of a permutation (matrices) system and implemented as a design theory. In other words, these co-relations among design parameters could be hypothesized for a pattern-network-system over any topography, producing graphics or models of industrial products or even both architectural spaces and urban morphologies by computational operations, with respect to the conceptual fictions of design.

- The second suggestion could be debatable compared to the first one. It was assumed in the study that people mostly communicate and interact with the designed environment through visual perception; however, what about the visually impaired people? How they perceive designs, which sense they use, (are there any relationships between designed environments and their way of perception, or could any design parameter be proposed for this way of perception in order to control any design processes and final products), how designs are implemented and examined perceptually would be the questions to be raised and to be studied.

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# APPENDIX A

## QUESTIONNAIRE FORM
***(face-to-face interview, at survey sites)***
*English*

Date

Sex=
Age=
Profession, Sector=

Nickname, communication address=
Favorite color=

*This questionnaire is conducted within the scope of a thesis in Master Program of Urban Design in City and Regional Planning Department in Architecture Faculty of METU. It aims to tackle the relationship between a design (as a final product) and its visual perception. In other words, it aims to deliver a sufficient usage in a simple and ordered way of design concepts, and to demonstrate that any design depends on those design principles (and elements and tools) concerning design concepts. Therefore, this questionnaire tries to figure out whether the designs are visually perceived such as good or bad, relevant or irrelevant to concepts based on the principles (elements and tools).*

*This questionnaire focuses on the importance of design principles and elements and tools for visually perceiving an urban and architectural environment. This survey is done to 150 people.*

Answer thinking of visual quality: 'visuality'

Thanks
Ebru EREN
Architect

Please make an evaluation about the environment regarding the 'semantic words' below and specify a value between -2 and +2.

| **URBAN SITE_ .....** | | **What is your comment on visuality of this environment?** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **SCALE**<br>**GESTALT PRINCIPLES** | **NUMBER*** | **Semantic A** | | **-2** | **-1** | **0** | **1** | **2** | **Semantic B** | **Which elements? How? Why? What is the concept here?** |
| | | | | | | | | | | |
| ***Prägnanz*** | DP 1 | bad | | | | | | | good | |
| | DP 2 | failure | | | | | | | successful | |
| | DP 3 | disturbing | | | | | | | arranged/ uniform | |
| | DP 4 | weak | | | | | | | satisfactory | |
| | DP 5 | complicated | | | | | | | simple | |
| | DP 6 | partial/half done | | | | | | | full/holistic | |
| ***Closure*** | DP 7 | open | | | | | | | enclosed | |
| | DP 8 | outside | | | | | | | inside | |
| | DP 9 | interrupted/ unfinished | | | | | | | completed/ finished | |
| | DP 10 | unsociable | | | | | | | social/ communicative | |
| ***Good-continuation*** | DP 11 | hard-to-follow | | | | | | | easy-to-follow | |
| | DP 12 | broken | | | | | | | undivided | |
| | DP 13 | non-directing | | | | | | | directing | |
| | DP 14 | inert | | | | | | | flowing | |
| ***Grouping*** | DP 15 | complex | | | | | | | easy-to-find | |
| | DP 16 | forgettable | | | | | | | memorable | |
| | DP 17 | non-classifiable/ mixed-up | | | | | | | classifiable | |
| | DP 18 | included differences | | | | | | | organized in similarity | |
| | DP 19 | non-repetitive | | | | | | | repetitive | |
| | DP 20 | continuous | | | | | | | fragmentary | |
| ***Pattern***<br>*Figure&Ground* | DP 21 | hard-to-distinguish | | | | | | | distinguishable | |
| | DP 22 | non-repetitive | | | | | | | repetitive/ rhythmic | |
| | DP 23 | cursory or hindered | | | | | | | figurative/ descriptive | |
| | DP 24 | disordered/ mixed-up | | | | | | | ordered/ arranged | |
| | DP 25 | unbalanced | | | | | | | balanced | |
| * Design Parameters (DP) | | | | | | | | | | |

**ANKET FORMU**
***(röportaj, çalışma sahasında)***

*Türkçe*

Tarih

Cinsiyet=
Yaş=
Meslek, Sektör=

Rumuz, İletişim Adresi=
Favori Renk=

*Bu anket, ODTÜ, Mimarlık Fakültesi, Şehir ve Bölge Planlama Bölümü, Kentsel Tasarım Master Programı tez çalışması için yapılmaktadır. Tez, bir son ürün olarak tasarım ile bu tasarımın görsel algısı arasındaki ilişkiyi irdelemektedir. Başka bir deyişle, tez, görsel algısı iyi bir tasarımın, tasarım prensip, eleman ve araçlarının, tasarım fikrince basit ve belirli bir düzen sağlanmış uygun ve yeterli kullanımlarıyla elde edilebileceğini önerir ve tasarımların bunlara bağlı olarak, tasarım fikrine dayalı üretilmesinin önemsenmesini amaçlar. Bu yüzden, bu anket tasarımların görsel olarak nasıl algılandığını ve bu algılamanın nelere dayandığını (iyi-kötü, hangi prensip, eleman ve araç, fikre bağlı mı değil mi) belirlemeye ve belirtmeye çalışmaktadır.*

*Yaklaşık 150 kişiye ulaşmayı hedefleyen anketin amacı, tasarım prensip, eleman ve araçlarının kentsel ve mimari çevrenin görsel algısındaki önemini gösterme çabasındadır.*

Görsellik üzerine ...

Teşekkürler
Ebru EREN
Mimar

Lütfen, bulunduğunuz çevreyi değerlendirip,
yorumunuzu aşağıdaki skala üzerinden -2 ile +2 aralığından bir değerle belirtiniz.

| **KENTSEL ALAN_ .....** | | **Bulunduğunuz çevrenin görselliğini nasıl yorumlarsınız?** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **SKALA**<br>**GESTALT PRENSİPLERİ** | **SIRA*** | **Semantik A** | | **-2** | **-1** | **0** | **1** | **2** | **Semantik B** | **Hangi elemanlar? Nasıl/Neden? Sizce burdaki fikir nedir?** |
| | | | | | | | | | | |
| ***Prägnanz*** | DP 1 | kötü | | | | | | | iyi | |
| | DP 2 | başarısız | | | | | | | başarılı | |
| | DP 3 | rahatsız edici | | | | | | | düzenli | |
| | DP 4 | zayıf | | | | | | | güçlü/ tatminkar | |
| | DP 5 | karmaşık | | | | | | | basit | |
| | DP 6 | tamamlanmamış | | | | | | | tamam/yeterli | |
| ***Kapalılık*** | DP 7 | açık | | | | | | | kapalı | |
| | DP 8 | dış | | | | | | | iç | |
| | DP 9 | kesintili/ tamamlanmamış | | | | | | | tamamlanmış/ bitmiş | |
| | DP 10 | antisosyal | | | | | | | sosyal | |
| ***Süreklilik*** | DP 11 | takibi zor | | | | | | | takibi kolay | |
| | DP 12 | kırık | | | | | | | bölünmemiş | |
| | DP 13 | yönlendirmeyen | | | | | | | yönlendiren | |
| | DP 14 | dingin/yavaş | | | | | | | akıcı | |
| ***Gruplama*** | DP 15 | kaotik | | | | | | | kolay bulunur | |
| | DP 16 | hatırlaması zor | | | | | | | kolay hatırlanır | |
| | DP 17 | karışık | | | | | | | sınıflandırılabilir | |
| | DP 18 | farklı | | | | | | | benzer | |
| | DP 19 | tekrarlamayan | | | | | | | tekrarlayan | |
| | DP 20 | devamlı | | | | | | | parça parça | |
| ***Örüntü*** *FigürveZemin* | DP 21 | ayırtedilemez | | | | | | | ayıredilebilir | |
| | DP 22 | tekrarlamayan | | | | | | | tekrarlayan | |
| | DP 23 | silik | | | | | | | belirgin | |
| | DP 24 | düzensiz/ dağınık | | | | | | | düzenli/ kurallı | |
| | DP 25 | dengesiz | | | | | | | dengeli | |
| * Dizayn Parametreleri (DP) | | | | | | | | | | |

# APPENDIX B

## RE-PRESENTATIONS
***(Architectural Drawings and Documents)***

Documents are obtained from Directorate of Construction & Technical Works/METU (Yapı İşleri ve Teknik Daire Başkanlığı/ODTÜ) to be used as course materials in 'AH544: Architectural History Research Studio: Modern Capital City; Ankara' by Assoc. Prof. Dr. Tomris Elvan Altan Ergut in spring semester of 2012-2013 academic year and in 'ARCH 778: Formal Analysis of Buildings' by Assoc. Prof. Dr. Berin Fatma Gür in fall semester of 2012-2013 academic year in METU.

The documents are gathered together in DVD for easy-accessibility. DVD, attached on the inside of the back cover of the thesis, includes Construction & Technical Works Archive and Author Photo Archive.

The content of DVD:

- **Archive File**: 'Construction & Technical Works Archive' (names of documents are re-edited)
- **DVD-pdf**: 'Collections for the survey' (*architectural drawings, Google-earth views, renders and photos of concrete/digital models*) [96]
- **Lists of the Figures and Reference File**: Lists of the Figures in DVD-pdf and Lists of the References of the Figures

[96] They are re-named sequentially with the pages (from 1 to 87) of **'DVD-pdf'** to which the collections are adapted.
For example, 'DVD-pdf-p.16' refers to the plan of Site B_ the Faculty of Architecture as given as a sample in page 142, the following page.

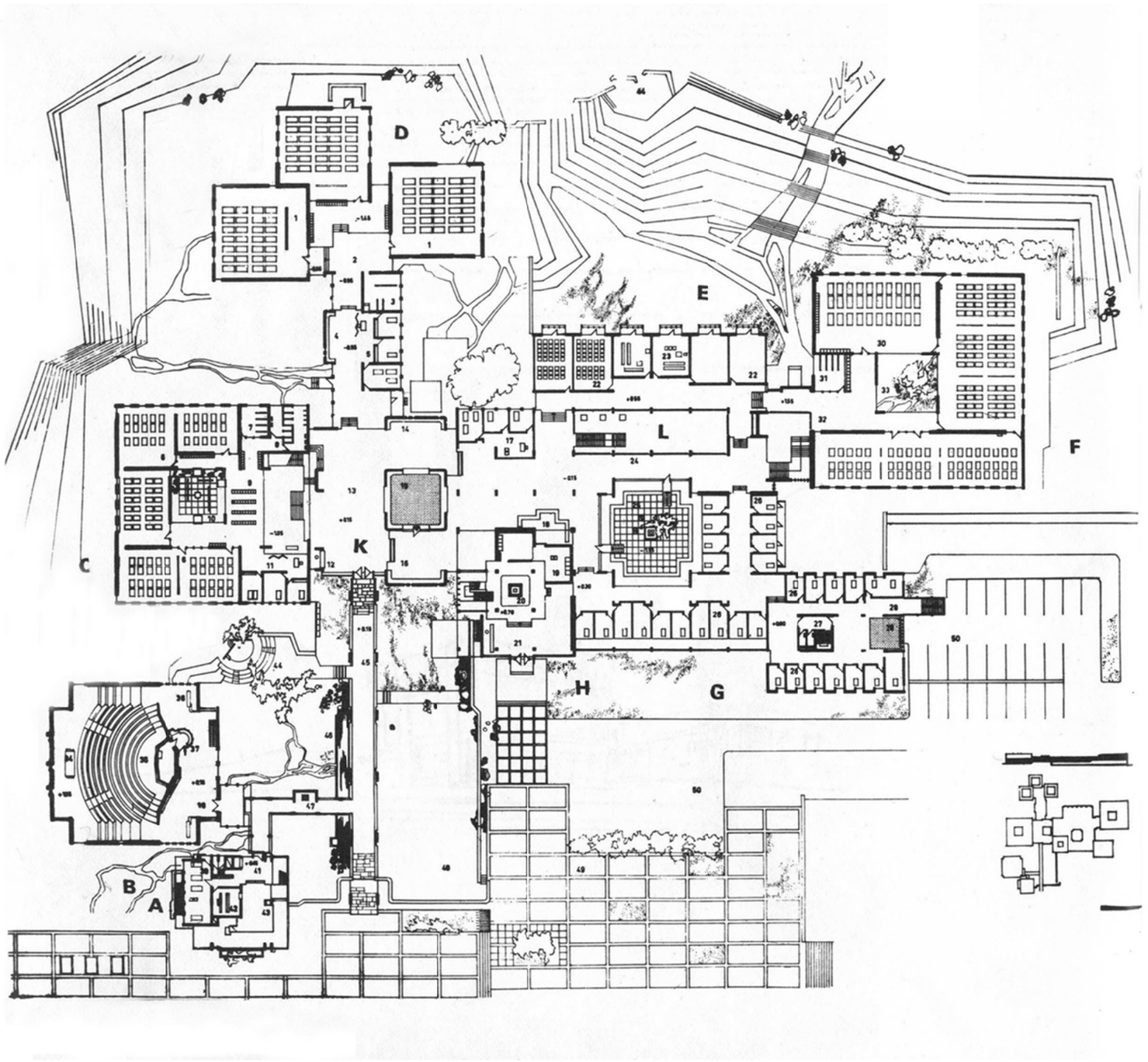


**Figure B.1:** The sample: the plan of the Faculty of Architecture (Site B)
(Source: Çinici, 1975, p. 18)

# APPENDIX C

## PEARSON CORRELATION MATRICES

**Table C.1:** Site A_ Department of Basic English: F&G Buildings

| ± 0,5 | ± 0,6 & ± 0,7 | ± 0,8 & ± 0,9 | other correlations | ? |
|---|---|---|---|---|

| | DP 1 | DP 2 | DP 3 | DP 4 | DP 5 | DP 6 | DP 7 | DP 8 | DP 9 | DP 10 | DP 11 | DP 12 | DP 13 | DP14 | DP 15 | DP 16 | DP 17 | DP 18 | DP 19 | DP 20 | DP 21 | DP 22 | DP 23 | DP 24 | DP 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DP 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| DP 2 | 0,50049 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| DP 3 | 0,03734 | 0,03370 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| DP 4 | 0,14405 | 0,04334 | -0,06304 | 1 | | | | | | | | | | | | | | | | | | | | | |
| DP 5 | -0,06564 | -0,17774 | 0,31025 | -0,22168 | 1 | | | | | | | | | | | | | | | | | | | | |
| DP 6 | 0,06657 | -0,03004 | 0,34962 | 0,19672 | 0,00000 | 1 | | | | | | | | | | | | | | | | | | | |
| DP 7 | -0,48536 | -0,37068 | -0,23529 | 0,25218 | 0,20684 | -0,04370 | 1 | | | | | | | | | | | | | | | | | | |
| DP 8 | 0,11099 | -0,45230 | -0,29144 | 0,19309 | 0,13974 | -0,40942 | 0,13247 | 1 | | | | | | | | | | | | | | | | | |
| DP 9 | 0,53273 | 0,40686 | -0,36587 | 0,32292 | -0,49188 | -0,06396 | -0,15065 | 0,16479 | 1 | | | | | | | | | | | | | | | | |
| DP 10 | 0,28212 | 0,34321 | 0,14494 | 0,39353 | -0,55212 | 0,15793 | -0,43483 | -0,09575 | 0,21212 | 1 | | | | | | | | | | | | | | | |
| DP 11 | 0,06580 | 0,10588 | 0,24792 | -0,07730 | -0,23775 | -0,41526 | -0,38315 | 0,22130 | -0,00825 | 0,39985 | 1 | | | | | | | | | | | | | | |
| DP 12 | 0,02003 | -0,02841 | -0,06761 | 0,02899 | -0,47549 | -0,52243 | -0,20284 | 0,32687 | 0,22264 | 0,34061 | 0,84801 | 1 | | | | | | | | | | | | | |
| DP 13 | -0,34297 | -0,32795 | -0,34776 | -0,04587 | -0,28219 | 0,15104 | 0,13375 | 0,23375 | 0,14681 | 0,10546 | 0,09635 | 0,17014 | 1 | | | | | | | | | | | | |
| DP 14 | -0,02324 | -0,07690 | 0,12203 | 0,01308 | -0,16091 | -0,05440 | -0,18305 | 0,33528 | 0,24556 | 0,17039 | 0,37873 | 0,41614 | 0,40512 | 1 | | | | | | | | | | | |
| DP 15 | -0,27537 | -0,31068 | -0,21693 | -0,17437 | 0,33371 | -0,12087 | 0,21693 | 0,43968 | -0,27779 | -0,17817 | 0,12468 | -0,08312 | 0,59192 | 0,16876 | 1 | | | | | | | | | | |
| DP 16 | -0,02486 | -0,00748 | 0,13058 | 0,01399 | 0,17218 | -0,39774 | 0,19587 | 0,18232 | -0,35830 | 0,07507 | 0,40525 | 0,19512 | -0,04157 | -0,08127 | 0,36116 | 1 | | | | | | | | | |
| DP 17 | -0,31061 | -0,15681 | -0,37325 | 0,16001 | 0,07291 | -0,35741 | 0,37325 | 0,38480 | -0,04552 | -0,09538 | 0,10488 | 0,11759 | 0,41116 | 0,14626 | 0,61178 | 0,34063 | 1 | | | | | | | | |
| DP 18 | 0,42039 | 0,19218 | -0,21505 | 0,37798 | -0,22684 | -0,26201 | 0,00000 | 0,27508 | 0,61369 | 0,22608 | 0,03625 | 0,32629 | -0,14474 | -0,09815 | -0,31722 | -0,20049 | -0,07884 | 1 | | | | | | | |
| DP 19 | 0,24742 | -0,11891 | -0,27845 | 0,35811 | 0,08901 | -0,06018 | 0,22782 | 0,34432 | 0,34267 | -0,11643 | -0,34722 | -0,06013 | -0,24635 | -0,21531 | -0,28006 | -0,17419 | -0,04640 | 0,62558 | 1 | | | | | | |
| DP 20 | -0,50276 | -0,17017 | -0,09901 | -0,53060 | 0,17408 | -0,22068 | 0,09901 | -0,04460 | -0,28981 | -0,24398 | 0,22763 | 0,18969 | 0,54034 | 0,20541 | 0,54772 | 0,16485 | 0,41885 | -0,18099 | -0,29826 | 1 | | | | | |
| DP 21 | -0,08850 | -0,36550 | -0,14788 | 0,20830 | 0,29713 | -0,30135 | 0,31689 | 0,72506 | 0,02319 | -0,13187 | 0,27683 | 0,41929 | 0,19791 | 0,25858 | 0,23373 | 0,13600 | 0,34853 | 0,24405 | 0,34365 | 0,10668 | 1 | | | | |
| DP 22 | 0,16533 | -0,30137 | -0,17876 | 0,31749 | 0,17959 | -0,33391 | 0,12769 | 0,62801 | 0,06540 | -0,18458 | 0,20156 | 0,32681 | -0,00232 | 0,14304 | 0,23544 | 0,26643 | 0,21966 | 0,36223 | 0,43298 | -0,04299 | 0,52644 | 1 | | | |
| DP 23 | -0,08355 | 0,30424 | -0,15887 | -0,15567 | -0,11970 | -0,02698 | -0,11348 | -0,01431 | 0,09134 | 0,09693 | 0,07478 | 0,08174 | 0,45207 | 0,50379 | 0,25109 | -0,01511 | 0,45124 | -0,20909 | -0,39653 | 0,42023 | 0,07662 | -0,17538 | 1 | | |
| DP 24 | -0,18742 | -0,64579 | 0,02786 | -0,02388 | 0,44078 | -0,39737 | 0,36215 | 0,70515 | -0,47327 | -0,31117 | 0,06618 | 0,21134 | 0,00760 | 0,34097 | 0,25683 | 0,05565 | 0,30246 | 0,19961 | 0,26134 | 0,14067 | 0,71834 | 0,45231 | 0,01505 | 1 | |
| DP 25 | -0,38673 | -0,16865 | 0,03423 | 0,20545 | -0,06018 | -0,24414 | 0,30808 | 0,10176 | -0,06262 | -0,24742 | 0,00787 | 0,22821 | -0,06538 | 0,04971 | -0,25248 | 0,05319 | 0,19790 | 0,23527 | 0,16793 | 0,17286 | 0,26309 | 0,15158 | 0,18754 | 0,28207 | 1 |

**Table C.2:** Site B_ the Faculty of Architecture

| ± 0,5 | ± 0,6 & ± 0,7 | ± 0,8 & ± 0,9 | other correlations | ? | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DP 1 | DP 2 | DP 3 | DP 4 | DP 5 | DP 6 | DP 7 | DP 8 | DP 9 | DP 10 | DP 11 | DP 12 | DP 13 | DP14 | DP 15 | DP 16 | DP 17 | DP 18 | DP 19 | DP 20 | DP 21 | DP 22 | DP 23 | DP 24 | DP 25 |
| DP 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| DP 2 | 0,82243 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| DP 3 | 0,33211 | 0,16241 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| DP 4 | 0,53300 | 0,41703 | 0,19472 | 1 | | | | | | | | | | | | | | | | | | | | | |
| DP 5 | -0,24325 | -0,36386 | 0,18949 | -0,20135 | 1 | | | | | | | | | | | | | | | | | | | | |
| DP 6 | 0,39460 | 0,29277 | 0,68040 | 0,44676 | 0,04712 | 1 | | | | | | | | | | | | | | | | | | | |
| DP 7 | 0,08176 | 0,00000 | -0,11201 | -0,15339 | 0,00000 | -0,26922 | 1 | | | | | | | | | | | | | | | | | | |
| DP 8 | 0,01361 | 0,03992 | 0,31379 | -0,12765 | -0,08995 | 0,18126 | 0,46502 | 1 | | | | | | | | | | | | | | | | | |
| DP 9 | 0,07289 | -0,02376 | 0,32176 | 0,05698 | 0,24475 | 0,18910 | 0,21851 | 0,13819 | 1 | | | | | | | | | | | | | | | | |
| DP 10 | -0,01752 | -0,13712 | 0,09603 | 0,49320 | 0,25378 | 0,04197 | -0,12609 | -0,19935 | 0,19672 | 1 | | | | | | | | | | | | | | | |
| DP 11 | 0,21212 | 0,17782 | 0,32519 | 0,14213 | -0,06678 | 0,51253 | 0,05451 | -0,01361 | -0,03240 | 0,04673 | 1 | | | | | | | | | | | | | | |
| DP 12 | 0,12990 | -0,07260 | -0,03390 | -0,26112 | 0,57248 | -0,31108 | 0,33378 | -0,07777 | 0,32733 | 0,24325 | -0,16083 | 1 | | | | | | | | | | | | | |
| DP 13 | 0,30682 | 0,28896 | 0,18681 | 0,05330 | -0,15025 | 0,42182 | -0,49055 | -0,35378 | 0,04859 | -0,02629 | 0,39394 | -0,12990 | 1 | | | | | | | | | | | | |
| DP 14 | 0,15949 | -0,01200 | 0,05042 | 0,00000 | -0,10814 | 0,15058 | -0,17654 | -0,15058 | 0,04590 | 0,21758 | 0,43348 | 0,14024 | 0,66862 | 1 | | | | | | | | | | | |
| DP 15 | 0,21793 | 0,07853 | 0,31165 | -0,10760 | -0,21304 | 0,25924 | -0,10316 | 0,08412 | -0,02452 | -0,31840 | 0,24087 | -0,21540 | 0,35557 | 0,12693 | 1 | | | | | | | | | | |
| DP 16 | 0,51109 | 0,66648 | 0,47032 | 0,50850 | -0,06338 | 0,45667 | -0,30643 | 0,05332 | 0,09934 | -0,08360 | -0,04646 | -0,20233 | 0,14713 | -0,22155 | 0,03322 | 1 | | | | | | | | | |
| DP 17 | 0,43939 | 0,40010 | 0,60195 | 0,35533 | 0,12401 | 0,46717 | -0,32703 | -0,05896 | 0,04859 | 0,28040 | 0,19192 | 0,21031 | 0,28030 | 0,10633 | 0,08794 | 0,57304 | 1 | | | | | | | | |
| DP 18 | -0,07410 | -0,15703 | -0,01692 | -0,23171 | 0,10109 | -0,17377 | -0,35543 | -0,23292 | -0,05453 | -0,24761 | 0,07410 | -0,03025 | 0,22848 | 0,32001 | 0,25867 | -0,03787 | 0,03293 | 1 | | | | | | | |
| DP 19 | 0,18233 | 0,15284 | 0,30925 | -0,06108 | 0,14759 | 0,07017 | -0,04685 | 0,24171 | -0,13226 | -0,31131 | -0,26915 | 0,07443 | -0,08465 | -0,29526 | -0,20375 | 0,38162 | 0,12155 | 0,20524 | 1 | | | | | | |
| DP 20 | -0,15613 | -0,13088 | -0,25208 | 0,10461 | -0,21415 | -0,11851 | -0,26076 | -0,04841 | -0,27420 | 0,26657 | -0,19702 | -0,24585 | 0,12825 | 0,29798 | -0,15618 | -0,22228 | 0,02602 | 0,17271 | -0,37703 | 1 | | | | | |
| DP 21 | -0,20134 | 0,16662 | 0,06012 | -0,36322 | -0,08288 | -0,10895 | 0,08357 | 0,24804 | -0,26491 | -0,33439 | -0,05679 | -0,24027 | -0,26329 | -0,44728 | -0,28725 | 0,13456 | 0,04646 | -0,08837 | 0,19525 | 0,12729 | 1 | | | | |
| DP 22 | 0,28977 | 0,07729 | 0,48720 | 0,00000 | -0,09122 | 0,31149 | 0,23692 | 0,55596 | 0,16193 | -0,28438 | -0,11415 | -0,09679 | 0,00659 | -0,07821 | 0,42876 | 0,23786 | -0,07025 | -0,05726 | 0,46795 | -0,31992 | -0,14810 | 1 | | | |
| DP 23 | 0,43809 | 0,49611 | 0,15267 | 0,43259 | 0,22501 | 0,34856 | -0,04147 | -0,14150 | 0,13557 | -0,01778 | 0,33049 | 0,13178 | 0,02306 | -0,11824 | -0,17164 | 0,57743 | 0,40734 | 0,01879 | 0,05285 | -0,28567 | 0,01178 | -0,27394 | 1 | | |
| DP 24 | 0,55789 | 0,43916 | 0,50020 | 0,19147 | 0,08139 | 0,09980 | 0,22027 | 0,02240 | 0,35639 | -0,19935 | -0,05896 | 0,19998 | -0,04762 | -0,33420 | 0,11846 | 0,51695 | 0,30389 | -0,08503 | 0,51461 | -0,51577 | 0,06259 | 0,35881 | 0,34166 | 1 | |
| DP 25 | 0,47104 | 0,42230 | 0,33162 | 0,36823 | 0,22243 | 0,31139 | 0,00000 | -0,25264 | -0,04196 | -0,09080 | 0,31403 | 0,03205 | 0,21589 | -0,07416 | 0,06438 | 0,60855 | 0,37945 | 0,14932 | 0,26992 | -0,39966 | -0,00669 | 0,13650 | 0,62722 | 0,56991 | 1 |

**Table C.3:** Site C_ the Accommodation Zone: Dormitories

| ± 0,5 | ± 0,6 & ± 0,7 | ± 0,8 & ± 0,9 | other correlations | ? | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DP 1 | DP 2 | DP 3 | DP 4 | DP 5 | DP 6 | DP 7 | DP 8 | DP 9 | DP 10 | DP 11 | DP 12 | DP 13 | DP14 | DP 15 | DP 16 | DP 17 | DP 18 | DP 19 | DP 20 | DP 21 | DP 22 | DP 23 | DP 24 | DP 25 |
| DP 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| DP 2 | 0,53652 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| DP 3 | 0,05510 | 0,19094 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| DP 4 | 0,40273 | 0,28592 | 0,31524 | 1 | | | | | | | | | | | | | | | | | | | | | |
| DP 5 | 0,09101 | 0,01060 | 0,10180 | -0,19401 | 1 | | | | | | | | | | | | | | | | | | | | |
| DP 6 | -0,09240 | 0,12199 | 0,15972 | 0,17623 | 0,49665 | 1 | | | | | | | | | | | | | | | | | | | |
| DP 7 | -0,00574 | -0,03409 | -0,42652 | 0,13133 | -0,20819 | -0,17744 | 1 | | | | | | | | | | | | | | | | | | |
| DP 8 | -0,29356 | -0,14237 | -0,33140 | -0,53705 | -0,02415 | -0,23157 | 0,37966 | 1 | | | | | | | | | | | | | | | | | |
| DP 9 | -0,03374 | 0,18931 | -0,46657 | -0,13942 | -0,20402 | 0,04347 | 0,00810 | 0,32978 | 1 | | | | | | | | | | | | | | | | |
| DP 10 | -0,07955 | -0,03501 | -0,03056 | -0,28658 | 0,32068 | 0,47829 | -0,39462 | 0,01329 | 0,17465 | 1 | | | | | | | | | | | | | | | |
| DP 11 | 0,09959 | 0,51581 | -0,12359 | -0,11202 | -0,40147 | -0,17766 | 0,29790 | 0,03456 | 0,12975 | -0,11896 | 1 | | | | | | | | | | | | | | |
| DP 12 | 0,13530 | 0,01374 | -0,22789 | 0,11249 | -0,54546 | -0,34866 | -0,04497 | -0,21390 | 0,22525 | -0,00770 | 0,29130 | 1 | | | | | | | | | | | | | |
| DP 13 | 0,16112 | -0,02716 | 0,21334 | -0,38577 | 0,04146 | -0,34452 | 0,01481 | 0,19074 | -0,34838 | -0,25097 | 0,27026 | -0,17016 | 1 | | | | | | | | | | | | |
| DP 14 | -0,20095 | 0,60000 | -0,18526 | -0,12775 | -0,63006 | -0,26926 | 0,44377 | 0,06043 | 0,07563 | -0,20804 | 0,72983 | 0,29164 | 0,19596 | 1 | | | | | | | | | | | |
| DP 15 | 0,18900 | 0,11934 | 0,00947 | 0,14106 | -0,02577 | 0,31763 | -0,03551 | -0,04531 | 0,37114 | 0,05469 | 0,07198 | 0,28862 | -0,20506 | 0,02763 | 1 | | | | | | | | | | |
| DP 16 | 0,04700 | -0,18617 | -0,24803 | -0,06134 | -0,02327 | 0,09562 | 0,35986 | -0,07812 | -0,22346 | 0,21404 | 0,33456 | 0,15295 | -0,03619 | 0,47414 | 0,03572 | 1 | | | | | | | | | |
| DP 17 | -0,09648 | 0,18617 | -0,26513 | -0,26894 | -0,60862 | -0,32511 | 0,24585 | 0,11532 | 0,36313 | 0,00549 | 0,71193 | 0,40715 | 0,07876 | 0,82351 | 0,10035 | 0,44393 | 1 | | | | | | | | |
| DP 18 | -0,16519 | 0,15861 | 0,39803 | -0,27687 | 0,39687 | 0,15479 | -0,48304 | -0,02258 | -0,01413 | 0,18878 | 0,10588 | -0,07410 | 0,29720 | -0,18515 | -0,02409 | -0,08392 | 0,02176 | 1 | | | | | | | |
| DP 19 | -0,02896 | -0,10037 | 0,10013 | -0,09666 | 0,45728 | 0,27986 | -0,16685 | -0,15243 | -0,11241 | -0,06425 | -0,16706 | -0,16393 | 0,26166 | -0,34084 | 0,11947 | -0,11689 | -0,37764 | 0,60949 | 1 | | | | | | |
| DP 20 | -0,16519 | -0,13878 | -0,12114 | 0,00955 | -0,57849 | -0,11609 | 0,49025 | 0,20324 | 0,09185 | -0,47751 | 0,36254 | 0,01308 | 0,25413 | 0,69009 | 0,14799 | 0,10257 | 0,33258 | -0,41509 | -0,20923 | 1 | | | | | |
| DP 21 | 0,16142 | 0,08719 | -0,24099 | -0,33587 | 0,28594 | 0,34034 | -0,33817 | -0,08827 | 0,18641 | 0,52089 | 0,13168 | 0,11501 | -0,10102 | -0,19738 | 0,44394 | 0,21869 | -0,03645 | 0,22126 | 0,36003 | -0,28579 | 1 | | | | |
| DP 22 | 0,06242 | -0,18835 | -0,06165 | 0,47051 | 0,22766 | 0,02298 | 0,25256 | -0,04022 | -0,19297 | -0,52090 | -0,40195 | -0,08023 | -0,21227 | -0,32980 | 0,12056 | -0,16794 | -0,53336 | -0,19792 | 0,14044 | -0,01120 | -0,31749 | 1 | | | |
| DP 23 | -0,02896 | -0,31545 | -0,33792 | -0,37285 | -0,17513 | -0,33583 | 0,19813 | -0,09799 | -0,16350 | -0,06425 | 0,38981 | 0,34047 | 0,19936 | 0,58429 | -0,07965 | 0,73730 | 0,56647 | -0,07278 | -0,11842 | 0,20013 | 0,16001 | -0,23766 | 1 | | |
| DP 24 | 0,07863 | 0,25952 | -0,09061 | 0,19995 | -0,38741 | 0,60000 | -0,03775 | 0,60000 | 0,22195 | -0,29072 | 0,21838 | 0,29670 | -0,29318 | 0,15863 | 0,34237 | 0,08137 | 0,21156 | -0,16465 | -0,28578 | 0,19758 | 0,60000 | 0,17597 | 0,04763 | 1 | |
| DP 25 | -0,10730 | 0,20517 | 0,11513 | -0,19054 | 0,28341 | 0,42906 | -0,21850 | 0,11685 | 0,02089 | 0,41864 | -0,04980 | 0,06122 | -0,29610 | -0,18662 | 0,22641 | -0,04825 | -0,08960 | 0,03254 | -0,22863 | -0,24639 | 0,21807 | -0,10765 | -0,09414 | 0,12171 | 1 |

**Table C.4:** Site D_ CC&EE: The Bridge Building

| ± 0,5 | ± 0,6 & ± 0,7 | ± 0,8 & ± 0,9 | other correlations | ? | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DP 1 | DP 2 | DP 3 | DP 4 | DP 5 | DP 6 | DP 7 | DP 8 | DP 9 | DP 10 | DP 11 | DP 12 | DP 13 | DP14 | DP 15 | DP 16 | DP 17 | DP 18 | DP 19 | DP 20 | DP 21 | DP 22 | DP 23 | DP 24 | DP 25 |
| DP 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| DP 2 | 0,39244 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| DP 3 | 0,60000 | 0,47237 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| DP 4 | 0,11308 | 0,61260 | 0,32749 | 1 | | | | | | | | | | | | | | | | | | | | | |
| DP 5 | 0,37543 | 0,21876 | 0,10594 | -0,00625 | 1 | | | | | | | | | | | | | | | | | | | | |
| DP 6 | 0,06695 | 0,43628 | 0,23024 | 0,34202 | -0,36880 | 1 | | | | | | | | | | | | | | | | | | | |
| DP 7 | 0,18839 | 0,09593 | -0,09872 | -0,31426 | 0,52713 | -0,14729 | 1 | | | | | | | | | | | | | | | | | | |
| DP 8 | 0,03859 | -0,01720 | -0,14156 | -0,28094 | 0,31044 | -0,30117 | 0,77985 | 1 | | | | | | | | | | | | | | | | | |
| DP 9 | 0,60000 | 0,20568 | 0,08467 | 0,42423 | -0,16145 | 0,45615 | -0,33853 | -0,30563 | 1 | | | | | | | | | | | | | | | | |
| DP 10 | 0,01843 | 0,12320 | 0,16229 | 0,05979 | -0,52223 | 0,05044 | -0,32444 | 0,07754 | -0,01546 | 1 | | | | | | | | | | | | | | | |
| DP 11 | 0,08894 | -0,14633 | -0,30117 | -0,23079 | 0,12922 | -0,14978 | 0,38132 | 0,53719 | 0,25818 | -0,08248 | 1 | | | | | | | | | | | | | | |
| DP 12 | 0,19446 | -0,02000 | -0,12347 | 0,02911 | -0,07063 | 0,15009 | 0,02925 | 0,26567 | 0,47041 | 0,12022 | 0,70836 | 1 | | | | | | | | | | | | | |
| DP 13 | 0,11383 | 0,13372 | -0,15185 | -0,21707 | -0,02534 | 0,22341 | 0,00675 | -0,25312 | 0,24588 | -0,35348 | 0,04116 | 0,20248 | 1 | | | | | | | | | | | | |
| DP 14 | 0,28168 | -0,14120 | -0,30999 | -0,43400 | 0,48030 | -0,41753 | 0,51644 | 0,37850 | 0,05905 | -0,26884 | 0,55141 | 0,17223 | 0,25154 | 1 | | | | | | | | | | | |
| DP 15 | 0,34932 | 0,34857 | 0,10829 | 0,54579 | 0,16004 | 0,30069 | -0,12508 | -0,06668 | 0,68077 | -0,06920 | 0,33755 | 0,61770 | 0,16094 | 0,05665 | 1 | | | | | | | | | | |
| DP 16 | 0,47261 | 0,08132 | -0,41197 | 0,21553 | 0,10311 | 0,20061 | 0,01830 | -0,10716 | 0,33354 | -0,29146 | 0,32104 | 0,39674 | 0,22344 | 0,23346 | 0,64994 | 1 | | | | | | | | | |
| DP 17 | 0,31801 | 0,15661 | 0,04605 | 0,17915 | 0,11415 | -0,22137 | -0,39278 | -0,18383 | 0,31580 | 0,11770 | 0,22467 | 0,25243 | 0,03461 | 0,06424 | 0,39045 | 0,11524 | 1 | | | | | | | | |
| DP 18 | -0,05963 | 0,20370 | 0,40102 | 0,17622 | 0,07647 | 0,28405 | 0,12309 | 0,09599 | 0,22224 | -0,17306 | 0,08399 | 0,04861 | -0,15694 | -0,12714 | 0,06751 | -0,00338 | -0,32031 | 1 | | | | | | | |
| DP 19 | 0,04880 | 0,24589 | 0,24788 | 0,25084 | -0,14574 | 0,61980 | -0,21290 | -0,24037 | 0,64535 | 0,06788 | 0,01680 | 0,18975 | 0,01553 | -0,12967 | 0,13489 | -0,06319 | -0,03082 | 0,53408 | 1 | | | | | | |
| DP 20 | -0,16650 | -0,09945 | 0,03899 | -0,06205 | 0,23419 | -0,28760 | 0,14549 | 0,02152 | -0,28223 | -0,09253 | -0,32759 | -0,34080 | -0,02531 | 0,06798 | -0,27168 | -0,36680 | 0,03555 | -0,57052 | -0,31746 | 1 | | | | | |
| DP 21 | 0,17061 | -0,02172 | -0,35763 | -0,15284 | 0,00852 | 0,05187 | 0,23038 | 0,11771 | 0,30658 | -0,21220 | 0,43621 | 0,58947 | 0,72396 | 0,43652 | 0,43133 | 0,49310 | 0,05187 | -0,35789 | -0,17619 | 0,05333 | 1 | | | | |
| DP 22 | -0,07572 | 0,15183 | 0,04167 | 0,09825 | -0,19864 | 0,27629 | 0,03702 | 0,07078 | 0,22225 | 0,06086 | 0,19764 | 0,60000 | -0,19930 | -0,02906 | 0,04061 | 0,11587 | -0,10361 | 0,65622 | 0,34083 | -0,40936 | -0,33528 | 1 | | | |
| DP 23 | 0,17376 | 0,25440 | -0,13659 | 0,13956 | -0,12155 | 0,05283 | -0,00809 | -0,01547 | 0,34694 | 0,23275 | 0,35172 | 0,39800 | 0,31734 | 0,34932 | 0,32837 | 0,22789 | 0,35474 | -0,45414 | -0,02709 | 0,32590 | 0,57885 | 0,60000 | 1 | | |
| DP 24 | 0,21010 | 0,44134 | 0,37750 | 0,38665 | 0,22046 | 0,01173 | 0,02516 | 0,15832 | 0,48542 | 0,11200 | 0,28139 | 0,54532 | 0,26279 | 0,21393 | 0,53118 | -0,06342 | 0,32463 | 0,06503 | 0,25090 | -0,01159 | 0,38350 | -0,21234 | 0,40992 | 1 | |
| DP 25 | 0,51744 | 0,64777 | 0,45194 | 0,36232 | 0,41367 | 0,11987 | 0,13653 | 0,14587 | 0,44769 | 0,16502 | 0,25112 | 0,41515 | 0,11117 | 0,28370 | 0,49332 | 0,00838 | 0,38209 | 0,18980 | 0,42346 | -0,07612 | 0,16001 | 0,60000 | 0,38520 | 0,83683 | 1 |

**Table C.5:** Site E_ the Shopping Center: Çarşı

| ± 0,5 | ± 0,6 & ± 0,7 | ± 0,8 & ± 0,9 | other correlations | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DP 1 | DP 2 | DP 3 | DP 4 | DP 5 | DP 6 | DP 7 | DP 8 | DP 9 | DP 10 | DP 11 | DP 12 | DP 13 | DP14 | DP 15 | DP 16 | DP 17 | DP 18 | DP 19 | DP 20 | DP 21 | DP 22 | DP 23 | DP 24 | DP 25 |
| DP 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| DP 2 | 0,85578 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| DP 3 | 0,67306 | 0,71721 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| DP 4 | 0,68571 | 0,75380 | 0,58692 | 1 | | | | | | | | | | | | | | | | | | | | | |
| DP 5 | 0,04769 | 0,18400 | 0,28288 | 0,28447 | 1 | | | | | | | | | | | | | | | | | | | | |
| DP 6 | 0,03222 | 0,27599 | 0,16659 | 0,21731 | 0,05867 | 1 | | | | | | | | | | | | | | | | | | | |
| DP 7 | -0,01577 | 0,07332 | 0,10436 | 0,00443 | -0,20553 | -0,00448 | 1 | | | | | | | | | | | | | | | | | | |
| DP 8 | -0,18401 | -0,10836 | -0,25832 | -0,25461 | -0,26175 | -0,12859 | 0,28335 | 1 | | | | | | | | | | | | | | | | | |
| DP 9 | 0,55395 | 0,39343 | 0,36604 | 0,14854 | -0,01472 | 0,18438 | -0,16331 | -0,02859 | 1 | | | | | | | | | | | | | | | | |
| DP 10 | 0,16299 | 0,09579 | 0,04856 | 0,07729 | 0,04287 | -0,09066 | 0,15537 | -0,17924 | 0,19933 | 1 | | | | | | | | | | | | | | | |
| DP 11 | 0,26114 | 0,36937 | 0,26689 | 0,45408 | 0,34536 | 0,18980 | -0,34851 | -0,06254 | 0,11957 | 0,05389 | 1 | | | | | | | | | | | | | | |
| DP 12 | 0,29250 | 0,29281 | 0,19913 | 0,47674 | 0,25628 | -0,06854 | -0,24398 | -0,05560 | 0,04064 | 0,14590 | 0,80691 | 1 | | | | | | | | | | | | | |
| DP 13 | 0,12675 | 0,12441 | 0,07118 | 0,23385 | 0,26773 | -0,02215 | -0,47170 | 0,12843 | 0,18383 | 0,05945 | 0,80707 | 0,70214 | 1 | | | | | | | | | | | | |
| DP 14 | 0,34494 | 0,20434 | 0,14427 | 0,11849 | 0,02416 | -0,31011 | -0,14785 | -0,02868 | -0,03387 | 0,37749 | 0,31752 | 0,34813 | 0,35567 | 1 | | | | | | | | | | | |
| DP 15 | 0,18159 | 0,16077 | 0,20759 | 0,20042 | 0,20912 | -0,01360 | -0,50933 | -0,25090 | 0,08196 | 0,15817 | 0,67305 | 0,48075 | 0,68861 | 0,48123 | 1 | | | | | | | | | | |
| DP 16 | 0,02576 | 0,05635 | 0,06464 | 0,20997 | 0,30856 | 0,00731 | -0,53180 | -0,38559 | -0,15611 | 0,06343 | 0,54065 | 0,33517 | 0,50467 | 0,27407 | 0,83173 | 1 | | | | | | | | | |
| DP 17 | 0,30896 | 0,22889 | 0,18189 | 0,49301 | 0,35186 | -0,29427 | -0,26602 | -0,10741 | 0,04026 | 0,12621 | 0,62532 | 0,64593 | 0,64947 | 0,36355 | 0,53001 | 0,48870 | 1 | | | | | | | | |
| DP 18 | 0,26190 | 0,31083 | 0,36297 | 0,51952 | 0,31008 | 0,04920 | -0,01314 | -0,12969 | 0,26916 | 0,18194 | 0,43214 | 0,60460 | 0,31133 | -0,09178 | 0,09031 | 0,02146 | 0,42339 | 1 | | | | | | | |
| DP 19 | 0,10330 | 0,23031 | 0,37703 | 0,43572 | 0,26385 | -0,18551 | 0,38471 | 0,04315 | -0,31865 | -0,09351 | 0,25828 | 0,30509 | -0,00330 | 0,00974 | 0,11693 | 0,12434 | 0,39497 | 0,35284 | 1 | | | | | | |
| DP 20 | -0,04298 | -0,00696 | -0,17866 | -0,16464 | 0,13916 | -0,00542 | -0,26289 | -0,20014 | -0,02090 | -0,09183 | 0,09143 | 0,14224 | 0,15100 | 0,01452 | -0,10615 | 0,03903 | -0,04026 | -0,10209 | -0,37526 | 1 | | | | | |
| DP 21 | 0,12061 | 0,21753 | 0,52713 | 0,32591 | 0,34862 | 0,33161 | -0,10060 | -0,30406 | 0,22013 | -0,14589 | 0,41138 | 0,34077 | 0,19200 | -0,14794 | 0,30186 | 0,12105 | 0,08029 | 0,50585 | 0,30532 | -0,27142 | 1 | | | | |
| DP 22 | 0,06938 | 0,11200 | -0,10853 | -0,08171 | -0,35546 | -0,13506 | 0,67868 | 0,34417 | -0,22690 | 0,07902 | -0,41748 | -0,24656 | -0,44420 | 0,00000 | -0,51591 | -0,40499 | -0,20892 | -0,28344 | 0,08393 | 0,04671 | -0,62097 | 1 | | | |
| DP 23 | 0,44971 | 0,40483 | 0,46899 | 0,52278 | 0,53488 | 0,00000 | -0,29090 | -0,45059 | 0,21629 | 0,20231 | 0,57043 | 0,54675 | 0,31544 | 0,40917 | 0,51388 | 0,35002 | 0,54942 | 0,60200 | 0,37614 | -0,16067 | 0,55859 | -0,48994 | 1 | | |
| DP 24 | 0,55590 | 0,61116 | 0,44511 | 0,60439 | 0,36447 | 0,10480 | -0,06964 | -0,32889 | 0,16718 | 0,32668 | 0,61811 | 0,63147 | 0,36551 | 0,52098 | 0,45317 | 0,35315 | 0,39832 | 0,34713 | 0,21509 | 0,10800 | 0,26943 | -0,11361 | 0,62838 | 1 | |
| DP 25 | 0,55592 | 0,54470 | 0,42381 | 0,44479 | 0,09727 | 0,23441 | -0,41478 | -0,49154 | 0,35852 | 0,22333 | 0,39039 | 0,32401 | 0,21606 | 0,27570 | 0,40062 | 0,38979 | 0,16811 | 0,10486 | -0,14222 | 0,24797 | 0,23724 | -0,19996 | 0,39764 | 0,68384 | 1 |

**Table C.6:** TOTAL

eliminated

| | DP 1 | DP 2 | DP 3 | DP 4 | DP 5 | DP 6 | DP 7 | DP 8 | DP 9 | DP 10 | DP 11 | DP 12 | DP 13 | DP14 | DP 15 | DP 16 | DP 17 | DP 18 | DP 19 | DP 20 | DP 21 | DP 22 | DP 23 | DP 24 | DP 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **DP 1** | 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| **DP 2** | 0,99638 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| **DP 3** | 0,96958 | 0,96811 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| **DP 4** | 0,93633 | 0,95897 | 0,95095 | 1 | | | | | | | | | | | | | | | | | | | | | |
| **DP 5** | 0,22986 | 0,23362 | 0,12049 | 0,09181 | 1 | | | | | | | | | | | | | | | | | | | | |
| **DP 6** | 0,90944 | 0,92640 | 0,84543 | 0,92525 | 0,03871 | 1 | | | | | | | | | | | | | | | | | | | |
| **DP 7** | -0,31276 | -0,23567 | -0,33444 | -0,07176 | 0,27599 | -0,10405 | 1 | | | | | | | | | | | | | | | | | | |
| **DP 8** | -0,77969 | -0,75736 | -0,77043 | -0,62059 | -0,63584 | -0,47078 | 0,32956 | 1 | | | | | | | | | | | | | | | | | |
| **DP 9** | 0,31525 | 0,23697 | 0,25255 | 0,01992 | -0,13603 | 0,16473 | -0,94047 | -0,30210 | 1 | | | | | | | | | | | | | | | | |
| **DP 10** | -0,05382 | -0,11273 | -0,17080 | -0,27340 | -0,37972 | 0,02841 | -0,65284 | 0,25194 | 0,81093 | 1 | | | | | | | | | | | | | | | |
| **DP 11** | 0,95622 | 0,93828 | 0,97908 | 0,87150 | 0,16581 | 0,77145 | -0,48662 | -0,83858 | 0,41161 | -0,06452 | 1 | | | | | | | | | | | | | | |
| **DP 12** | 0,49704 | 0,52087 | 0,65959 | 0,62377 | 0,19536 | 0,28116 | 0,06192 | -0,61499 | -0,30914 | -0,77086 | 0,61001 | 1 | | | | | | | | | | | | | |
| **DP 13** | 0,46894 | 0,49669 | 0,39036 | 0,43444 | 0,91359 | 0,33843 | 0,40709 | -0,69762 | -0,31363 | -0,58089 | 0,36675 | 0,44276 | 1 | | | | | | | | | | | | |
| **DP 14** | -0,31075 | -0,27564 | -0,46805 | -0,31632 | 0,66764 | -0,20008 | 0,72225 | 0,12300 | -0,48255 | -0,23086 | -0,50327 | -0,34579 | 0,56276 | 1 | | | | | | | | | | | |
| **DP 15** | -0,25866 | -0,21212 | -0,16595 | -0,10061 | 0,49619 | -0,37783 | 0,67438 | -0,13013 | -0,78989 | -0,91729 | -0,22543 | 0,55016 | 0,54099 | 0,43101 | 1 | | | | | | | | | | |
| **DP 16** | -0,40505 | -0,34537 | -0,23439 | -0,06922 | -0,44766 | -0,25742 | 0,57425 | 0,52017 | -0,78430 | -0,60310 | -0,38007 | 0,34489 | -0,25049 | -0,09904 | 0,52187 | 1 | | | | | | | | | |
| **DP 17** | 0,74501 | 0,79032 | 0,65209 | 0,81239 | 0,42443 | 0,84584 | 0,36692 | -0,47345 | -0,25497 | -0,33984 | 0,54233 | 0,33636 | 0,71360 | 0,28419 | 0,07403 | -0,12951 | 1 | | | | | | | | |
| **DP 18** | 0,05057 | -0,00811 | -0,13031 | -0,28627 | 0,50058 | -0,08388 | -0,42110 | -0,30222 | 0,65909 | 0,59520 | 0,02873 | -0,53562 | 0,19352 | 0,32265 | -0,37355 | -0,92718 | -0,09709 | 1 | | | | | | | |
| **DP 19** | 0,22958 | 0,17232 | 0,06440 | -0,11030 | 0,62033 | 0,03206 | -0,44276 | -0,51788 | 0,65079 | 0,45797 | 0,22306 | -0,32645 | 0,35868 | 0,27637 | -0,28506 | -0,95515 | 0,03230 | 0,97172 | 1 | | | | | | |
| **DP 20** | 0,43492 | 0,48482 | 0,34529 | 0,48904 | 0,77377 | 0,44207 | 0,61719 | -0,48795 | -0,49997 | -0,60946 | 0,26039 | 0,36695 | 0,94226 | 0,63583 | 0,51453 | -0,06940 | 0,84269 | 0,00723 | 0,13986 | 1 | | | | | |
| **DP 21** | 0,85437 | 0,82158 | 0,75708 | 0,68024 | 0,03855 | 0,82205 | -0,59158 | -0,56086 | 0,68970 | 0,47091 | 0,79979 | 0,02017 | 0,14124 | -0,35173 | -0,69767 | -0,68919 | 0,50307 | 0,37771 | 0,46342 | 0,09904 | 1 | | | | |
| **DP 22** | -0,40326 | -0,37891 | -0,56236 | -0,44499 | 0,65333 | -0,31811 | 0,63891 | 0,15813 | -0,39564 | -0,14012 | -0,57009 | -0,43000 | 0,48584 | 0,98710 | 0,39284 | -0,15671 | 0,14477 | 0,41553 | 0,35070 | 0,52602 | -0,38730 | 1 | | | |
| **DP 23** | 0,87182 | 0,85465 | 0,79118 | 0,77215 | -0,08141 | 0,91040 | -0,47375 | -0,46268 | 0,55227 | 0,39394 | 0,78930 | 0,06816 | 0,10116 | -0,38119 | -0,68309 | -0,51826 | 0,59114 | 0,18115 | 0,26233 | 0,12831 | 0,97328 | -0,44445 | 1 | | |
| **DP 24** | 0,69027 | 0,74022 | 0,59320 | 0,77530 | 0,40321 | 0,82153 | 0,43055 | -0,40067 | -0,30924 | -0,34526 | 0,47275 | 0,29330 | 0,69409 | 0,33033 | 0,08730 | -0,08395 | 0,99634 | -0,12399 | -0,00911 | 0,84632 | 0,45330 | 0,18897 | 0,55202 | 1 | |
| **DP 25** | 0,94671 | 0,93952 | 0,87478 | 0,82372 | 0,52305 | 0,80144 | -0,23460 | -0,88887 | 0,29508 | -0,10381 | 0,88939 | 0,44767 | 0,68283 | -0,06114 | -0,11934 | -0,55853 | 0,76313 | 0,26802 | 0,45660 | 0,59747 | 0,79250 | -0,13839 | 0,75752 | 0,70670 | 1 |